बैठक सूचना:

विभागीय तकनीकी अनुमोदन समिति की बैठक दिनांक 18.07.2018 को अपराह्न 2.30 बजे समिति कक्ष, प्रांत कार्यालय, उत्तर प्रदेश भवन में आयोजित की गई है, जिसमें गुरुवार राष्ट्रीय संस्थान एवं जयपुर संस्थान राष्ट्रीय जिला परिषद के अधिवक्ता अभियंता (अभि.) समिति कक्ष में तथा चौथ संस्थान राष्ट्रीय जिला परिषद के अधिवक्ता अभियंता (अभि.) एनआईसी, वी.सी. के माध्यम से बैठक में उपस्थित होंगे। बैठक में निम्न अधिकारियों की उपस्थिति संदर्भ प्रातःनीय है—

1. अधिकारिक निदेशक, जल ग्रहण विकास एवं भू-संस्करण विकास।
2. अधिकृत अभियंता, प्रामाणिक विकास।
3. अधिकृत अभियंता (ईंजीएस), महानगरी गौरिनंदन।
4. अधिकृत अभियंता (पीएस), रायपुर राज।
5. निदेशक (तकनीकी), जयपुर विभाग विश्वसन विषय लिंकेटेड, जयपुर द्वारा मनोनीत तकनीकी सदस्य।
6. विभाग निदेशक (EC) राजस्थान अधिकृत जवाबदेह निगम लिए., ई-166, गुवाहाटी मार्ग, सी-स्की, जयपुर द्वारा मनोनीत तकनीकी सदस्य।
7. जयपुर संस्थान राष्ट्रीय जिला परिषद के अधिवक्ता अभियंता (अभि.), जिला परिषद जयपुर, (विभागीय समिति कक्ष में)।
8. अन्य संस्थान राष्ट्रीय जिला परिषद के अधिवक्ता अभियंता (अभि.), जिला परिषद अजमेर, भरतपुर, बैकोकर, कोटा, जोधपुर एवं उदयपुर (वी.सी. के माध्यम से जिला गृहमंत्री)।

बैठक में सौंप स्टीट लाइट के संदर्भ एवं आईपीआई द्वारा निर्मित 4 मॉडल के तकनीकी मापदंडों में से उपयुक्त तकनीकी मापदंडों के निर्धारण पर चर्चा।

कृपया बैठक में निर्धारित समय एवं तिथि पर उपस्थित होने का श्रम करें।

संबन्धी उपरोक्तातुसार

(के. के. शामी)
अधिकृत अभियंता (प्राप्ति)

प्रतिलिपि निम्न को सूचनार्थ एवं आवश्यक कार्यावली हेतु प्रस्तुत है—

1. निजी सचिव, प्रामुख सचिव, प्रामाणिक विकास एवं पंचायती राज विभाग।
2. निजी सचिव, शासन सचिव, पंचायती राज विभाग।
3. निजी सचिव, अयोध्या, महानगरी गौरिनंदन, प्रामाणिक विकास।
4. निजी सचिव, अयोध्या, जल प्रणाली विकास एवं भू-संस्करण विकास।
5. निजी सचिव, अयोध्या, भरतपुर, बैकोकर, जयपुर, कोटा, जोधपुर एवं उदयपुर।
6. अधिकृत निदेशक, जल प्रणाली विकास एवं भू-संस्करण विकास।
7. मुख्य तकनीकी अधिकारी, जिला परिषद अजमेर, भरतपुर, बैकोकर, जयपुर, कोटा, जोधपुर एवं उदयपुर के मेजबान निर्देशन के लिए निर्देशित करवें।
8. प्रथम निदेशक (EC) राजस्थान अधिकृत जवाबदेह निगम लिए., ई-166, गुवाहाटी मार्ग, सी-स्की, जयपुर।
9. निदेशक (तकनीकी), जयपुर विभाग विश्वसन विषय लिंकेटेड, जयपुर।
10. संयुक्त शासन सचिव (प्रशासन), प्रामाणिक विकास विभाग, राजस्थान, जयपुर।
11. अधिकृत अभियंता (ईंजीएस), महानगरी गौरीनंदन, प्रामाणिक विकास विभाग।
12. अधिकृत अभियंता (प्रो), पंचायती राज।
13. अधिकृत अभियंता (अभि.), जिला परिषद, अजमेर, भरतपुर, बैकोकर, जयपुर, कोटा, जोधपुर एवं उदयपुर।
14. अधिवक्ता अभियंता (टी.सी.), परित्यागार्जुन को मजबूर करने के लिए प्रतापगढ़ द्वारा तकनीकी मापदंड एवं मॉडल अभि. के प्रस्तावना (प्रेक्षण) करने का श्रम करें।
15. श्रीमान यादव, प्रमुख अधिकारी, एनआईसी, को निर्देशित समय पर वी.सी. के लिए आयोजन सुनिश्चित करने वाला।
16. प्रोग्राम, वादिता को विभागीय वेबसाइट पर अपलोड करने वाला।

अधिकृत अभियंता (प्राप्ति)
White LED (W-LED) Based Solar Street Lighting System Model-1

