LOUISIANA
DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
SPECIFICATIONS

OFF GRID PHOTOVOLTAIC (PV) MONOCRYSTALLINE SOLAR PANEL

DESCRIPTION

This specification sets forth the requirements of a Photovoltaic (PV), Monocrystalline Solar Panel (Module) that will be used to replace the existing pole-mounted solar panel currently installed at existing Automatic Traffic Recorder (ATR) stations. The solar panel shall be an 85 to 100 W off-grid, all-weather design capable of operating on a twenty-four (24) hours per day, seven (7) days per week basis at a standard irradiance of 85%, minimum efficiency.

The primary function of the solar panel will be to charge the existing 12 Volt DC Power Battery Bank. The battery bank is used to run the existing Radar Vehicle Detector (RVD), Charge Controller (or Voltage Regulator), modems, other various instruments and components all of which make up the DOTD operated ATR traffic monitoring stations. The ATR stations are mounted to roadside poles throughout the state. All stations are fully equipped with an existing cabinet that houses the control center, batteries, modem, voltage regulator, and antenna.

Each Solar Panel must include at a minimum the following items:

- Junction Box with Terminal Block
- Pole Mounting Bracket and Hardware
- Batteries are not required

REQUIREMENTS

Mechanical

The panel shall have two (2) bypass diodes and a minimum of thirty-six (36) Monocrystalline Silicon solar cells in series embedded in transparent EVA (Ethylene Vinyl Acetate).

The panel shall measure, at a maximum, 1209 x 537 x 50mm / 47.6” x 21.1” x 2” and weigh no more than 7.7kg / 17lbs.

The frame must be constructed of a non-corrosive material such as silver anodized aluminum, silver universal frame, or a clear anodized aluminum alloy type 6063-T6. The front cover shall be made of a high transmission 3.0mm - 3.2mm (1/8”) tempered glass. The back of the panel shall be sealed with a sheet of polyester. All connectors must be corrosion resistant and all weather protected. The panel must be able to withstand harsh weather conditions such as humidity, high winds, high heat, etc.
Electrical

The Monocrystalline Solar Panel must meet the following electrical requirements:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power ($P_{max}$)</td>
<td>85 to 100 W</td>
</tr>
<tr>
<td>Module Efficiency</td>
<td>14% - 16.70%</td>
</tr>
<tr>
<td>Power Tolerance</td>
<td>+10%/-5%</td>
</tr>
<tr>
<td>Nominal Voltage</td>
<td>12V</td>
</tr>
<tr>
<td>Efficiency Reduction at 200W/m²</td>
<td>&lt;5% reduction (efficiency 14.5%)</td>
</tr>
<tr>
<td>Temperature Coefficient of $I_{SC}$</td>
<td>0.105%/°C</td>
</tr>
<tr>
<td>Temperature Coefficient of $V_{OC}$</td>
<td>-0.360%/°C</td>
</tr>
<tr>
<td>Temperature Coefficient of ($P_{max}$)</td>
<td>-0.45%/°C</td>
</tr>
<tr>
<td>Normal Operation Cell Temperature</td>
<td>47±2°C</td>
</tr>
<tr>
<td>Maximum series fuse rating</td>
<td>20A</td>
</tr>
<tr>
<td>Maximum system voltage</td>
<td>600V (IEC 61215 rating)</td>
</tr>
<tr>
<td></td>
<td>1000V (TUV Rheinland rating)</td>
</tr>
<tr>
<td>Operating Conditions</td>
<td>-40 - +55°C</td>
</tr>
</tbody>
</table>

Junction Box and Terminal Block

The wiring shall be terminated on the backside of the panel in a water tight, corrosion and UV radiation resistant junction box. The junction box must meet the protection class of IP 65, shall have no cavities, and shall withstand a temperature range from -40 °F to 185 °F. The terminal block shall have either four (4) screw connections that accept PG 13.5, M20 13mm (1/2”) conduit or cable fittings that accept 6 – 12 mm diameter cable. Terminals must accept 8-14 AWG wire.

Pole Mounting Brackets and Hardware

The Monocrystalline Solar Panel shall come complete with stainless steel, adjustable pole mounting brackets and all necessary hardware such as bolts, washers, hex head nuts, installation instructions, etc. required to securely mount the panel to the existing roadside pole. The brackets must be designed to withstand wind speeds of at least 110 mph, and adjustable enough to accommodate up to two (2) solar panels per bracket per pole. The outside diameter of a DOTD roadside pole is 8” OD at the base and 4.5” OD nearer the top.

IDENTIFICATION

The following information must be located inside the module laminate:

a) Name and contact information of manufacturer of Solar Module
b) Name and contact information of manufacturer of Solar Cells
c) Unique serial number and Model number of Module
d) Month and Year of manufacture
e) Electrical and mechanical specifications
COMPLIANCE AND TESTING

Solar panels shall comply with at least one (1) of the following International Specifications:
- IEEE1262 ("Recommended Practice for Qualifications of Photovoltaic Modules")
- IEC 61215/IEC 61730.

Panels must pass a Salt Mist corrosion test per IEC 61701. Documentation indicating the test results may be required prior to award.

CERTIFICATION

Certification stating that the product meets the requirements of this specification may be required prior to award. Each shipment should be supplied with a certification stating that the product meets the requirements of this specification, the Salt Mist corrosion test results, the Underwriters Laboratories (UL) Certification, and a copy of the manufacturer’s warranty. Certification provided will be kept on file by the Department.

WARRANTY

Panel shall come complete with a standard manufacturer’s product and performance warranty.