SECTION 26 31 00

SOLR COLLECTORS

This section includes editing notes to assist the user in editing the section to suit project requirements. These notes are included as hidden text, and can be revealed or hidden by one of the following methods:

· Microsoft Word: From the pull-down menus select TOOLS, then OPTIONS. Under the tab labeled VIEW, select or deselect the HIDDEN TEXT option.

· Corel WordPerfect: From the pull-down menus select VIEW, then select or deselect the HIDDEN TEXT option.

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. SolR Modules.
2. Cable Tray and accessories.

B. Related Sections:
1. Division **[01 Section "General Requirements".] [_____.]**
2. Division **[05 Section "TopR Retrofit Steel Roof Framing System".] [_____.]**
3. Division **[07 Section "Thermal Insulation".] [_____.]**
4. Division **[07 Section "CoolR Metal Roofing".] [_____.]**
5. Division **[07 Section "Sheet Metal Flashing and Trim'.] [_____.]**
6. Division **[07 Section "Roof Specialties".] [_____.]**
7. Division **[07 Section "Roof Accessories".] [_____.]**
8. Division **[07 Section "Joint Sealants".] [_____.]**

1.2 SYSTEM DESCRIPTION

A. Design Requirements:

1. Contractor is responsible for providing the SolR system, including attachment of the solar blanket to new roof. Provide modifications to meet specified requirements and maintain visual design concepts as indicated in layout drawings.
2. Contract Drawings are diagrammatic and are intended to establish basic dimension of units, sight lines, and profiles of units.
3. Provide details for attachment, fastening, penetrations, and electrical connections.
4. Provide concealed fastening wherever possible.
5. Roof penetrations shall not be allowed. All conduit trays shall be mounted on the surface for visual identification.

B. Performance Requirements:

1. AC kWh energy production will take into consideration system losses, including but not limited to wire losses, module temperature losses, inverter efficiency, soiling loss factors, shading loss factors and local weather data, and electrical losses.
2. Maximum SolR System voltage shall not exceed 600 Voc, and must be compliant with NEC 690.7.

C. Interface with building systems:

1. PV system AC connection point.
2. Data transmission means RS485.

D. Financial Incentives, Rebates, and Tax Credit Eligibility Requirements for SolR systems:

1. Identify potential incentives, rebates, and tax incentives.
2. Provide SolR System including design and installation that complies with eligibility requirements for SolR system owner to receive incentives, rebates, and tax credits from sources such as federal, state, and electric utility services providers.

1.3 SUBMITTALS

A. Product Data:

1. Submit product data for photovoltaic system components including but not limited to the following:

a. SolR Modules
b. Inverters
c. Combiner Boxes
d. Disconnect Switches
e. Monitoring System
f. Roof Mounted Accessories

2. Include information for the following roofing system components including but not limited to the following:

a. Factory finishes
b. Sealants
c. Grounding
d. Accessories

B. Sustainable Design Submittals:
1. On-Site Renewable Energy Return On Investment (ROI) analysis.
2. Copies of grants and rebates applied for.

C. Shop Drawings:

1. Submit shop drawings covering fabrication, installation, and finish of specified systems.

a. Fully dimensioned plans and elevations with detail coordination keys.
b. Electrical and structural penetration details of weather-tight building envelope.
c. Locations and types of exposed fasteners and joints.
d. Wiring diagrams
e. Rough-in requirements

D. Samples:

1. Provide samples of **[68] [136] [144]** watt SolR module for approval. Approved samples may be used in final installation.
2. Provide on-site mock up of SolR module installation for approval. Locate on-site mock-up within project construction site. On-site mock up shall use mounting method and hardware intended for actual SolR module installation.

E. Submit the following Informational Submittals:

1. Estimated Design Data:

a. Provide assumptions used to obtain AC kWh energy production including but not limited to: wire losses, module temperature losses, inverter efficiency, soiling loss factors, shading loss factors and local weather data, and electrical losses.
b. Estimated monthly and yearly AC kWh energy production.

2. Test Reports:

a. Written results obtained from manufacturer or independent third party certification of testing specified as part of System Requirements and Source and Field Quality Control articles.

3. Certifications specified in Quality Assurance article.

4. Qualification Data:

a. Contractor shall be approved by roof manufacturer to install SolR system, SolR System Integrated to Roof, and all roof related items.

5. Manufacturer's Instructions:

a. Manufacturer's printed installation instructions.
b. Indicate by transmittal that copies of instructions and recommendations have been distributed to installer.

6. Contractor's Field Reports:

a. Written results and findings of Contractor's field services specified as part of Field Quality Control.

F. Closeout Submittals

1. Project Record Documents:

a. Record actual locations of SolR modules, inverters, combiner boxes, disconnect switches, and wire/conduit runs.
b. Record actual locations of grounding systems and penetration of building envelope.

2. Operation and Maintenance Data:

a. Submit manufacturer's printed, recommended operation and maintenance data.

