Minimum Content of the Commissioning Test Report

Overview

The Commissioning Test Report describe here summarises and documents all the tests performed by the Contractor for implementing a solar PV System.

The Consumer (through his Contractor) should submit to Kahramaa the results of his commissioning tests.

The objective is to list a minimum set of information that a Contractor is required to present to Kahramaa after the commissioning of the PV System.

General information

Type of document: Report
Type of file: PDF
Number of documents: 1

Description	Notes
Frontpage	
Meaningful name of the project	
Subject ("Commissioning Test Report" or similar)	
Test engineer (mandatory)	Name and Signature
Installer (mandatory)	Name and Signature
Designer (if present)	Name and Signature
Inspector (if present)	Name and Signature
Inspector (if present)	Name and Signature
Inspector (if present)	Name and Signature
Date (Year, Month, Day)	With any updates

Description	Result / value
Content	
PV module installation	□ On building □ Other structure (e.g. canopy) □ Ground
Building installation (if applicable)	□ Flat rooftop □ Roof flap □ Façade □ Other
Building type (if applicable)	□ Villa or small household □ Apartment block □ Offices □ School/University □ Healthcare/Hospital □ Industrial □ Hotel/Restaurant □ Entertainment □ Agricultural/Stable □ Detention/Correctional □ Other . . . . .
Area of the PV array [m^2]	
PV technology	□ Mono-crystalline silicon □ Multi-crystalline silicon □ Thin-film (specify) . . . . . □ Other (specify) . . . . .
Tracking system if any	□ No tracking □ Single-axis tracking □ Two-axes tracking

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AC System

Type of document: Table
Type of file: PDF
Number of documents: 1

Description	Result / value
Content	
Means of isolating the Inverter has been provided on the AC side	☐ Yes ☐ No
All isolation and switching devices have been connected such that PV installation is wired to the "load" side and the public supply to the "source" side	☐ Yes ☐ No
In case of an RCD is installed to the AC circuit feeding an Inverter, the RCD shall ensure that it has been selected according to the requirements of IEC 62548	☐ Yes ☐ No ☐ N/A
Inverters fully compliant with the *standards for Solar PV Systems*	☐ Yes ☐ No
Interface protection (IP) is external to Inverter (s)	☐ Yes ☐ No (informative)
Interface protection (IP) – internal or external – fully compliant with the *standards for Solar PV Systems*	☐ Yes ☐ No
The interface device compliant with the *standards for Solar PV Systems*	☐ Yes ☐ No
The backup interface device is compliant with *standards for Solar PV Systems*	☐ Yes ☐ No ☐ N/A
A UPS to support the Interface protection system is present	☐ Yes ☐ No ☐ N/A

Labelling and Identification

Type of document: Table
Type of file: PDF
Number of documents: 1

Description	Result / value
Content	
All circuits, protective devices, switches and terminals suitably labelled to the requirements of IEC 60364 and IEC 62548	☐ Yes ☐ No
All DC junction boxes (PV generator and PV array boxes) carry a warning label indicating that active parts inside the boxes are fed from a PV array and may still be energised after isolation from the PV inverter and public supply	☐ Yes ☐ No ☐ N/A
Means of isolation on the AC side is clearly labelled	☐ Yes ☐ No
Dual supply warning labels are fitted at the point of interconnection	☐ Yes ☐ No
A single line wiring diagram is displayed on site	☐ Yes ☐ No
Installer details are displayed on site	☐ Yes ☐ No
Shutdown procedures are displayed on site	☐ Yes ☐ No
Emergency procedures are displayed on-site (where relevant)	☐ Yes ☐ No ☐ N/A
All signs and labels are suitably affixed and durable	☐ Yes ☐ No

Minimum Content of the Commissioning Test Report

Fire Protection (Only for PV Systems on Buildings)