Supply and Installation of White LED (W-LED) Based Solar Street Lighting System complete in all respect with technical specification as per Annexure-1 having:

i. **PV Module** :- Indigenously manufactured having crystalline silicon solar cells, the power output of module under STC should be a minimum of 40 Wp at a load voltage* of 16.4 ± 0.2 V. The module efficiency should not be less than 12%.

ii. **Battery** :- Tubular Gel/VRLA type having 12 V- 40Ah at C/10 discharge rate.

iii. **Light Source** :- White Light Emitting Diode (W-LED), 7 Watt (max.). W-LED luminaries, dispersed beam, soothing to eyes with the use of proper optics and diffuser. The lamps should be housed in an assembly suitable for outdoor use.

iv. **Light Output** :- Minimum 16 Lux when measured at the periphery of 4 meter diameter from a height of 4 meter. The illumination should be uniform without dark bands or abrupt variations, and soothing to the eye. Higher light output will be preferred.

v. **Mounting of Light** :- Pole mounted, Minimum 5 mt. above the ground level.

vi. **Electronics Efficiency** :- The total electronic efficiency should be at least 85%.

vii. **Duty Cycle** :- Dusk to down.

viii. **Quality & Warranty** :- The complete Solar Street Light System (including battery) will be warranted for period of Five years from the date of supply. The PV module will be warranted for a minimum period of 25 years from the date of supply. The PV module must be warranted for their output peak that capacity, which should not be less than 90% at the end of Ten (10) years and 80% at the end of 25 years.
TECHNICAL SPECIFICATIONS FOR
SOLAR PHOTOVOLTAIC LIGHTING SYSTEMS & POWER PACKS
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- With Lead Acid Battery.
- Operates from dusk to dawn at full Brightness.

**BROAD PERFORMANCE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>PV Module</td>
<td>40 Wp under STC</td>
</tr>
<tr>
<td>Battery</td>
<td>Tubular GEL / VRLA, 12V- 40 AH @ C/10</td>
</tr>
<tr>
<td>Light Source</td>
<td>White Light Emitting Diode (W-LED)</td>
</tr>
<tr>
<td></td>
<td>7 Watt (Max.), W-LED luminaire, dispersed beam, soothing to eyes</td>
</tr>
<tr>
<td></td>
<td>with the use of proper optics and diffuser</td>
</tr>
<tr>
<td>Light Output</td>
<td>Minimum 16 Lux when measured at the periphery of 4 meter diameter from a</td>
</tr>
<tr>
<td></td>
<td>height of 4 meter. The illumination should be uniform without dark bands</td>
</tr>
<tr>
<td></td>
<td>or abrupt variations, and soothing to the eye. Higher light output will</td>
</tr>
<tr>
<td></td>
<td>be preferred.</td>
</tr>
<tr>
<td>Mounting of light</td>
<td>Pole mounted, Minimum 4 meters above the ground level</td>
</tr>
<tr>
<td>Electronics Efficiency</td>
<td>Minimum 85% total</td>
</tr>
<tr>
<td>Duty Cycle</td>
<td>Dusk to dawn at full brightness</td>
</tr>
<tr>
<td>Autonomy</td>
<td>3 days or Minimum 42 operating hours per permissible discharge</td>
</tr>
</tbody>
</table>
TECHNICAL SPECIFICATIONS FOR
SOLAR PHOTOVOLTAIC LIGHTING SYSTEMS & POWER PACKS
(Off-grid Solar Applications Scheme 2016-17)

TECHNICAL DETAILS

PV MODULE

i. Indigenously manufactured PV module should be used.

ii. The PV module should have crystalline silicon solar cells and must have a certificate of testing conforming to IEC 61215 Edition II / BIS 14286 from an NABL or IECQ accredited Laboratory.

iii. The power output of the module(s) under STC should be a minimum of 40 Wp at a load voltage* of 16.4 ± 0.2 V.

iv. The open circuit voltage* of the PV modules under STC should be at least 21.0 Volts.

v. The module efficiency should not be less than 12 %.

vi. The terminal box on the module should have a provision for opening it for replacing the cable, if required.

vii. There should be a Name Plate fixed inside the module which will give:
    a. Name of the Manufacturer or Distinctive Logo.
    b. Model Number
    c. Serial Number
    d. Year of manufacture

viii. A distinctive serial number starting with NSM will be engraved on the frame of the module or screen printed on the Tedlar sheet of the module.

*The load voltage and Voc conditions of the PV modules are not applicable for the system having MPPT based charge controller

BATTERY

i. Tubular Gel / VRLA Type.

ii. The battery will have a minimum rating of 12V, 40 Ah at C/10 discharge rate.

iii. 75 % of the rated capacity of the battery should be between fully charged and load cut off conditions.

iv. Battery should conform to the latest BIS/ International standards.
TECHNICAL SPECIFICATIONS FOR
SOLAR PHOTOVOLTAIC LIGHTING SYSTEMS & POWER PACKS
(Off-grid Solar Applications Scheme 2016-17)

LIGHT SOURCE

i. The light source will be a white LED type.
ii. The colour temperature of white LED used in the system should be in the range of 5500ºK–6500ºK.
iii. W-LEDs should not emit ultraviolet light.
iv. The light output from the white LED light source should be constant throughout the duty cycle.
v. The lamps should be housed in an assembly suitable for outdoor use.
vi. The temperature of heat sink should not increase more than 20ºC above ambient temperature during the dusk to dawn operation.