3. Warranty:
a. Submit specified product warranty.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: To ensure quality of appearance and performance, obtain equipment for systems from a single photovoltaic system manufacturer.

B. Installer Qualifications: Certified in writing by equipment manufacturers as qualified for installation of specified systems.

C. Regulatory Requirements:

1. Provide system meeting requirements of National Electric Code (NEC) including

but not limited to article 690 - "Solar Photovoltaic Systems." Edition to be adopted by local jurisdiction, containing information on photovoltaic systems such as grounding, conductor, over-current protection, disconnect, and labeling requirements.

2. Provided system must meet all requirements of federal, state, and local building codes.
3. Provide system that meets or exceeds electric utility company interconnection requirements for self-generating equipment.

4. Provide SolR modules compliant with the following requirements:

    a. UL-1 703 - "Flat-Plate Photovoltaic Modules and Panels."
    b. CEC eligible renewable equipment.

5. Provide inverters compliant with requirements:

    a. UL-1 742 - "Standards for Inverters, Converters and Controllers."
    b. IEEE 1547-2003 "Standard for Interconnecting Distributed Resources with Electric Power Systems."
    c. Certifications: Submit system component manufacturer's certification that products furnished for Project meet or exceed specified requirements.

1.5 PRE-INSTALLATION CONFERENCE

A. Conduct pre-installation conference with - roof contractor and manufacturer, engineer, Owner, and approved applicator 2 weeks prior to job start.
B. Review requirements of Contract Documents and submittals.
C. Review penetration details, shading on site, customer care issues, and all details relating to facility maintenance and ongoing operation.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Inspect equipment at time of delivery. Remove from jobsite and immediately replace all equipment not conforming to specification.
B. Protect finished surfaces as necessary to prevent damage.
C. Do not use adhesive papers or sprayed coatings that become firmly bonded when exposed to sun.
D. Do not leave coating residue on any surfaces.
E. Replace damaged units.

1.7 PROJECT CONDITIONS

A. Environmental Requirements:

1. Do not install system during rain, snow, or windy conditions, or when these conditions are imminent.
2. Work on a dry roof only. Determine acceptable moisture level by method specified by manufacturer.

B. Existing Conditions: Ensure existing conditions are stable, solid, and ready to accept new construction.

1.8 WARRANTIES

A. Furnish manufacturer’s 5-year limited warranty providing coverage against defects in materials and workmanship under normal application, use, installation, operation and service for SolR product purchased from an authorized channel partner/installer.

B. Furnish manufacturer's 25-year limited power output warranty providing coverage that the SolR product will produce a minimum of 92% of the minimum power output rating in the first 10 years, a minimum of 84% of the minimum power output rating in the first 20 years, and a minimum of 80% of the minimum power output rating in the first 25 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Sheffield Metals International; SolR **[Choose 1, 2, or 3]**

1. SolR 68 PV Laminate Modules: Triple junction, amorphous silicon photovoltaic (PV) laminates encapsulated in ETFE, with ethylene propylene copolymer adhesive-sealant with microbial inhibitor; Rated power 68 watts. IEEE 1262 compliant and listed to UL 1703, UL Class B fire rating.

2. SolR 136 PV Laminate Modules: Triple junction, amorphous silicon photovoltaic (PV) laminates encapsulated in ETFE, with ethylene propylene copolymer adhesive-sealant with microbial inhibitor; Rated power 136 watts. IEEE 1262 compliant and listed to UL 1703, UL Class B fire rating.

3. SolR 144 PV Laminate Modules: Triple junction, amorphous silicon photovoltaic (PV) laminates encapsulated in ETFE, with ethylene propylene copolymer adhesive-sealant with microbial inhibitor; Rated power 144 watts. IEEE 1262 compliant and listed to UL 1703, UL Class B fire rating.

2.2 REQUIRED EQUIPMENT

A. Wire Management System:

1. Shall cover all exposed wires and connectors from solar modules to the junction boxes from UV exposure.
2. Match color of standing seam metal roof.
3. Attach to standing seam metal roof by friction connection with set screws to standing seam, without penetrations.

B. SolR Array Connectors:

1. Must be UL Listed.
2. Must be polarized and UV resistant.
3. Must be compatible with factory connectors attached to the SolR modules.

C. Inverters:

1. Sized to provide maximum power point tracking for voltage and current range expected from SolR array for temperatures and solar insolation conditions expected for project conditions.
2. Capable of adjusting to "sun splash" from all possible combinations of cloud fringe effects without interruption of electrical production.
3. Listed to UL 1741.
4. Complies with IEEE 1547-2003.
5. Inverter will be exposed to weather and possible vandalism when mounted outdoors. The contractor will provide a suitable pad-lockable fence or other enclosure for housing these components.
6. Provide hinged cover fiberglass or metal NEMA 1 or better enclosed unit.

D. Combiner Boxes/Junction Boxes:

1. Provide hinged cover fiberglass or metal NEMA 1 or better enclosure.

E. DC Disconnect Switch

1. Provide DC disconnect switch to isolate the SolR system from the inverter.
2. Provide heavy-duty, external operation handle switch.

