Photovoltaic Installer/Designer (PV2) Certification Process:

The ETA Level 2 Photovoltaic Installer/Designer (PV2) Certification is designed for individuals who have significant experience in the design and installation of solar electric (photovoltaic) systems.

As part of the certification process, candidates must provide documentation/ proof of completion of:

- Education in photovoltaics, safety and customer service
- Hands-on experience in the field
- Obtain a passing score on the written PV2 examination

Eligibility Requirements:

To become certified and maintain certification, the Applicant must:

- Be at least 18 years of age
- Meet the prerequisites of related experience and education as outlined below
- Complete a checklist form documenting these requirements
- Sign and agree to uphold the ETA Code of Conduct
- Pay the PV2 examination fees to ETA
- Pass the written examination

Education:

Prior to sitting for the examination, candidates for the PV2 certification must have completed:

- 60 contact hours of training in photovoltaics from an ETA-approved training facility#,
- or 60 contact hours of training in photovoltaics from a training facility that is demonstrated to meet the same criteria as is required of an ETA-approved training facility.
- and successful completion of an OSHA 10 hour construction industry safety training course or equivalent course in your jurisdiction.
- and successfully obtain the ETA Customer Service Specialist (CSS) Certification.

Candidates who have earned the Photovoltaic Installer - Level 1 (PVI1) certification (and the PVI1 certification is current) may apply those 40-hours of PVI1 toward the educational requirement for PV2 (in other words, an additional 20 hours of approved training will be required).

Hands-on Experience:

Individuals pursuing the ETA PV2 Certification are expected to have an extensive background in designing and installing PV systems. The more varied this experience, the more weight will be assigned to it as part of the applicant checklist process. We realize that a specific installer may continuously design and install similar projects, but only rarely come in contact with less common technologies or system options. We also appreciate that on very large projects; a specific installer may only come in contact with one task (such as placing panels on racks) repeatedly.

It is our intention that an individual earning the PV2 Certification demonstrates a wide range of skills and abilities. For this reason, the following checklist has been developed to encourage and document a broad background of skills and tasks. Points have been assigned to each task, and the applicant must demonstrate **a minimum of 150 points** prior to being approved to sit for the certification examination. However certain core tasks (indicated with an **asterisk***) have been deemed as critical; ALL applicants must have accomplished those prior to sitting for the exam

Each item claimed on the experience checklist must be attested to by a supervisor, employer or

customer. Please provide that individual's contact information for ETA to verify the applicant's experience in installing and designing PV systems. ETA requires at least two individual reference contacts (who can attest to the applicant's skills and background) for verification (even if only one person verifies all the skills listed on this application checklist).

Attaching documentation that verifies this experience will expedite the process.

Experience Checklist: (150 Total Points Minimum Required)

**** indicates required task***

Perform a System Assessment:* *(10 points minimum, 20 points maximum)*

Involves meeting with the client to determine needs/expectations, perform a loads assessment, identify placement of the array, placement of the balance of systems, conduit runs, best system configuration for the site (grid-tied, stand-alone, DC-coupled, etc.), ownership options, determining available insolation, array orientation, conducting a shading analysis, hazard assessment, aesthetic concerns, type of racking system, identify setback requirements, identify any structural (load) issues, staging and lifting requirements, conduct any necessary soil tests, identify any power factor issues, determine battery storage locations, determine utility interconnection. .

10 points *Attested By (provide name and email or phone number):

_____

10 points Attested By:

_____

Possible Attachments: Documentation of above

Select the Components:* *(10 points minimum, 20 points maximum)*

Select and size the appropriate: solar modules, combiner boxes, DC disconnects, inverters, surge protection, AC disconnect, charge controllers, batteries, racking systems, wire and raceways.

10 points *Attested By: _____

10 points Attested By: _____

Possible Attachments: Bill of sale or packing list from installation

Create a Financial Bid: *(5 points each, 10 points maximum)*
Involves pricing the components, labor, permits, shipping, additional soft costs. Calculate system price, payback period, maximizing incentives, minimizing demand charges, identifying potential energy efficiencies.

5 points Attested By: _____

5 points Attested By: _____

Possible Attachments: Copy of bid package

Create a System Design/Application Package: * *(10 points minimum, 20 points maximum)*
Involves creating a one-line drawing of the system, a plan view of the project, any structural assessment of the building where the system will be placed, make and model information of components, system component locations, product warranty information, racking system design, system grid connection details.

