

राजस्थान सरकार
ग्रामीण विकास एवं पंचायती राज विभाग
(ग्रामीण विकास, अनुभाग-5)

एफ 27(213) ग्राविदि/ग्रुप-5/पीएमएवाई-जी/अभि./तक. अनु.समिति/2018-19 जयपुर, दिनांक 11 जुलाई. 2018

--: बैठक सूचना :-

विभागीय तकनीकी अनुमोदन समिति की बैठक दिनांक 18.07.2018 को अपरान्ह 2.30 बजे समिति कक्ष, प्रथम तल, उत्तर पश्चिम भवन में आहुत की गई है, जिसमें मुख्यालय स्तरीय सदस्य एवं जयपुर संभाग स्तरीय जिला परिषद के अधिशाषी अभियंता (अभि.)समिति कक्ष में तथा शेष संभाग स्तरीय जिला परिषद के अधिशाषी अभियंता (अभि.) एनआईसी, वी.सी. के माध्यम से बैठक में उपस्थित होंगे। बैठक में निम्न अधिकारियों की उपस्थिति सादर प्रार्थनीय है-

1. अतिरिक्त निदेशक, जल ग्रहण विकास एवं भू-संरक्षण विभाग।
2. अधीक्षण अभियन्ता, ग्रामीण विकास।
3. अधीक्षण अभियन्ता (ईजीएस), महात्मा गाँधी नरेगा।
4. अधीक्षण अभियन्ता (प्रो), पंचायती राज।
5. निदेशक (तकनीकी), जयपुर विद्युत वितरण निगम लिमिटेड, जयपुर द्वारा मनोनीत तकनीकी सदस्य।
6. प्रबन्ध निदेशक (EC) राजस्थान अक्षय ऊर्जा निगम लि., ई-166, युधिष्ठिर मार्ग, सी-स्कीम, जयपुर द्वारा मनोनीत तकनीकी सदस्य।
7. जयपुर संभाग स्तरीय जिले के अधिशाषी अभियंता (अभि.), जिला परिषद जयपुर, (विभागीय समिति कक्ष में)।
8. अन्य संभाग स्तरीय जिलों के अधिशाषी अभियंता (अभि.), जिला परिषद अजमेर, भरतपुर, बीकानेर, कोटा, जोधपुर एवं उदयपुर (वी.सी. के माध्यम से जिला मुख्यालय)।

बैठक में सोलर स्ट्रीट लाईट के लिए एमएनआरई द्वारा निर्धारित 4 मॉडलों के तकनीकी मापदण्डों में से उपयुक्त तकनीकी मापदण्डों के निर्धारण पर चर्चा।

कृपया बैठक में निर्धारित समय एवं तिथि पर उपस्थित होने का श्रम करें।
संलग्न :- उपरोक्तानुसार

(के. के. शर्मा)

अधीक्षण अभियन्ता (ग्रावि)

प्रतिलिपि निम्न को सूचनार्थ एवं आवश्यक कार्यवाही हेतु प्रेषित है:-

1. निजी सचिव, प्रमुख सचिव, ग्रामीण विकास एवं पंचायती राज विभाग।
2. निजी सचिव, शासन सचिव, पंचायती राज विभाग।
3. निजी सचिव, आयुक्त, महात्मा गांधी नरेगा, ग्रामीण विकास।
4. निजी सचिव, आयुक्त, जल ग्रहण विकास एवं भू-संरक्षण विभाग।
5. जिला कलेक्टर, अजमेर, भरतपुर, बीकानेर, जयपुर, कोटा, जोधपुर एवं उदयपुर।
6. अतिरिक्त निदेशक, जल ग्रहण विकास एवं भू-संरक्षण विभाग।
7. मुख्य कार्यकारी अधिकारी, जिला परिषद अजमेर, भरतपुर, बीकानेर, जयपुर, कोटा, जोधपुर एवं उदयपुर को भेजकर निवेदन है कि बैठक में सम्बन्धित अधिकारियों को भाग लेने के लिए निर्देशित करावें।
8. प्रबन्ध निदेशक (EC) राजस्थान अक्षय ऊर्जा निगम लि., ई-166, युधिष्ठिर मार्ग, सी-स्कीम, जयपुर।
9. निवेशक (तकनीकी), जयपुर विद्युत वितरण निगम लिमिटेड, जयपुर।
10. संयुक्त शासन सचिव (प्रशासन), ग्रामीण विकास विभाग, राजस्थान, जयपुर।
11. अधीक्षण अभियन्ता (ईजीएस), महात्मा गाँधी नरेगा ग्रामीण विकास विभाग।
12. अधीक्षण अभियन्ता (प्रो), पंचायती राज।
13. अधिशाषी अभियंता (अभि.) जिला परिषद, अजमेर, भरतपुर, बीकानेर, जयपुर, कोटा, जोधपुर एवं उदयपुर।
14. अधिशाषी अभियंता (टी.सी.), पंचायती राज को भेजकर लेख है कि प्रस्तावित सोलर लाईट के तकनीक मापदण्ड व मॉडलों आदि के प्रस्तुतीकरण (प्रजेंटेशन) करने का श्रम करें।
15. श्रीपाल यादव, प्रभारी अधिकारी, एनआईसी, को निर्धारित समय पर वी.सी. के लिए व्यवस्था सुनिश्चित करने बाबत।
16. प्रोग्रामर, ग्रावि को विभागीय वेबसाइट पर अपलोड करने बाबत।

