



# IECRE OPERATIONAL DOCUMENT

**IEC System for Certification to Standards relating to Equipment for use in  
Renewable Energy applications (IECRE System)**

**Conditional PV plant certificate**



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**Conditional PV plant certificate**

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## IECRE

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**CONDITIONAL PV PLANT CERTIFICATE****INTRODUCTION**

Assessment of a PV system requires oversight of the design and manufacture of the components as well as the design, installation, and operation of the system. A Conditional PV Plant Certificate may be completed at the time a PV system is commissioned as described in this document. The Annual PV Plant Performance Certificate builds on the Conditional PV Plant Certificate and is based on a full year of operation so as to quantify the observed performance of the system and document conformance to accepted maintenance procedures as described in OD-402.

**1 Scope**

This Operational Document defines the requirements for issuance of a Conditional PV Plant Certificate that covers the electrical, mechanical, and civil work of the PV plant based on conformance assessment to the relevant IEC and other international standards to ensure if they are installed and functioning as designed.

**2 Normative references**

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61215 series

IEC 61724-1 *Photovoltaic system performance – Part 1: Monitoring*

IEC 61724-2 *Photovoltaic system performance – Part 2: Capacity evaluation method*

IEC 61730 series

IEC 62109 series

IEC 62790, *Junction boxes for photovoltaic modules - Safety requirements and tests*

IEC 62446-1 *Grid connected photovoltaic (PV) systems – Part 1: Minimum requirements for system documentation, commissioning tests and inspection*

IEC 62446-2 *Grid connected photovoltaic (PV) systems – Part 2: Maintenance of PV systems*

IEC 62548 *Photovoltaic (PV) arrays – Design requirements*

and/or IEC/TS 62738 *Design guidelines and recommendations for photovoltaic power plants*

IEC/TS 63049 *Guideline for increased confidence in PV system installation and operations and maintenance (installations aspects only)*

IECRE 01 *System Basic Rules*

IECRE 02 *System Rules of Procedure*

IECRE 04 *PV-OMC Rules of Procedure*

ISO/IEC 17020 *Conformity assessment – Requirements for the operation of various types of bodies performing inspection*

ISO/IEC 17025 *General Requirements for the Competence of Testing and Calibration Laboratories*

ISO/IEC 17065 *Conformity assessment – Requirements for bodies certifying products, processes and services*

### **3 Terms and definitions**

For the purposes of this document, the terms and definitions given in the International Electrotechnical Commission Glossary (<http://std.iec.ch/glossary>) and the following apply.

#### **3.1 Modular approach (power block product)**

A power block may be identified and assessed in a modular fashion for its system design and component compliance to the relevant standards. Details of the power block that can be reconfigured for a different site or climate shall be identified as part of the initial assessment.

A power block certificate can then be issued covering those aspects that are constant across all sites. This power block certificate is intended to be portable across future sites as long as the fundamental design remains constant.

Any aspects requiring changes to the power block configuration due to site-specific requirements are covered under the scope of the site conformity certificate.

### **4 General Provisions**

The normative ISO/IEC references define the general program requirements for RECB and REIB operating under the PV program.

Additional requirements and definitions for RECBs and REIBs operating the PV program are described in IECRE 01, IECRE 02, and IECRE *04 PV OMC Rules of Procedure*.

### **5 Documentation of Equipment Certificates and Oversight of Quality Management**

This verification of certificates shall be performed by the RECB in charge of the conditional PV plant certificate.

PV modules shall be certified according to IEC 61215 and IEC 61730, including any special tests defined in the relevant part of the IEC 61215 series (for example, IEC 61215-1-1 for crystalline silicon modules). This certification shall be done according system 5 of ISO/IEC 17065 through an accredited certification body for the IEC 61215.

The PV module manufacturer's Quality Management System (QMS) shall be certified to IEC/TS 62941 at the time of manufacture of the modules. Any findings of the subsequent factory audit are included either in the Conditional or Annual PV Plant Performance Certification documentation as indicated in the report template..

PV inverters shall be type-certified to IEC 62093 and IEC 62109. This certification shall be done according system 5 of ISO/IEC 17065 through an accredited certification body for the IEC 62109.

Solar trackers (if used) shall be type-certified to IEC 62817. This certification shall be done according system 5 of ISO/IEC 17065 through an accredited certification body for the IEC 62817. For existing PV power plants it is acceptable, that other IEC standards apply.

CB certificate with FCS scheme can be valid for the product certification.

A copy of each certificate shall be included.

## 6 Documentation of System Design Certificate

This verification of certificate shall be performed by the RECB in charge of the conditional PV plant certificate.

The design of the PV system shall be certified to IEC 62548 (or IEC/TS 62738 if applicable).

A copy of the certificate shall be included.

## 7 Certificate for Commissioning of the PV system

This evaluation shall be performed by the RECB based in the report of the REIB.