ELECTRONICS

i. The total electronic efficiency should be at least 85%.
ii. Electronics should operate at 12 V and should have temperature compensation for proper charging of the battery throughout the year.
iii. No load current consumption should be less than 20 mA.
iv. The PV module itself should be used to sense the ambient light level for switching ON and OFF the lamp.
v. The PCB containing the electronics should be capable of solder free installation and replacement.
vi. Necessary lengths of wires/cables, switches suitable for DC use and fuses should be provided.

ELECTRONIC PROTECTIONS

i. Adequate protection is to be incorporated under “No Load” conditions e.g. when the lamp is removed and the system is switched ON.
ii. The system should have protection against battery overcharge and deep discharge conditions.
iii. Fuse should be provided to protect against short circuit conditions.
iv. Protection for reverse flow of current through the PV module(s) should be provided.
v. Electronics should have temperature compensation for proper charging of the battery throughout the year.
vi. Adequate protection should be provided against battery reverse polarity.
vii. Load reconnect should be provided at 80% of the battery capacity status.
TECHNICAL SPECIFICATIONS FOR
SOLAR PHOTOVOLTAIC LIGHTING SYSTEMS & POWER PACKS
(Off-grid Solar Applications Scheme 2016-17)

MECHANICAL COMPONENTS

i. A corrosion resistant metallic frame structure should be fixed on the pole to hold the SPV module.

ii. The frame structure should have provision to adjust its angle of inclination to the horizontal, so that it can be installed at the specified tilt angle.

iii. The pole should be made of Galvanised Iron (GI) pipe.

iv. The height of the pole should be 4 metres above the ground level, after grouting and final installation.

v. The pole should have the provision to hold the luminaire.

vi. The lamp housing should be water proof and should be painted with a corrosion resistant paint.

vii. A vented, acid proof and corrosion resistant metallic box or plastic box [made of Polypropylene Copolymer (PP-CP)] with a locking arrangement for outdoor use should be provided for housing the battery.

INDICATORS

- The system should have two indicators, green and red.
- The green indicator should indicate the charging under progress and should glow only when the charging is taking place. It should stop glowing when the battery is fully charged.
- Red indicator should indicate the battery “Load Cut Off” condition.

QUALITY AND WARRANTY

i. The street lighting system (including the battery) will be warranted for a period of five years from the date of supply.

ii. The PV module(s) will be warranted for a minimum period of 25 years from the date of supply. The PV modules must be warranted for their output peak watt capacity, which should not be less than 90% at the end of Ten (10) years and 80% at the end of Twenty five (25) years.

iii. The Warranty Card to be supplied with the system must contain the details of the system.
OPERATION and MAINTENANCE MANUAL

An Operation, Instruction and Maintenance Manual, in English and the local language, should be provided with the Solar Street Lighting System. The following minimum details must be provided in the Manual:

- Basic principles of Photovoltaics.
- A small write-up (with a block diagram) on Solar Street Lighting System - its components, PV module, battery, electronics and luminaire and expected performance.
- Type, Model number, Voltage & capacity of the battery, used in the system.
- The make, model number, country of origin and technical characteristics (including IESNA LM-80 report) of W-LEDs used in the lighting system.
- About Charging and Significance of indicators.
- Clear instructions about erection of pole and mounting of PV module(s) and lamp housing assembly on the pole.
- Clear instructions on regular maintenance and trouble shooting of the Solar Street Lighting System.
- DO's and DON'T's.
- Name and address of the contact person for repair and maintenance, in case of non-functionality of the solar street lighting system.
White LED (W-LED) Based Solar Street Lighting System Model-II

Supply and Installation of White LED (W-LED) Based Solar Street Lighting System complete in all respect with technical specification as per Annexured having:

i. **PV Module** :- Indigenously manufactured having crystalline silicon solar cells, the power output of module under STC should be a minimum of 30 Wp at a load voltage* of 16.4 ± 0.2 V. The module efficiency should not be less than 12%.

ii. **Battery** :- Tubular Gel/VRLA type having 12 V- 40Ah at C/10 discharge rate.

iii. **Light Source** :- White Light Emitting Diode (W-LED), 7 Watt (max.), W-LED luminaries, dispersed beam, soothing to eyes with the use of proper optics and diffuser. The lamps should be housed in an assembly suitable for outdoor use.

iv. **Light Output** :- Minimum 16 Lux when measured at the periphery of 4 meter diameter from a height of 4 meter. The illumination should be uniform without dark bands or abrupt variations, and soothing to the eye. Higher light output will be preferred.

v. **Mounting of Light** :- Pole mounted, Minimum 5 mt. above the ground level.

vi. **Electronics Efficiency** :- The total electronic efficiency should be at least 85%.

vii. **Duty Cycle** :- Dusk to down. First Four hours at full brightness. And then rest of the time at lower light level, with motion sensor. In case if any movement is there, it senses it and glows to full level. Then it comes back to lower level after sometime, automatically.

viii. **Quality & Warranty** :- The complete Solar Street Light System (including battery) will be warranted for period of Five years from the date of supply. The PV module will be warranted for a minimum period of 25 years from the date of supply. The PV module must be warranted for their output peak that capacity, which should not be less than 90% at the end of Ten (10) years and 80% at the end of 25 years.
TECHNICAL SPECIFICATIONS FOR
SOLAR PHOTOVOLTAIC LIGHTING SYSTEMS & POWER PACKS
(Off-grid Solar Applications Scheme 2016-17)

MODEL - II

- With Lead Acid Battery
- Operates dusk to dawn, First 4 Hours at full Brightness, rest of the time at lower light level, with motion sensor.