10 points *Attested By: _____

10 points Attested By: _____

Possible Attachments: Copy of one-line drawing(s), Copy of system components packing list

Size and Configure the Array:* *(5 points minimum, 10 points maximum)*
Determine the appropriate size of the array based on load demands, angle and azimuth, financial limitations, utility restrictions, utility net metering rules, future-proofing concerns, derate factors. Calculate string sizes and numbers. Calculate available space required for the array.

5 points *Attested By: _____

5 points Attested By: _____

Possible Attachments: Copy of interconnection agreement and/or design software array layout

Manage the Process for Obtaining Permits and Approvals: *(10 points each, 20 points maximum)*
Involves working with the client in creating the Permits and Approvals application package; submitting appropriate documentation to all authorities having jurisdiction, utilities, insurance companies, etc; obtaining all necessary permits.

10 points Attested By: _____

10 points Attested By: _____

Possible Attachments: Copy of application package, copy of permit(s)

Installing Arrays:* *(10 points each, minimum of **three system installs required***. Each system must be at least 2 kW in size. Maximum 50 points)*

Install a flush-to-roof, or ground mounted, or ballasted flat-roof array. Construct and/or attach the racking system. Attach the panels to the rack, configure and test the array based on the system design. Terminate the array in the appropriate combiner box and/or DC/AC disconnect.

10 points *Attested By: _____

10 points *Attested By: _____

10 points *Attested By: _____

10 points Attested By: _____

10 points Attested By: _____

Design the Wiring System:* *(10 points minimum, 20 points maximum)*

Identify the proper wire type for each circuit. Size the conductors and overcurrent protection for each circuit based on the ampacity of the array, temperature factors, voltage drop, voltage rise, conduit fill. Select appropriate conduit type. Ensure proper color coding of conductors. Calculate conduit expansion.

10 points *Attested By: _____

10 points Attested By: _____

Possible Attachments: Copy of one-line drawing(s), Copy of three-line drawing(s), Voltage drop calculations. Other pages as you develop.

Install and Terminate Conductors and Overcurrent Protection within the PV Source Circuit:* *(5 points minimum, 10 points maximum)*

Includes creating MC4 jumpers in the field. Configuring strings. Terminating conductors in the combiner box.

5 points *Attested By: _____

5 points Attested By: _____

Install and Terminate Conductors and Overcurrent Protection within the PV Output Circuit:* *(10 points minimum, 20 points maximum)*
Involves placing of conduit (buried and above ground), supporting conduit, bending conduit, pulling conductors through conduit between the combiner box (or junction box) and the DC disconnect. Involves terminating conductors at combiner box and DC disconnect.

10 points *Attested By: _____

10 points Attested By: _____

Install Load Side Utility Interconnection: *(10 points minimum, 20 points maximum)*
Involves placing conduit, supporting conduit, bending conduit, pulling conductors through conduit between the inverter and the point of utility interconnection (load side). Also involves making connection in service panel or other load side connection point.

10 points Attested By: _____

10 points Attested By: _____

Install Supply Side Utility Interconnection: *(15 points minimum, 15 points maximum)*
Involves placing conduit, supporting conduit, bending conduit, pulling conductors through conduit between the inverter and the point of utility interconnection (supply side). Also involves making connection in junction box or other supply side connection point.

15 points Attested By: _____

Design a Bonding and Grounding System: *(10 points each, 10 points maximum)*
Involves designing and sizing the equipment bonding, system grounding conductors, grounding electrodes, from the panels to the ground rods.

10 points Attested By: _____

Install and Test a Bonding and Grounding System: *(10 points each, 10 points maximum)*
Involves installing and testing the equipment bonding, system grounding conductors, grounding electrodes, from the panels to the ground rods.

10 points Attested By: _____

Install a Complete Microinverter System: *(10 points each, 10 points maximum)*
The installer was involved in the system installation process from start to finish. This involves matching inverters to panels, installing both. Connecting the inverters to the panels, terminating the branch circuit in an AC disconnect, connecting the AC disconnect to the load side connection. Configuring the reporting system for monitoring by the manufacturer. Checking output against anticipated results.

10 points Attested By: _____

Install a Complete Power Optimizer System: *(10 points each, 10 points maximum)*
The installer was involved in the system installation process from start to finish. This involves connecting the optimizers to the panels, terminating the circuit in an DC disconnect. Connecting the DCD to the fixed voltage inverter, connecting the inverter to the load side point of utility interconnection. Configuring the reporting system for monitoring by the manufacturer. Checking output against anticipated results.