The PV system shall be commissioned according to IEC 62446-1 for one of the categories listed in Table 2 and as documented in the test report defined in IEC 62446-1 Section X.

A copy of the IEC 62446-1 Inspection Report shall be included with the Conditional PV Plant Certificate.

Table 1. IEC 62446-1 requirements for PV system maintenance by category

Plant Type	IEC 62446-1 Category
U1 – Utility	2
U2 – Residential	1
U3 – Commercial	2
U4 – Distributed	1

Definition from IEC 62446-1:

- Category 1 tests – The minimum requirement - A standard set of tests that shall be applied to all systems
- Category 2 tests – An expanded sequence of tests that assumes all category 1 tests have already been undertaken

## 8 PV System Performance Test Results

This evaluation shall be performed by the RECB based in the report of the REIB.

The system performance shall be recorded according to Table 3 and with guidance described below.

Table 3. IEC 61724 requirements for PV system performance measurements by category

Plant Type	U1 – Utility	U2 – Residential	U3 – Commercial	U4 – Distributed
IEC 61724 Class	A	C	B	B
Measurements				
Output power measurement as described in IEC 61724-2 and associated reference conditions	X	X	X	X

### 8.1 Output power measurement

The AC output power,  $P_{out}$ , as defined in Table 3 and section 7.6 of IEC 61724-1 is measured for reference test conditions using the method described in IEC 61724-2. The reference test conditions used for IEC 61724-2 shall be reported along with the output power measurement result. If applicable, the plant performance is reported both for constrained and unconstrained operation as described in Section 8, item 15 in IEC 61724-2.

### 8.2 Performance ratio

The ratio of the measured to the modelled (power) performance, as defined in IEC 61724-1 and as measured in IEC 61724-2 is reported for the same period as the output power.

## 9 Test report

This evaluation shall be performed by the RECB based in the report of the REIB.

The final test report will include the test reports created by execution of the measurements in IEC 61724-2. In addition, the Conditional PV Plant Certificate will include the following using the template in Annex A and the standardized digital format in Annex B.

- 1) Description of the party doing the test
- 2) Description of the site being tested, including latitude, longitude, and altitude
- 3) Description of the system being tested including DC and AC power ratings, module model and manufacturer, inverter model and manufacturer, tilt and azimuth
- 4) Documentation of applicable equipment and design certificates including date of completion and reference to full report
- 5) Documentation of system commissioning (with IEC 62446-1 Test Report attached)
- 6) Documentation of system maintenance plan (with procedures attached)
- 7) Summary of the test results generated during execution of IEC 61724-2 as indicated in Section 9 for the Certificate class
- 8) A list of any irregularities observed



**Annex A: Template for Conditional PV Plant Certificate**

<p><b>Conditional PV Plant Certificate</b></p> <p><b>Certificate Type: _____ *</b></p>
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\*(refer to Table 1 for types)

Client	
Installation Address	
Latitude Longitude Altitude	
Test date	
Contractor name and address	

System Description (brief)	
Rated power – kW DC	
Rated power – kW AC	
Location	
Module type	
Inverter type	
Tilt	
Azimuth	
Anything else?	

I / we being the person(s) responsible for the issuance of the Conditional PV Plant Certificate for the electrical installation (as indicated by the signature(s) below), particulars of which are described above, having exercised reasonable skill and care when carrying out the design construction, inspection and testing, hereby certify that the said work for which I/we have been responsible is, to the best of my/our knowledge and belief, in accordance with .....

<p>Signature(s):</p>  <p>Name(s):</p>  <p>Date:</p>  <p>(The extent of liability of the signatory(s) is limited to the work described above)</p>	<p>COMMENTS:</p>          
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**Documentation of Modules**

**Documentation of Module Sources**

Module lot identification*	Factory ID	Manufacture start date	Manufacture end date

\* If modules were manufactured at multiple locations or at multiple times, the certifications below must be verified for each batch by duplicating the table below for each batch.

**Conditional PV Plant Certificate Test Results**

**Documentation of Module Certificates\***

Certificate name	Reference (entity completing test and document reference number)	Date	Resolution of findings
PV module type certificate according to IEC 61215 and IEC 61730			Not applicable
Factory QMS registration or recent surveillance before manufacture date according to IEC 62941**			
Factory QMS annual surveillance after manufacture date according to IEC 62941***			

\* If components were manufactured at multiple locations or at multiple times, the certifications must be verified for each batch.

\*\* Results of the QMS audit(s) are summarized in next table.

\*\*\* The follow up surveillance is required at the time of the Conditional PV Plant Certification if the date of the Certification falls after the initial IEC 62941 Factory Audit has expired as defined in the Rules of Procedure. The second audit is optional at the time of the Conditional PV Plant Certification if the initial IEC 62941 Factory Audit is current, but is then required as part of the Annual PV Plant Performance Certification.