BROAD PERFORMANCE SPECIFICATIONS

<table>
<thead>
<tr>
<th>PV Module</th>
<th>30 Wp under STC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery</td>
<td>Tubular GEL / VRLA, 12V- 20 AH @ C/20</td>
</tr>
<tr>
<td>Light Source</td>
<td>White Light Emitting Diode (W-LED) 7 Watt (Max.), W-LED luminaire, dispersed beam, soothing to eyes with the use of proper optics and diffuser</td>
</tr>
<tr>
<td>Light Out put</td>
<td>Multiple Light levels: The lamp should have two levels of light to take care of different lighting needs during the night. - Minimum 16 Lux when measured at the periphery of 4 meter diameter from a height of 4 meter (at “High” illumination level). The illumination should be uniform without dark bands or abrupt variations. - Minimum 8 lux at lower illumination level (Higher light output will be preferred)</td>
</tr>
<tr>
<td>Mounting of light</td>
<td>Pole mounted, Minimum 4 meters above the ground level</td>
</tr>
<tr>
<td>Electronics Efficiency</td>
<td>Minimum 85% total</td>
</tr>
<tr>
<td>Duty Cycle</td>
<td>Dusk to Dawn 4 Hours full light, rest of the time at lower light level, with motion sensor.  - In case any movement is there, it senses it and glows to full level.  - Then it comes back to lower level after sometime, automatically.</td>
</tr>
<tr>
<td>Autonomy</td>
<td>3 days or Minimum 42 operating hours per permissible discharge</td>
</tr>
</tbody>
</table>
TECHNICAL SPECIFICATIONS FOR
SOLAR PHOTOVOLTAIC LIGHTING SYSTEMS & POWER PACKS
(Off-grid Solar Applications Scheme 2016-17)

TECHNICAL DETAILS

PV MODULE

i. Indigenously manufactured PV module should be used.

ii. The PV module should have crystalline silicon solar cells and must have a certificate of testing conforming to IEC 61215 Edition II / BIS 14286 from an NABL or IECQ accredited Laboratory.

iii. The power output of the module(s) under STC should be a minimum of 40 Wp at a load voltage* of 16.4 ± 0.2 V.

iv. The open circuit voltage* of the PV modules under STC should be at least 21.0 Volts.

v. The module efficiency should not be less than 12 %.

vi. The terminal box on the module should have a provision for opening it for replacing the cable, if required.

vii. There should be a Name Plate fixed inside the module which will give:
    a. Name of the Manufacturer or Distinctive Logo.
    b. Model Number
    c. Serial Number
    d. Year of manufacture

viii. A distinctive serial number starting with NSM will be engraved on the frame of the module or screen printed on the Tedlar sheet of the module.

*The load voltage and Voc conditions of the PV modules are not applicable for the system having MPPT based charge controller.

BATTERY

i. Tubular Gel / VRLA Type.

ii. The battery will have a minimum rating of 12V, 20 Ah at C/20 discharge rate.

iii. 75% of the rated capacity of the battery should be between fully charged and load cutoff conditions.

Battery should conform to the latest BIS/ international standards.
TECHNICAL SPECIFICATIONS FOR
SOLAR PHOTOVOLTAIC LIGHTING SYSTEMS & POWER PACKS
(Off-grid Solar Applications Scheme 2016-17)

LIGHT SOURCE

i. The light source will be a white LED type.
ii. The colour temperature of white LED used in the system should be in the range of 5500°K–6500°K.
iii. W-LEDs should not emit ultraviolet light.
iv. The light output from the white LED light source should be constant throughout the duty cycle.
v. The lamps should be housed in an assembly suitable for outdoor use.
vi. The temperature of heat sink should not increase more than 20°C above ambient temperature during the dusk to dawn operation.

ELECTRONICS

i. The total electronic efficiency should be at least 85%.
ii. Electronics should operate at 12 V and should have temperature compensation for proper charging of the battery throughout the year.
iii. No load current consumption should be less than 20 mA.
iv. The PV module itself should be used to sense the ambient light level for switching ON and OFF the lamp.
v. The PCB containing the electronics should be capable of solder free installation and replacement.
vi. Necessary lengths of wires/cables, switches suitable for DC use and fuses should be provided.