अधीक्षण अभियन्ता (ग्रावि)

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 dawn.
- 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.

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**TECHNICAL SPECIFICATIONS FOR
SOLAR PHOTOVOLTAIC LIGHTING SYSTEMS & POWER PACKS
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MODEL-I:

- With Lead Acid Battery.
- Operates from dusk to dawn at full Brightness.

BROAD PERFORMANCE SPECIFICATIONS

PV Module	40 Wp under STC
Battery	Tubular GEL / VRLA , 12V- 40 AH @ C/10
Light Source	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
Light Out put	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.
Mounting of light	Pole mounted, Minimum 4 meters above the ground level
Electronics Efficiency	Minimum 85% total
Duty Cycle	Dusk to dawn at full brightness
Autonomy	• 3 days or Minimum 42 operating hours per permissible discharge

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**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 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.

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**TECHNICAL SPECIFICATIONS FOR
SOLAR PHOTOVOLTAIC LIGHTING SYSTEMS & POWER PACKS
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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)**

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 DONT'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

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4R.2.
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** :- 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 dawn. 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.

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**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

PV Module	30 Wp under STC
Battery	Tubular GEL / VRLA , 12V- 20 AH @ C/20
Light Source	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
Light Out put	Multiple Light levels: The lamp should have two levels of light to take care of different lighting needs during the night. <ul style="list-style-type: none"> • 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 <p style="text-align: center;">(Higher light output will be preferred)</p>
Mounting of light	Pole mounted, Minimum 4 meters above the ground level
Electronics Efficiency	Minimum 85% total
Duty Cycle	Dusk to Dawn 4 Hours full light, rest of the time at lower light level, with motion sensor. <ul style="list-style-type: none"> • In case any movement is there, it senses it and glows to full level. • Then it comes back to lower level after sometime, automatically.
Autonomy	3 days or Minimum 42 operating hours per permissible discharge

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**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 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 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 DONT's.
- Name and address of the contact person for repair and maintenance, in case of non-functionality of the solar street lighting system.

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White LED (W-LED) Based Solar Street Lighting System Model-III

4R-3

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 dawn.
- 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

PV Module	40 Wp under STC
Battery	Minimum 160 Wh Lithium Ferro phosphate battery
Light Source	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

Light Out put	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.
Mounting of light	Pole mounted, Minimum 5 meters above the ground level
Electronics Efficiency	Minimum 85% total
Duty Cycle	Dusk to dawn

**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. 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
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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
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- 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
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- 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 DONT'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-IV

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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 dawn. 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.

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**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

PV Module	30 Wp under STC
Battery	Minimum 120 Wh Lithium Ferro phosphate battery
Light Source	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
Light Out put	Multiple Light levels: The lamp should have two levels of light to take care of different lighting needs during the night. <ul style="list-style-type: none"> • 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)
Mounting of light	Pole mounted, Minimum 5 meters above the ground level
Electronics	Overall total Efficiency of the Electronics should be Minimum 90%
Duty Cycle	Dusk to Dawn 4 Hours full light, rest of the time at lower light level, with motion sensor. <ul style="list-style-type: none"> • In case any movement is there, it senses it and glows to full level • Then it comes back to lower level after sometime, automatically.

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.

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**TECHNICAL SPECIFICATIONS FOR
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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.

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**TECHNICAL SPECIFICATIONS FOR
SOLAR PHOTOVOLTAIC LIGHTING SYSTEMS & POWER PACKS
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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 DONT's.