**Documentation of Inverter Certificates\***

<b>Certificate name</b>	<b>Reference (entity completing test and document reference number)</b>	<b>Date</b>	<b>Resolution of findings</b>
PV inverter type certificate according to IEC 62093 and IEC 62109			Not applicable
Factory QMS audit certificate before manufacture date according to IEC/TS63157 or equivalent**			
Factory QMS audit certificate after manufacture date according to IEC/TS63157 or equivalent***			

\* If inverters were manufactured at multiple locations or at multiple times, the certifications must be verified for each batch.

\*\* Results of the QMS audit(s) are summarized in next table.

\*\*\* The second audit is required at the time of the Conditional PV Plant Certification if the date of the Certification falls after the initial ISO 9001 Factory Audit has expired as defined in the Rules of Procedure. The second audit is optional at the time of the Conditional PV Plant Certification if the initial ISO 9001 Factory Audit is current, but is then required as part of the Annual PV Plant Performance Certification.

**Documentation of Solar tracker Certificates\***

<b>Certificate name</b>	<b>Reference (entity completing test and document reference number)</b>	<b>Date</b>	<b>Resolution of findings</b>
PV solar tracker type certificate according to IEC 62817 and IEC 62109			Not applicable
Factory QMS audit certificate before manufacture date according to ISO 9001 or equivalent**			
Factory QMS audit certificate after manufacture date according to ISO 9001 or equivalent***			

\* If solar tracker were manufactured at multiple locations or at multiple times, the certifications must be verified for each batch.

\*\* Results of the QMS audit(s) are summarized in next table.

\*\*\* The second audit is required at the time of the Conditional PV Plant Certification if the date of the Certification falls after the initial ISO 9001 Factory Audit has expired as defined in the Rules of Procedure. The second audit is optional at the time of the Conditional PV Plant Certification if the initial ISO 9001 Factory Audit is current, but is then required as part of the Annual PV Plant Performance Certification

### Documentation of System Installation – Design Review

Certificate name	Reference (entity completing test and document reference number)	Date	Resolution of findings
Certificate for design of the PV system according to IEC 62548 (or IEC/TS 62738 if applicable).*			

\* Results of the design audit are summarized in next table.

### Documentation of System Installation – Quality management

Certificate name	Reference (entity completing test and document reference number)	Date	Resolution of findings
QMS audit certificate of installation process according to IEC 63049*			
QMS audit certificate of O&M process according to IEC 63049, referencing IEC 62446-2*			

\* Results of the QMS audit(s) are summarized in next table.

### Documentation of Audit Findings for Installation and O&M

Finding (non conformity identified during IEC 63049 audit)	Severity (Serious = could lead to failure; Moderate = severity unknown; Cosmetic = unlikely to affect product function)	Date of finding	Date of resolution	Comment

### Certificate for Commissioning of PV System

Applicable standard	Reference (entity completing test and document reference number)	Date
IEC 62446-1		

### Documentation of Audit Findings for Commissioning

Finding (issues or concerns identified during IEC 62446-1)	Severity (Serious = could lead to failure; Moderate = severity unknown; Cosmetic = unlikely to affect product function)	Date of finding	Date of resolution	Comment

### PV System Performance Test Results

Test or measurement	Result	End date of test period	Reference conditions
Output Power according to IEC 61724-2, section 8, item 15, including uncertainty of measurement	+ kW kW		W/m <sup>2</sup> °C
Performance index for power generated at TRC as defined in IEC 61724-2, section 8, item 15	%		W/m <sup>2</sup> °C

### Annex B: Digital Template for Conditional PV Plant Certificate

The following provides a consistent format for data reporting to facilitate data base creation.

Field name	Example	Units
<b>Certificate_number</b>	<b>IECREPV458976.1</b>	<b>N</b>
<b>Certificate_type</b>	<b>F</b>	<b>Milestone</b>
Name_of_System	<b>Hypothetical Ground-mount System #1</b>	
Certificate_holder	<b>PG&amp;E</b>	
Authorized_viewer1	<b>Wells Fargo</b>	
Authorized_viewer2		
Authorized_viewer3		
Authorized_viewer4		
System-type	<b>U1L1</b>	<b>usage,architecture</b>
Geo_Location		<b>deg/deg</b>
System_Capacity_contract	<b>100000</b>	<b>kW</b>
System_Capacity_measured	<b>998000</b>	<b>kW</b>
System_Capacity_ppi	<b>.995</b>	<b>Ratio</b>
Uncertainty_sc	<b>1.5</b>	<b>%</b>
<b>Timestamp</b>	<b>2015.05.21.08.05.01</b>	<b>yyyy.mm.dd.hh.mm.ss</b>
Availability_contract	<b>99</b>	<b>%</b>
Certifier	<b>TUVR</b>	<b>Name</b>

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