ELECTRONIC PROTECTIONS

i. Adequate protection is to be incorporated under “No Load” conditions e.g. when the lamp is removed and the system is switched ON.
ii. The system should have protection against battery overcharge and deep discharge conditions.
iii. Fuse should be provided to protect against short circuit conditions.
iv. Protection for reverse flow of current through the PV module(s) should be provided.
v. Electronics should have temperature compensation for proper charging of the battery throughout the year.
vi. Adequate protection should be provided against battery reverse polarity.
vii. Load reconnect should be provided at 80% of the battery capacity status.
TECHNICAL SPECIFICATIONS FOR
SOLAR PHOTOVOLTAIC LIGHTING SYSTEMS & POWER PACKS
(Off-grid Solar Applications Scheme 2016-17)

MECHANICAL COMPONENTS

i. A corrosion resistant metallic frame structure should be fixed on the pole to hold the SPV module.

ii. The frame structure should have provision to adjust its angle of inclination to the horizontal, so that it can be installed at the specified tilt angle.

iii. The pole should be made of Galvanised Iron (GI) pipe.

iv. The height of the pole should be 4 metres above the ground level, after grouting and final installation.

v. The pole should have the provision to hold the luminaire.

vi. The lamp housing should be water proof and should be painted with a corrosion resistant paint.

vii. A vented, acid proof and corrosion resistant metallic box or plastic box [made of Polypropylene Copolymer (PP-CP)] with a locking arrangement for outdoor use should be provided for housing the battery.

INDICATORS

- The system should have two indicators, green and red.
- The green indicator should indicate the charging under progress and should glow only when the charging is taking place. It should stop glowing when the battery is fully charged.
- Red indicator should indicate the battery “Load Cut Off” condition.

QUALITY AND WARRANTY

i. The street lighting system (including the battery) will be warranted for a period of five years from the date of supply.

ii. The PV module(s) will be warranted for a minimum period of 25 years from the date of supply. The PV modules must be warranted for their output peak watt capacity, which should not be less than 90% at the end of Ten (10) years and 80% at the end of Twenty five (25) years.

iii. The Warranty Card to be supplied with the system must contain the details of the system.
TECHNICAL SPECIFICATIONS FOR
SOLAR PHOTOVOLTAIC LIGHTING SYSTEMS & POWER PACKS
(Off-grid Solar Applications Scheme 2016-17)

An Operation, Instruction and Maintenance Manual, in English and the local language, should be provided with the Solar Street Lighting System. The following minimum details must be provided in the Manual:

- Basic principles of Photovoltaics.
- A small write-up (with a block diagram) on Solar Street Lighting System - its components, PV module, battery, electronics and luminaire and expected performance.
- Type, Model number, Voltage & capacity of the battery, used in the system.
- The make, model number, country of origin and technical characteristics (including IESNA LM-80 report) of W-LEDs used in the lighting system.
- About Charging and Significance of indicators.
- Clear instructions about erection of pole and mounting of PV module(s) and lamp housing assembly on the pole.
- Clear instructions on regular maintenance and trouble shooting of the Solar Street Lighting System.
- DO's and DON'T's.
- Name and address of the contact person for repair and maintenance, in case of non-functionality of the solar street lighting system.
White LED (W-LED) Based Solar Street Lighting System Model-III

Supply and Installation of White LED (W-LED) Based Solar Street Lighting System complete in all respect with technical specification as per Annexure-I having:

i. **PV Module** :- Indigenously manufactured having crystalline silicon solar cells, the power output of module under STC should be a minimum of 40 Wp at a load voltage* of 16.4 ± 0.2 V. The module efficiency should not be less than 12%.

ii. **Battery** :- Minimum 160 Wh capacity Lithium Ferro Phosphate Battery, confirming to the latest BIS/International standards.

iii. **Light Source** :- White Light Emitting Diode (W-LED), 7 Watt (max.), W-LED luminaries, dispersed beam, soothing to eyes with the use of proper optics and diffuser. The lamps should be housed in an assembly suitable for outdoor use.

iv. **Light Output** :- Minimum 16 Lux when measured at the periphery of 4 meter diameter from a height of 4 meter. The illumination should be uniform without dark bands or abrupt variations, and soothing to the eye. Higher light output will be preferred.

v. **Mounting of Light** :- Pole mounted, Minimum 5 mt. above the ground level.

vi. **Electronics Efficiency** :- The total electronic efficiency should be at least 85%.

vii. **Duty Cycle** :- Dusk to down.

viii. **Quality & Warranty** :- The complete Solar Street Light System (including battery) will be warranted for period of Five years from the date of supply. The PV module will be warranted for a minimum period of 25 years from the date of supply. The PV module must be warranted for their output peak that capacity, which should not be less than 90% at the end of Ten (10) years and 80% at the end of 25 years.
TECHNICAL SPECIFICATIONS FOR
SOLAR PHOTOVOLTAIC LIGHTING SYSTEMS & POWER PACKS
(Off-grid Solar Applications Scheme 2016-17)

MODEL-III

- With Lithium Ferro phosphate Battery;
- Operates from dusk to dawn at full Brightness