Type of document: Table
Type of file: PDF
Number of documents: 1

Description	Result / value
Content (all PV Systems on buildings)	
A manual emergency system for the disconnection of the PV modules from the internal electric plant of the building operates in one of the ways indicated.	☐ DC outside ☐ AC outside ☐ Fire-compartment ☐ Not present
In case there is a passage of cables from PV modules inside the building before the disconnector, the cables inside the building should be placed in trunking with fire-rated protection of at least one-half-hour	☐ Yes ☐ No ☐ N/A
Except for One-and-Two-Family Dwelling, electrical disconnection is operated by a manual call point with all the following characteristics: – installed at the height of 1.1 – 1.4 m above floor level, in a plain, accessible, well-lit and free-hindrance place – close to external access to be easily operated by personnel or firefighters – in accordance with NFPA 72 and a proper label indicate that it actuates the disconnection of the PV plant	☐ Yes ☐ No
Each PV array equipped with an earth fault detector that preferably shuts down the array in case of failure	☐ Yes ☐ No ☐ N/A
A simplified site plan with the position of PV modules, cables and disconnectors is exposed close to the main energy meter. If a manual call point is present in the building, a further copy of the simplified site plan is exposed on the side.	☐ Yes ☐ No
The area where PV modules, cables and other equipment are located, if accessible, marked by proper signs. They are also placed in correspondence with each PV plant access door. The same signs indicate cables before disconnectors and are placed every 5 meters along the cable. The signs are UV resistant and indicate the DC voltage as the Open Circuit Voltage at STC of the PV array. Their minimum size is 200 × 200 mm (w × h).	☐ Yes ☐ No
Content (Building Attached PV – BAPV only)	
Adoption of one of these measures when the PV system is installed on a rooftop	☐ PV modules placed on a roof made of non-combustible material ☐ Interposition of a non-combustible layer between PV modules and the roof (at least ½ hour fire-rated) ☐ A new risk assessment is required ☐ None of the above

Minimum Content of the Commissioning Test Report

Description	Result / value
PV modules, wirings and other equipment do not cover any possible ventilation systems on the roof, e.g. skylights, smoke extraction systems or chimneys	☐ Yes ☐ No
PV components and wirings are placed at a minimum distance of 1 m (top view) from the perimeter of the ventilation systems and according to the manufacturer's prescriptions	☐ Yes ☐ No
PV components and wirings are placed at a minimum distance of 0.5 m (top view) from the perimeter of skylights, chimneys or other openings	☐ Yes ☐ No
Components and equipment installed internally or externally do not obstruct in any way the existing means of egress	☐ Yes ☐ No
The minimum elevation of the PV modules above the roof of 50 mm	☐ Yes ☐ No
Content (Building Integrated PV – BIPV only)	
In the case of BIPV, verify if they are not installed in compartmented fire areas, at least one of these further measures is adopted	☐ The manual call point also disconnects or short-circuits PV modules having an open circuit voltage not greater than 120 VDC ☐ An AFCI to protect the DC side from series arcs according to NEC Section 690.11 and UL 1699B is installed ☐ None of the above
Where applicable, PV modules, wirings, switchboard assemblies and other equipment do not cover any possible ventilation systems on the roof, e.g. skylights, smoke extraction systems or chimneys	☐ Yes ☐ No ☐ N/A
Where applicable, PV components and wirings are placed at a minimum distance of 1 m (top view) from the perimeter of the ventilation systems and in accordance with the manufacturer's prescriptions	☐ Yes ☐ No ☐ N/A
Where applicable, PV components and wirings are placed at a minimum distance of 0.5 m (top view) from the perimeter of skylights, chimneys or other openings	☐ Yes ☐ No ☐ N/A
Where applicable, components and equipment installed internally or externally do not obstruct in any way the existing means of egress	☐ Yes ☐ No ☐ N/A
Content (Households only)	
The back-sheet, the junction box and the wiring of each PV module are compliant with at least one of these conditions	☐ Not reachable without a proper provisional tool (stair, scaffold, etc.) ☐ Protected with at least IPXXA degree (the back of the hand) ☐ None of the above ☐ N/A

Minimum Content of the Commissioning Test Report

Description	Result / value
When the spacing between rows of supporting structures exceeds 0.5 m, the connections are placed on the floor, not higher than 50 mm, without sharp edges and clearly visible. They withstand the weight of a person (100 kg).	☐ Yes ☐ No ☐ N/A
Ballasts and their arrangements are clearly visible and without sharp edges	☐ Yes ☐ No ☐ N/A
Electrical connections between the PV array and combiner boxes or inverters preferably do not interfere with existing passages for people. In the case of passage crossing, the connections should be placed on the floor, not higher than 50 mm, without sharp edges and clearly visible. The top of the trunking and the floor surface should be matched with sloped surfaces to avoid the step. This trunking withstands a weight of a person (100 kg).	☐ Yes ☐ No ☐ N/A