10 points Attested By: _____

Install a Complete String Inverter System: *(10 points each, 10 points maximum)*
The installer was involved in the system installation process from start to finish. This involves matching the inverters to the array, installing both. Connecting the array to the combiner box, then to the DC disconnect, then to the inverter, then to the AC disconnect, and then to the load side point of utility. Configuring the reporting system for monitoring by the manufacturer. Checking output against anticipated results.

10 points Attested By: _____

Install a Complete Stand-Alone System: *(15 points each, 15 points maximum)*
The installer was involved in the system installation process from start to finish. This involves matching the inverter to the load demands, installing the battery bank, connecting the charge controller to the battery bank, then the battery bank to the inverter. Checking the output against anticipated results.

15 points Attested By: _____

Install a complete AC or DC Coupled System: *(15 points each, 15 points maximum)*
The installer was involved in the system installation process from start to finish. This involves matching the inverter to the system demands, calculating critical loads, installing the battery bank, connecting the charge controller to the battery bank, then the battery bank to the inverter or installing a battery-based inverter with battery pack. Checking the output against anticipated results.

15 points Attested By: _____

Install a three-phase inverter and make a three-phase load-side connection:
(10 points each, 10 points maximum)

10 points Attested By: _____

Design a Battery Bank System against Load Demands: *(5 points each, 10 points maximum)*
Select the appropriate battery, charge controller, determine the Ah required, configure the bank. Size wire for connections.

5 points Attested By: _____

5 points Attested By: _____

Possible Attachments: Battery bank sizing calculations

Install and Test a Battery Bank: *(5 points each, 10 points maximum)*

5 points Attested By: _____

5 points Attested By: _____

Install an Electric Vehicle Charging Station: *(10 points each, 10 points maximum)*

10 points Attested By: _____

Manage a Project: *(20 points each, 40 points maximum)*
The installer was involved in the system installation process from start to finish. This involves preparing the bid package, managing the crew, managing the budget, managing the project schedule, overseeing system commissioning, orientation to the system with the client.

20 points Attested By: _____

20 points Attested By: _____

Possible Attachments: Copy of of project budget, schedule, Gantt Chart, Pert Chart

Commission a System: *(10 points each, 20 points maximum)*
Conduct a complete commissioning of an installed system, testing connections, polarity, grounding, voltage and current tests, system function tests and verify energy production given operational conditions.

10 points Attested By: _____

10 points Attested By: _____

Possible Attachments: Copy of commissioning checklist

Conduct an Insulation Test using a Megohmmeter: *(5 points each, 5 points maximum)*

5 points Attested By: _____

Conduct an Earth Resistivity Test: *(5 points each, 5 points maximum)*

5 points Attested By: _____

Properly label a PV system in compliance with NEC requirements*: *(5 points each, 5 points maximum)*

5 points Attested By*: _____

Test a lead-acid battery bank using a hydrometer: *(5 points each, 5 points maximum)*

5 points Attested By: _____

Create system operation and maintenance documentation and conduct orientation with client. *(5 points each, 5 points maximum)*

5 points Attested By: _____

Possible Attachments: Copy of O&M document

Reference Contact Information:

Name: _____

Address: _____

Phone Number: _____

E-Mail Address: _____

Relationship to Applicant: _____
(ie: employer, supervisor, customer)

Name: _____

Address: _____

Phone Number: _____

E-Mail Address: _____

Relationship to Applicant: _____
(ie: employer, supervisor, customer)

Certification Maintenance Requirements:

Once certified, the PV2 certification is valid for four (4) years. To maintain the certification, the successful candidate must pay an annual $25 maintenance fee. This maintenance fee also provides membership in ETA. https://www.eta-i.org/maintenance.html webpage explains how Hands-On maintenance will renew the certification at the end of the four year term. The certification holder must submit proof of completion of 24 hours of continuing education earned throughout the four year term. This education can be provided by any legitimate provider (and in any broadly accepted format, ie: in class, electronic, web-based). ETA accepts a fairly broad range of educational topics as acceptable, provided a reasonable person could assess the program and determine that it would be helpful to a PV installer in carrying out the job duties associated with the industry. For example, training in photovoltaics, electricity, electrical systems, codes and standards, business practices, marketing, customer relations, financial accounting, etc. are all considered.

Thank You. ETA appreciates your efforts. We are proud to provide you an opportunity to earn an advanced photovoltaic certification. Review the O*Net page , scroll down to **Credentials** and click the **Find Certifications** button: Photovoltaic Installer/Designer