BROAD PERFORMANCE SPECIFICATIONS

<p>| | |</p>
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<tbody>
<tr>
<td>PV Module</td>
<td>40 Wp under STC</td>
</tr>
<tr>
<td>Battery</td>
<td>Minimum 160 Wh Lithium Ferro phosphate battery</td>
</tr>
<tr>
<td>Light Source</td>
<td>White Light Emitting Diode (W-LED) 7 Watt (Max.), W-LED luminaire, dispersed beam, soothing to eyes with the use of proper optics and diffuser</td>
</tr>
<tr>
<td>Light Out put</td>
<td>Minimum 16 Lux when measured at the periphery of 4 meter diameter from a height of 4 meter. The illumination should be uniform without dark bands or abrupt variations, and soothing to the eye. Higher light output will be preferred.</td>
</tr>
<tr>
<td>Mounting of light</td>
<td>Pole mounted, Minimum 5 meters above the ground level</td>
</tr>
<tr>
<td>Electronics Efficiency</td>
<td>Minimum 85% total</td>
</tr>
<tr>
<td>Duty Cycle</td>
<td>Dusk to dawn</td>
</tr>
</tbody>
</table>
TECHNICAL SPECIFICATIONS FOR
SOLAR PHOTOVOLTAIC LIGHTING SYSTEMS & POWER PACKS
(Off-grid Solar Applications Scheme 2016-17)

TECHNICAL DETAILS

PV MODULE

i. Indigenously manufactured PV module should be used.

ii. The PV module should have crystalline silicon solar cells and must have a certificate of testing conforming to IEC 61215 Edition II / BIS 14286 from an NABL or IECQ accredited Laboratory.

iii. The power output of the module(s) under STC should be a minimum of 40 Wp at a load voltage* of 16.4 ± 0.2 V.

iv. The open circuit voltage* of the PV modules under STC should be at least 21.0 Volts.

v. **The module efficiency should not be less than 12 %.**

vi. The terminal box on the module should have a provision for opening it for replacing the cable, if required.

vii. There should be a Name Plate fixed inside the module which will give:
    a. Name of the Manufacturer or Distinctive Logo.
    b. Model Number
    c. Serial Number
    d. Year of manufacture

viii. A distinctive serial number starting with NSM will be engraved on the frame of the module or screen printed on the tedar sheet of the module.

*The load voltage and Voc conditions of the PV modules are not applicable for the system having MPPT based charge controller

BATTERY

i. Minimum 160 Wh capacity Lithium Ferro Phosphate Battery.

ii. Battery should conform to the latest BIS/ International standards.
TECHNICAL SPECIFICATIONS FOR
SOLAR PHOTOVOLTAIC LIGHTING SYSTEMS & POWER PACKS
(Off-grid Solar Applications Scheme 2016-17)

LIGHT SOURCE

i. The light source will be a white LED type.
ii. The colour temperature of white LED used in the system should be in the range of 5500°K–6500°K.
iii. W-LEDs should not emit ultraviolet light.
iv. The light output from the white LED light source should be constant throughout the duty cycle.
v. The lamps should be housed in an assembly suitable for outdoor use.
vi. The temperature of heat sink should not increase more than 20°C above ambient temperature during the dusk to dawn operation.

ELECTRONICS

i. The total electronic efficiency should be at least 85%.
ii. Electronics should operate at 12 V and should have temperature compensation for proper charging of the battery throughout the year.
iii. No Load current consumption should be less than 20 mA.
iv. The PV module itself should be used to sense the ambient light level for switching ON and OFF the lamp.
v. The PCB containing the electronics should be capable of solder free installation and replacement.
vi. Necessary lengths of wires/cables, switches suitable for DC use and fuses should be provided.

ELECTRONIC PROTECTIONS

i. Adequate protection is to be incorporated under “No Load” conditions e.g. when the lamp is removed and the system is switched ON.
ii. The system should have protection against battery overcharge and deep discharge conditions.
iii. Fuse should be provided to protect against short circuit conditions.
TECHNICAL SPECIFICATIONS FOR
SOLAR PHOTOVOLTAIC LIGHTING SYSTEMS & POWER PACKS
(Off-grid Solar Applications Scheme 2016-17)

iv. Protection for reverse flow of current through the PV module(s) should be provided.
v. Electronics should have temperature compensation for proper charging of the battery throughout the year.
vi. Adequate protection should be provided against battery reverse polarity.
vii. Load reconnect should be provided at 80% of the battery capacity status.

MECHANICAL COMPONENTS

(i) A corrosion resistant metallic frame structure should be fixed on the pole to hold the SPV module.
(ii) The frame structure should have provision so that the module can be oriented at the suitable tilt angle.
(iii) The pole should be made of Galvanised Iron (GI) pipe.
(iv) The height of the pole should be 5 metres above the ground level, after grouting and final installation.
(v) The pole should have the provision to hold the luminaire.
(vi) The Luminaire housing should be water proof (IP 65) and should be painted with a corrosion resistant paint and should be housing the battery. Alternatively, a vented, acid proof and corrosion resistant metallic box or plastic box [made of Polypropylene-Copolymer (PP-CP)] with a locking arrangement for outdoor use should be provided for housing the battery.

INDICATORS

- The system should have two indicators, green and red.
- The green indicator should indicate the charging under progress and should glow only when the charging is taking place. It should stop glowing when the battery is fully charged.
- Red indicator should indicate the battery "Load Cut Off" condition.

