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IECRE OPERATIONAL DOCUMENT

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

Conditional PV plant certificate

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

PRICE CODE

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IECRE

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.

Commented [MT1]: Removed as per PV-OMC/199/RV

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*

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

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

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

68 3 Terms and definitions

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

71 3.1 Modular approach (power block product)

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

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

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

80 4 General Provisions

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

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

85 5 Documentation of Equipment Certificates and Oversight of Quality 86 Management

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

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

Commented [MT2]: Added as per PV-OMC/199/RV

93 The PV module manufacturer's Quality Management System (QMS) shall be certified to IEC/TS
94 62941—at the time of manufacture of the modules. For any assessment that is completed and
95 issued by 31 December 2024, ISO 9001 will be acceptable. Any findings of the subsequent
96 factory audit are included either in the Conditional or Annual PV Plant Performance Certification
97 documentation as indicated in the report template.

98 PV inverters shall be type-certified to ~~IEC 62093~~ and IEC 62109 unless there are local/national
99 requirements which differ from the standard. These differences need to be stated into the report.

100 This certification shall be done according to system 5 of ISO/IEC 17065 through an accredited
101 certification body for the IEC 62109.

Commented [MT3]: Added as per PV-OMC/199/RV

102 Solar trackers (if used) shall be type-certified to IEC 62817. This certification shall be done
103 according to system 5 of ISO/IEC 17065 through an accredited certification body for the IEC
104 62817. For existing PV power plants it is acceptable, that other IEC standards apply.

Commented [MT4]: Added as per PV-OMC/199/RV

105 Storage systems using into the installations shall be type certified according with the IEC
106 standards applicable, for example converter shall comply IEC 62109, batteries IEC 60086 series
107 and Battery management systems IEC 61010-1.

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

109 A copy of each certificate shall be included.

110 **5.1. Component Acceptance Certificate.**

111 Component Acceptance Certificate will be issued for each PV power plant in order to verify the
112 quality of the critical components. This Certificate will include the data of the components,
113 quality control and name of the PV power plant project.

114 The next components shall be verified to issue the Component acceptance certificate:

- 115 • PV module.
- 116 • PV inverter.
- 117 • Storage systems.
- 118 • Solar trackers (if applicable).

119 Verification shall be done in 2 phases:

120 1. Component certificates performed by RECB. Each component below mentioned shall
121 comply with the specific IEC safety standard. For PV modules: IEC 61215 series and
122 IEC 61730 series, PV inverter IEC 62109 series, solar trackers IEC 62817 and storage
123 systems IEC 62109 for converter; IEC 60086 for batteries and IEC 61010-1 for Battery
124 Management System (BMS).

125 This compliance shall be guarantee by CB certificate or Type certificate issued by a
126 Certification body.

127
128 2. Factory evaluation. REIB shall verify through CIG 0-23 the factory process of the product
129 to include into the Component Acceptance Certificate. This inspection is only valid for
130 the project subject of evaluation

131 Conditional certificate for PV system can be issued in case of CAP was performed.

132 **6 Documentation of System Design Certificate**

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

135 The design of the PV system shall be certified to IEC 62548 (or IEC/TS 62738 if applicable)
136 unless there are local/national requirements which differ from the standard. These differences
137 need to be stated into the report.

138 A copy of the certificate shall be included.

139 **7 Certificate for Commissioning of the PV system**

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

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

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

Commented [MT5]: Modified as per PV-OMC/199/RV

145 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

146 Definition from IEC 62446-1:

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

151

152 **8 PV System Performance Test Results**

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

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

156 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

157 **8.1 Output power measurement**

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

163 **8.2 Performance ratio**

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

166

167

168 ~~9—PV System Performance Test Results~~

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

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

172 ~~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

173 ~~9.1—Output power measurement~~

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

179 ~~9.2—Performance ratio~~

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

182 ~~409~~ **Test report**

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

184 The final test report will include the test reports created by execution of the measurements in IEC
 185 61724-2. In addition, the Conditional PV Plant Certificate will include the following using the template
 186 in Annex A and the standardized digital format in Annex B.

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

198

Commented [MT6]: Duplicate of section 8, deleted as per PV-OMC/199/RV

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Annex A: Template for Conditional PV Plant Certificate

<p>Conditional PV Plant Certificate Certificate Type: _____ *</p>
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200

*(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*

Certificate name	Reference (entity completing test and document reference number)	Date	Resolution of findings
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*

Certificate name	Reference (entity completing test and document reference number)	Date	Resolution of findings
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 ² °C
Performance index for power generated at TRC as defined in IEC 61724-2, section 8, item 15	%		W/m ² °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
Certificate_number	IECREPV458976.1	N
Certificate_type	F	Milestone
Name_of_System	Hypothetical System #1 Ground-mount	
Certificate_holder	PG&E	
Authorized_viewer1	Wells Fargo	
Authorized_viewer2		
Authorized_viewer3		
Authorized_viewer4		
System-type	U1L1	usage,architecture
Geo_Location		deg/deg
System_Capacity_contract	100000	kW
System_Capacity_measured	998000	kW
System_Capacity_ppi	.995	Ratio
Uncertainty_sc	1.5	%
Timestamp	2015.05.21.08.05.01	yyyy.mm.dd.hh.mm.ss
Availability_contract	99	%
Certifier	TUVR	Name

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