

Standing Seam Spec Option BIPV  
Section 07400

- A. Standing Seam Metal Roof Manufacturer and Contractor shall be responsible for manufacturing and installing BIPV Standing Seam Roof Panel per drawings for a (3 kW,5kW, 10kW, 15kW, 30kw, 60kW, or 120kW) PV System. Electrical work to be by Electrical Contractor per Spec Section 48-14-00
- B. Related Specs – Section 48-14-00 Photovoltaic System
- C. Products –
- D. The Standing Seam Roof Manufacturer shall coordinate with the Architect on locations and appearance of all BIPV Standing Seam Panels and Ridge and/or Mid Roof cable trays. All locations must be approved by the Architect prior to installation.
- E. Fall arrest protection per OSHA 1926 Subpart M shall be provided for all work on top of BIPV Standing Seam Roof and Standing Seam Contractor shall offer safe protection to Electrical Contractor to connect BIPV module connectors in the Ridge and / or Mid Roof cable trays.
- F. The Standing Seam Metal Roof Contractor shall notify the Construction Manager a minimum of 5 days before closing in of Ridge Cap and / or Mid Roof cable trays so the Electrical Contractor can be notified to complete wiring on roof.
- G. Warranty - The Standing Seam Roof Contractor provide a 20 year warranty on the electrical performance of the PV modules, and warrant that the BIPV Standing Seam Panels will be free from manufacturing defects.

## SECTION 48 14 00

### PHOTOVOLTAIC SYSTEM

Related Specs – Section 07410 Metal Roofing and Section 26 Electrical

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section includes [3kW, 5kW, 10kW, 15kW, 30kW, 60kW, and 120kW] solar laminate PV system on metal roofing panel. The PV modules are integrated with the Standing Seam Roof and are part of Spec Section 07410. The Electrical Components of the System and wiring by Electrical Subcontractor are included herein.
- B. The PV system described in this document shall be of the grid-connected type and shall not include battery storage or any backup power components. PV system shall feed AC power into the local services when solar energy is available and shall immediately disconnect from the grid upon loss of grid power to the service as per IEEE and local utility regulations.
- C. The system shall comply with these specifications, the construction document drawings, all applicable codes, and all local authorities having jurisdiction. System shall comply with all policies and standards required by the electric utility having jurisdiction and all applicable incentive program guidelines. The equipment includes, but is not limited to, PV modules and Ridge Cap and / or Mid Roof cable trays are by Standing Seam Subcontractor (Section 07410). Inverters, disconnects, wire, conduit, junction boxes, mounting hardware, and monitoring equipment are by the Electrical Contractor.
- D. Electrical Contractor shall provide access to equipment for maintenance and service as required by the manufacturer's instructions and/or applicable codes.
- E. The Standing Seam Roof Contractor shall coordinate with the Architect on locations and appearance of all PV modules and Ridge and Mid Roof cable trays. All locations must be approved by the Architect prior to installation.
- F. The Electrical Contractor shall coordinate with the Architect and Electrical Engineer on locations and appearance of all exposed equipment, including but not limited to conduit, inverters, disconnects, wire ways, and control and monitoring equipment. All locations must be approved by the Architect and Electrical Engineer prior to installation.
- G. The Electrical Contractor shall be responsible for electrical tie in of the PV System to the Main Utility Box per drawings.

##### 1.2 RELATED DOCUMENTS

- A. The Electrical Contractor shall comply with all requirements of Division 26 - ELECTRICAL in this specification book and with the conditions of the Contract. The Contractor shall comply with the general conditions of this specification for requirements for submittals, substitutions, testing, training, warranty, damage responsibility, permits, fees, clean-up, and all other general items, in addition to any specific requirements of this section.
- B. Work shall comply with the requirements set forth by all applicable codes, standards, local authorities, utilities, and manufacturer's instructions/recommendations.
- C. The Electrical Contractor shall comply with the PV system construction document drawings, including all notes and specifications.
- D. The Electrical Contractor shall examine the architectural and electrical drawings to determine related requirements.

- E. All work, including equipment, materials, and installation shall conform to Uniform Building Code (UBC), NFPA-70 - National Electric Code; and Uniform Fire Code, editions under jurisdiction.
- F. The minimum requirement of the more stringent code or standard shall govern where more than one code or standard is applicable to any component or condition.

### 1.3 REFERENCES

- A. 2002 National Electric Code (NEC)
  - 1. Article 690 – Solar Photovoltaic Systems.
  - 2. Article 250 - Grounding.
  - 3. Article 110 – Requirements for Electrical Installations.
- B. IEEE Standards
  - 1. IEEE 1262 – PV Module Qualification for Performance and Reliability.
  - 2. IEEE 929 – Inverter Interconnection Standard.
- C. Underwriter’s Laboratories (UL) Standards
  - 1. UL1703 – Flat Plate PV Modules and Panels.
  - 2. UL1741 – Standard for Static Inverters and Charge Controllers for Use in Photovoltaic Power Systems.
- D. National Fire Protection Association Standards
- E. OSHA Standards
  - 1. 1926 Subpart M – Fall Protection

### 1.4 UTILITY APPROVAL

- A. Electrical Contractor shall provide all paperwork, coordination, and administration services required for local utility interconnection approval.

### 1.5 CONTRACTOR QUALIFICATIONS

- A. The PV system described herein shall be wired by a :
  - a. licensed electrical contractor.

## 1.6 WARRANTY

- A. The Electrical Contractor shall warrant that the :
  - a. PV Electrical work conforms to Contract requirements and is free of any defects.
- B. The Standing Seam Roof Contractor shall warrant:
  - a. For 20 years the Electrical output and BIPV Standing Seam Panels free of any defects
- C. Any defective materials or inferior workmanship during installation and/or the warranty period shall be corrected immediately to the entire satisfaction of the Construction Manager and without additional cost to the Owner.