QUALITY AND WARRANTY

i. The street lighting system (including the battery) will be warranted for a period of five years from the date of supply.
TECHNICAL SPECIFICATIONS FOR
SOLAR PHOTOVOLTAIC LIGHTING SYSTEMS & POWER PACKS
(Off-grid Solar Applications Scheme 2016-17)

ii. The PV module(s) will be warranted for a minimum period of 25 years from the date of supply. The PV modules must be warranted for their output peak watt capacity, which should not be less than 90% at the end of Ten (10) years and 80% at the end of Twenty five (25) years.

iii. The Warranty Card to be supplied with the system must contain the details of the system.

OPERATION and MAINTENANCE MANUAL

An Operation, Instruction and Maintenance Manual, in English and the local language, should be provided with the Solar Street Lighting System. The following minimum details must be provided in the Manual:

- Basic principles of Photovoltaics.
- A small write-up (with a block diagram) on Solar Street Lighting System – its components, PV module, battery, electronics and luminaire and expected performance.
- Type, Model number. Voltage & capacity of the battery, used in the system.
- The make, model number, country of origin and technical characteristics (including IESNA LM-80 report) of W-LEDs used in the lighting system.
- About Charging and Significance of indicators.
- Clear instructions about erection of pole and mounting of PV module(s) and lamp housing assembly on the pole.
- Clear instructions on regular maintenance and trouble shooting of the Solar Street Lighting System.
- DO's and DON'T's.
- Name and address of the contact person for repair and maintenance, in case of non-functionality of the solar street lighting system.
Supply and Installation of White LED (W-LED) Based Solar Street Lighting System complete in all respect with technical specification as per Annexure-I having:

i. **PV Module**: Indigenously manufactured having crystalline silicon solar cells, the power output of module under STC should be a minimum of 30 Wp at a load voltage* of 16.4 ± 0.2 V. The module efficiency should not be less than 12%.

ii. **Battery**: Minimum 120 Wh capacity Lithium Ferro Phosphate Battery, confirming to the latest BIS/International standards.

iii. **Light Source**: White Light Emitting Diode (W-LED), 7 Watt (max.), W-LED luminaries, dispersed beam, soothing to eyes with the use of proper optics and diffuser. The lamps should be housed in an assembly suitable for outdoor use.

iv. **Light Output**: Minimum 16 Lux when measured at the periphery of 4 meter diameter from a height of 4 meter. The illumination should be uniform without dark bands or abrupt variations, and soothing to the eye. Higher light output will be preferred.

v. **Mounting of Light**: Pole mounted, Minimum 5 mt. above the ground level.

vi. **Electronics Efficiency**: The total electronic efficiency should be at least 85%.

vii. **Duty Cycle**: Dusk to down. First Four hours at full brightness. And then, rest of the time at lower light level, with motion sensor. In case if any movement is there, it senses it and glows to full level. Then it comes back to lower level after sometime, automatically.

viii. **Quality & Warranty**: The complete Solar Street Light System (including battery) will be warranted for period of Five years from the date of supply. The PV module will be warranted for a minimum period of 25 years from the date of supply. The PV module must be warranted for their output peak that capacity, which should not be less than 90% at the end of Ten (10) years and 80% at the end of 25 years.
TECHNICAL SPECIFICATIONS FOR
SOLAR PHOTOVOLTAIC LIGHTING SYSTEMS & POWER PACKS
(Off-grid Solar Applications Scheme 2016-17)

MODEL-IV

- With Lithium Ferro phosphate Battery
- Operates dusk to dawn, First 4 Hours at full Brightness, rest of the time at lower light level, with motion sensor.

BROAD PERFORMANCE SPECIFICATIONS

<table>
<thead>
<tr>
<th>PV Module</th>
<th>30 Wp under STC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery</td>
<td>Minimum 120 Wh Lithium Ferro phosphate battery</td>
</tr>
<tr>
<td>Light Source</td>
<td>White Light Emitting Diode (W-LED)</td>
</tr>
<tr>
<td></td>
<td>7 Watt (Max.), W-LED luminaire, dispersed beam, soothing to eyes with the use of proper optics and diffuser</td>
</tr>
<tr>
<td>Light Out put</td>
<td>Multiple Light levels:</td>
</tr>
<tr>
<td></td>
<td>The lamp should have two levels of light to take care of different lighting needs during the night.</td>
</tr>
<tr>
<td></td>
<td>- Minimum 16 Lux when measured at the periphery of 4 meter diameter from a height of 4 meter (at &quot;High&quot; illumination level). The illumination should be uniform without dark bands or abrupt variations.</td>
</tr>
<tr>
<td></td>
<td>- Minimum 8 lux at lower illumination level (Higher light output will be preferred)</td>
</tr>
<tr>
<td>Mounting of light</td>
<td>Pole mounted, Minimum 5 meters above the ground level</td>
</tr>
<tr>
<td>Electronics</td>
<td>Overall total Efficiency of the Electronics should be Minimum 90%</td>
</tr>
<tr>
<td>Duty Cycle</td>
<td>Dusk to Dawn</td>
</tr>
<tr>
<td></td>
<td>4 Hours full light, rest of the time at lower light level, with motion sensor.</td>
</tr>
<tr>
<td></td>
<td>- In case any movement is there, it senses it and glows to full level</td>
</tr>
<tr>
<td></td>
<td>- Then it comes back to lower level after sometime, automatically</td>
</tr>
</tbody>
</table>
TECHNICAL SPECIFICATIONS FOR
SOLAR PHOTOVOLTAIC LIGHTING SYSTEMS & POWER PACKS
(Off-grid Solar Applications Scheme 2016-17)