F. AC Disconnect Switch:

1. Provide AC disconnect switch to isolate the SolR system from the service entrance equipment.
2. Coordinate with local electric utility service provider requirements.
3. Provide switch to disconnect ungrounded AC conductors.
4. Must be heavy-duty, pad-lockable, gang operated type, with external operation handle switch clearly indicating open and closed positions.
5. Easily visually inspected to determine that switch is in open or closed position and clearly labeled in compliance with NEC and local electric utility service provider requirements.

G. Fusing:

1. DC and AC fuses shall be J-type fuses or better
2. Fuses will be rated, listed, and able to handle the short circuit currents they may be subjected to.
3. Fuses will be sized according to the NEC.

H. Wiring/Cabling:

1. Module and Source Circuit Wiring
   a. Wires are to be USE-2 or RHW-2 insulated conductors or better.
   b. Wires are to be UV resistant, wet-rated 900C insulated conductors.
   c. Conductors will be sized according to the NEC.

2. Output Circuit and AC Circuit Wiring
   a. Wires are to be THWN-2 insulated conductors or better.
   b. Wires are to be wet rated 900C insulated conductors.
   c. Conductors will be sized according to the NEC.

I. Terminations:

1. Must use listed box terminal or compression type connections.
2. Twist on wire splices, crimped, soldered or taped connections are not acceptable.
3. Proper torque and manufacturers specifications must be followed.

J. Grounding:

1. All non-current carrying exposed metal parts of junction boxes, combiner boxes, disconnects, equipment and appliances in the entire electrical system that may be accidentally energized must be grounded.
2. The equipment-grounding conductor shall be sized according to the NEC.
3. Inverter shall be hard-wired to the service entrance equipment. Neither should have an internal bond between the neutral and grounding conductors nor should have any receptacle outlets that can be used when the inverter is operated.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine system to ensure surfaces are free from dirt or other deleterious matter, and away from Shaded equipment of parapet locations

3.2 INSTALLATION

A. Locate SolR array as shown on Drawings and approved shop drawings.

B. Install SolR system in accordance with NEC, manufacturer's printed instructions, electric utility service provider requirements, and approved shop drawings.

C. Install inverters with sufficient clearance to allow for proper ventilation and cooling.

1. Comply with manufacturer's clearance recommendations.

D. Preferred installation requires operational SolR modules in location and manner to ensure maximum unobstructed, direct sun exposure.

E. Anchors, fasteners and braces shall be structurally stressed not more than 50% of allowable stress when maximum loads are applied.

F. Allow for expansion and contraction due to thermal changes and structural movement without detriment to appearance or performance.

G. Installer shall verify that site, mounting surface substrate, supports and other site and work conditions are adequate and proper for installation.

H. Optimum Orientation for Roof Installation:

1. Install system flat with roof so that no protrusions are greater than 3/8" higher than roof surface.

3.3 FIELD QUALITY CONTROL

A. Notify Roofing Manufacturer 2 weeks prior to installation to ensure on site inspection of roof and solar system.
B. Verify existing roof guarantee requirements with manufacturer prior to solar installation.

3.4 ADJUSTING

A. Test and adjust operating functions in accordance with manufacturer's instructions to ensure performance to specifications upon installation.

3.5 CLEANING

A. Clean surfaces in compliance with manufacturer's recommendations; remove excess mastic, mastic smears, foreign materials, and other unsightly marks.
B. Clean metal surfaces exercising care to avoid damage.
C. Clean energy generating surfaces of the SolR module to ensure no obstructions block sunlight.

3.6 COMMISSIONING

A. Commissioning:
1. To be provided by Contractor/ Installer.
2. Prior to commissioning ensure SolR system has passed and received final inspection certificate from authorities having jurisdiction and local utility.
3. Ensure the installation has been performed in accordance with NEC and other

local codes. Following NEC articles refer to SolR systems:

4. Refer to commissioning procedures contained in the inverter installation manual
5. Refer to commissioning requirements contained within IEEE 1547.1 Standard Conformance Test Procedures for Equipment Interconnecting Distributed Resources with Electric Power Systems.
6. Provide suitable tools and equipment for commissioning.
7. Utilize System Commissioning Check sheet / Log sheet.
8. Provide commissioning certificate to Owner.

3.7 TRAINING

A. Training to be provided by Contractor/Installer to instruct the Owner's personnel of the following for the SolR system:

1. Basis of system design, operational requirements, and criteria.
2. Documentation of warranties, manuals and service agreements
3. Emergency training for warnings, trouble and error indications and shutdown instructions.
4. Operational procedures.
5. Troubleshooting, test and inspection procedures.
6. Maintenance procedures.
7. Repair procedures.
8. Provide training certificate to Owner.

3.8 PROTECTION

A. Protect existing roof and penetrations from debris and excessive foot traffic. Provide protection boards where required, and under all equipment staging areas.

END OF SECTION