## PART 2 PRODUCTS

### 2.1 GENERAL

- A. All materials, fixtures, and equipment required for the work shall be new, of first-class quality, and shall be furnished, delivered, erected, connected and finished in every detail, and shall be selected and arranged as to fit properly into the building spaces. Where no specific kind or quality of material is given, a first-class standard article as approved by the Construction Manager shall be furnished.
- B. All equipment shall be listed and labeled per recognized electrical testing laboratory and installed per the listing requirements and the manufacturer's instructions.
- C. All equipment shall be approved for use by the electric utility having jurisdiction and any applicable incentive programs.
- D. All equipment shall be properly grounded per the requirements of the National Electric Code, Article 250.
- E. All outdoor equipment shall be minimum NEMA 3R.
- F. Provide equipment as specified on the drawings, or approved equipment of equal quality and performance. Provide all accessories needed for a complete, secure, operational grid-tied PV system.
- G. Conduit specification shall comply with division 26 requirements.

### 2.2 PV MODULES – By Standing Seam Roof Contractor

- A. PV modules shall be IEEE 1262 compliant and listed to UL Standard 1703.
- B. PV modules shall be Uni-Solar PVL-136.

### 2.3 INVERTERS- By Electrical Contractor

- A. All inverters shall be IEEE 929 compliant, listed to UL Standard 1741, and inspected by local utility before commissioning, testing, and operation of the system.
- B. All inverters to be SMA or approved equal.

## PART 3 EXECUTION

### 3.1 GENERAL

- A. All electrical work shall be in accordance with the 2002 National Electric Code.
- B. All circuits connected to more than one source shall have over-current devices located so as to provide over-current protection from all sources per NEC Article 690.9 (a).
- C. Cut no structural members. If equipment cannot be properly concealed, notify Construction Manager.
- D. Attachments: Support all work adequately and per code.
- E. Shoring: The Contractor shall provide all permanent and temporary shoring, anchoring and bracing required by the nature of this work in order to make all parts absolutely stable and rigid, even when such shoring, anchoring and bracing are not explicitly called for.
- F. Contractor shall keep work areas in a clean and safe condition. Remove all equipment, tools, vehicles, rubbish, waste and debris from the site upon completion of the job. The Contractor shall pay all fees for recycling and disposal.
- G. Fall arrest protection per OSHA 1926 Subpart M shall be provided for all work on top of BIPV Standing Seam Roof and Standing Seam Contractor shall offer safe protection to Electrical Contractor to connect BIPV Module connectors in the Ridge and / or Mid Roof cable trays
- H. The Standing Seam Metal Roof Contractor shall notify the Construction Manager a minimum of 5 days before closing in of Ridge Cap and / or Mid Roof cable trays so the Electrical Contractor can be notified to complete wiring on roof
- I. All DC conductors shall be sized such that there is a maximum of 1.5% voltage drop measured at the short circuit current rating of that circuit over the entire length of each circuit from PV module to inverter and back to PV module. All AC conductors shall be sized for a maximum of 1.5% voltage rise measured at the continuous AC current rating of the inverter between the inverter and the point of interconnection with the grid.
- J. Each series string of PV modules shall be independently protected by an isolation fuse or breaker before it is connected in parallel with the other string on that PV output circuit. The current rating of this isolation fuse or breaker shall be less than the de-rated ampacity of the wiring that it is protecting and greater than 1.56 times the short circuit current rating of the PV modules in that PV source circuit. All other conductors and overcurrent devices shall be sized per the requirements of National Electric Code (NEC) Article 690.8.

### 3.2 POWER MAXIMIZATION

- A. Location of BIPV panels are indicated on the architectural drawings. Architect shall approve where BIPV Panels are located in regards to minimal shading at Shop Drawing time and prior to installation for maximum power production.

### 3.3 COMMISSIONING

- A. Electrical Contractor shall provide complete commissioning of the PV system.
- B. Standing Seam Contractor shall verify that all BIPV Standing Seam Roof Panels and Ridge and / or Mid Roof Cable trays are installed according to the requirements of the BIPV panel drawings, specifications, and manufacturer's written instructions.
- C. Electrical Contractor shall verify that all Electrical components are installed and connected according to the requirements of the PV electrical drawings, specifications, and manufacturer's written instructions.
- D. Before starting or operating the system Electrical Contractor shall check continuity of all conductors and grounding conductors to verify that there are no faults and that all equipment has been properly installed. Check factory instructions to see that installations have been made accordingly. Check equipment for any damage that may have occurred during shipment, after delivery, or during installation. Replace damaged equipment.
- E. Before starting or operating the system Electrical Contractor shall obtain a final inspection approval and final inspection from local utility. Electrical Contractor shall be present on site for both of these inspections.
- F. Electrical Contractor shall test all equipment to ensure specified capacity and performance of the system. The Electrical Contractor shall notify the Construction Manager a minimum of 5 days prior to the test so that an Owner's representative may witness the test. Electrical Contractor shall replace any electrical equipment, systems, or work found deficient during the test except for non working BIPV panels. Standing Seam Roof Contractor to replace any non working BIPV panels
- G. PV Module Test: During the daytime while the sun is shining on the PV array, measure the short circuit current and open circuit voltage of each string (in isolation from other parallel strings) and verify that the output is consistent with PV module manufacturer's specifications.
- H. Contractor shall make final adjustments to all inverters and monitoring equipment so that they will be placed in an acceptable operating condition. Adjustable parameters shall be set so that the PV system will produce the maximum possible amount of energy on an annual basis.
- I. Replace all damaged and/or malfunctioning equipment.

END OF SECTION