TECHNICAL DETAILS

PV MODULE

i. Indigenously manufactured PV modules should be used.
ii. The power output of the module under STC should be a minimum of 30 Wp.

iii. The PV module should be made up of crystalline silicon solar cells and must have a certificate of testing conforming to IEC 61215 Edition II / BIS 14286 from an NABL or IECQ accredited Laboratory.

iv. The Load voltage* of 16.40 V for 12 V battery or appropriate voltage for charging of battery used, under the standard test conditions (STC) of measurement.

v. The module efficiency should not be less than 12 %.

vi. The terminal box on the module should have a provision for opening, for replacing the cable, if required.

vii. There should be a Name Plate fixed inside the module which will give:
   a. Name of the Manufacturer or Distinctive Logo.
   b. Model Number
   c. Serial Number
   d. Year of manufacture

viii. A distinctive serial number starting with NSM will be engraved on the frame of the module or screen printed on the Tedlar sheet of the module.

*The Load voltage conditions of the PV modules are not applicable for the system having MPPT.

BATTERY

i. Minimum 120 Wh Lithium Ferro Phosphate Battery.
ii. Battery should conform to the latest BIS/ International standards.
TECHNICAL SPECIFICATIONS FOR
SOLAR PHOTOVOLTAIC LIGHTING SYSTEMS & POWER PACKS
(Off-grid Solar Applications Scheme 2016-17)

LIGHT SOURCE

i. The light source will be of white LED type.

ii. The colour temperature of W-LEDs used in the system should be in the range of 5500°K-6500°K.

iii. LEDs should not emit ultraviolet light.

iv. The light output from the W-LED light source should be constant throughout the duty cycle.

v. The lamps should be housed in an assembly suitable for outdoor use.

ELECTRONICS

i. The total electronic efficiency should be at least 85 %.

ii. The idle current should be less than 10ma

iii. The voltage drop from module terminals to the battery terminals should not exceed 0.8 volts including the drop across the diode and the cable when measured at maximum charging current.

iv. The PCB containing the electronics should be capable of solder free installation and replacement.

ELECTRONIC PROTECTIONS

i. The system should have protection against battery overcharge, deep discharge condition.

ii. Adequate protection should be provided against battery reverse polarity.

iii. Fuses should be provided to protect against short circuit conditions. Fuse is not mandatory, in case, over current protection is provided in the driver circuit.

iv. Protection for reverse flow of current through the PV module(s) should be provided.

MECHANICAL COMPONENTS

i. A corrosion resistant metallic frame structure should be fixed on the pole to hold the SPV module.
TECHNICAL SPECIFICATIONS FOR
SOLAR PHOTOVOLTAIC LIGHTING SYSTEMS & POWER PACKS
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ii. The frame structure should have provision so that the module can be oriented at the
suitable tilt angle.

iii. The pole should be made of Galvanised Iron (GI) pipe.

iv. The height of the pole should be 5 metres above the ground level, after grouting and
final installation.

v. The pole should have the provision to hold the luminaire.

vi. The Luminaire housing should be water proof (IP 65) and should be painted with a
corrosion resistant paint and should be housing the battery.
Alternatively:
A vented, acid proof and corrosion resistant metallic box or plastic box [made of
Polypropylene-Copolymer (PP-CP)] with a locking arrangement for outdoor use should be
provided for housing the battery.

INDICATORS

• The system should have two indicators, green and red.
• The green indicator should indicate the charging under progress and should glow only
when the charging is taking place. It should stop glowing when the battery is fully
charged.
• Red indicator should indicate the battery “Load Cut Off” condition

QUALITY AND WARRANTY

i. The complete Solar Street Lighting System (including battery) will be warranted for a
period of Five years from the date of supply.

ii. The PV module(s) will be warranted for a minimum period of 25 years from the date
of supply. PV modules used in Solar Home Lighting System must be warranted for their
output peak watt capacity, which should not be less than 90% at the end of Ten (10)
years and 80% at the end of Twenty five (25) years.

iii. The Warranty Card to be supplied with the system must contain the details of the
system. The manufacturers can also provide additional information about the system
and conditions of warranty as necessary.
TECHNICAL SPECIFICATIONS FOR
SOLAR PHOTOVOLTAIC LIGHTING SYSTEMS & POWER PACKS
(Off-grid Solar Applications Scheme 2016-17)

OPERATION and MAINTENANCE MANUAL

An Operation, Instruction and Maintenance Manual, in English and the local language, should be provided with the Solar Home Lighting System. The following minimum details must be provided in the Manual:

- Basic principles of Photovoltaics.
- A small write-up (with a block diagram) on Solar Home Lighting System - its components, PV module, battery, electronics and luminaire and expected performance.
- Significance of indicators.
- Type, Model number, voltage & capacity of the battery, used in the system.
- The make, model number, country of origin and technical characteristics (including IESNA LM-80 report) of W-LEDs used in the lighting system must be indicated in the manual.
- Clear instructions about mounting of PV module(s).
- Clear instructions on regular maintenance and trouble shooting of the Solar Home Lighting System.
- DO's and DON'T's.