Minimum Content of the Commissioning Test Report

PV Array Test Report

Type of document: Table
Type of file: PDF
Number of documents: Depending on the number of strings

Content						
PV Array number						
Sheet number						
Array	String reference	1	2	3	4	5
	PV module					
	Quantity					
Array parameters (as specified)	$V_{oc\text{-}stc}$ [V]					
	$I_{sc\text{-}stc}$ [A]					
String overcurrent protective device	Type					
	Rating [A]					
	DC rating [V]					
	Capacity [kA]					
String wiring	Type					
	Cross-sect [mm^2]					
String test	V_{oc} [V]					
	I_{sc} [A]					
	Irradiance [W/m^2]					
Polarity check OK		☐ Y ☐ N	☐ Y ☐ N	☐ Y ☐ N	☐ Y ☐ N	☐ Y ☐ N
Array insulation resistance	Test voltage [V]					
	Pos – Earth [MΩ]					
	Neg – Earth [MΩ]					
Earth continuity (where fitted) ☐ N/A		☐ Y ☐ N	☐ Y ☐ N	☐ Y ☐ N	☐ Y ☐ N	☐ Y ☐ N
Array isolator	Rating [A]					
	Rating [V]					
	Location					
	Functional check					
Inverter	Manuf. and model					
	Serial number					
	Functioning OK					

Minimum Content of the Commissioning Test Report

Monitoring System
Type of document: Table
Type of file: PDF
Number of documents: 1

Description	Result / value
Content (General information)	
Sampling interval [s]	
Recording interval [min]	
Start test: date and time [dd/mm/yyyy hh:mm]	
Stop test: date and time [dd/mm/yyyy hh:mm]	
Valid data in the time interval [%]	
Class of the monitoring system used	☐ A ☐ B ☐ C

Content (sensors)				
Sensor	**Type**	**Accuracy**	**Manufacturer and model**	**Calibration**
In-plane irradiance (POA)	☐ Pyranometer ☐ PV Cell ☐ Photodiode ☐ Esteemed			☐ Yes ☐ No
Global Horizontal Irradiance	☐ Pyranometer ☐ PV Cell ☐ Photodiode ☐ Esteemed ☐ N/A			☐ Yes ☐ No ☐ N/A
PV module temperature	☐ Measured ☐ Esteemed ☐ N/A			☐ Yes ☐ No ☐ N/A
Ambient air temperature	☐ Measured ☐ Esteemed			☐ Yes ☐ No
Wind speed	☐ Measured ☐ Esteemed ☐ N/A			☐ Yes ☐ No ☐ N/A
Wind direction	☐ Yes ☐ No ☐ N/A			☐ Yes ☐ No ☐ N/A
Soiling ratio	☐ Yes ☐ No ☐ N/A			☐ Yes ☐ No ☐ N/A
Array voltage (DC)	☐ Yes ☐ No ☐ N/A			☐ Yes ☐ No ☐ N/A
Array current (DC)	☐ Yes ☐ No ☐ N/A			☐ Yes ☐ No ☐ N/A
Array power (DC)	☐ Yes ☐ No ☐ N/A			☐ Yes ☐ No ☐ N/A
Output voltage (AC)	☐ Yes ☐ No ☐ N/A			☐ Yes ☐ No ☐ N/A
Output current (AC)	☐ Yes ☐ No ☐ N/A			☐ Yes ☐ No ☐ N/A
Output power (AC)	☐ Yes ☐ No			☐ Yes ☐ No
Output energy	☐ Yes ☐ No			☐ Yes ☐ No
Output power factor	☐ Yes ☐ No ☐ N/A			☐ Yes ☐ No ☐ N/A

Minimum Content of the Commissioning Test Report

Content (sensors)				
Sensor	**Type**	**Accuracy**	**Manufacturer and model**	**Calibration**
Reduced load demand	☐ Yes ☐ No ☐ N/A			☐ Yes ☐ No ☐ N/A
System output power factor request	☐ Yes ☐ No ☐ N/A			☐ Yes ☐ No ☐ N/A

PV System Performance

Type of document: Report
Type of file: PDF
Number of documents: 1

Description	Result / value
Content	
Time interval (hours)	
Total in-plane solar radiation (kwh/m^2)	
Energy Production (kWh)	
Performance Ratio (PR)	