Clean Energy Council

GRID-CONNECTED PV SYSTEMS (No Battery Storage)
Installation, Testing and Commissioning Checklist
for Accredited Installers and Supervisors

Clean Energy Council ACCREDITED

INSTALLATION CHECKLIST

PV ARRAY

Mounted flat on roof ☐
Building integrated ☐
Mounted on tilted array frame ☐
PV Array tilt ……°
PV Array orientation ……°
Solar array is securely fixed ☐

Details……
Timber used is suitable for external use or is properly sealed ☐
No dissimilar metals are in contact with the array frames or supports ☐
Roof penetrations are suitably sealed and weatherproofed ☐
PV wiring losses are less than 5% at the maximum current output of the array ☐
Weatherproof isolator is mounted immediately adjacent to the array ☐
Wiring is protected from UV and mechanical damage ☐

INVERTER

Double pole DC isolator (or DC circuit breaker mounted close to input of the inverter (Rating. ……A) ☐
Isolator mounted on output of the inverter (can be part of inverter) ☐
AC circuit breaker mounted within the switchboard to act as main switch for the PV / inverter system. (Rating …….. A) ☐
Inverter is housed in weatherproof enclosure or inside building ☐
Adequate space and ventilation for inverter ☐

LV DC CABLING

Is clearly identified in accordance with these guidelines ☐

SIGNAGE (White on Red) AS 4777.1 and Appendix A

WARNING Dual Supply Isolate Both Normal and Solar Supplies before working on this	is permanently fixed on the switchboard. ☐
Normal Supply MAIN SWITCH	is permanently fixed to main switch ☐
Solar Supply MAIN SWITCH	is fixed on main solar switch ☐

If the solar system is connected to a distribution board then the following sign is located on main switchboard and all intermediate distribution boards ☐

WARNING
DUAL SUPPLY
ISOLATE SOLAR SUPPLY AT DISTRIBUTION BOARD DB???

Where the inverter is not adjacent to the main switchboard, location information is provided ☐

Warning and Advisory Signs AS/NZS5033 Appendix G

SOLAR DC — is permanently fixed on array junction boxes (Black on White) ☐

SOLAR ARRAY
ON ROOF

Open circuit voltage: 220 V
Short circuit current: 20 A

Colour: White on red

Fire Emergency information is permanently fixed on the main switchboard ☐
(White on Red)

Shutdown procedure is permanently fixed at inverter and/or on main switchboard ☐

230-240 VOLT (LV) INSTALLATION

All low voltage wiring has been installed by a licensed electrical tradesperson ☐
All wiring has been tested and approved by a qualified electrical tradesperson ☐

This checklist is based on the Clean Energy Council's GC Design and Installation Guidelines. The Guidelines demonstrate the latest industry "best practice" and are to be read in conjunction with the relevant Australian Standards.

AUTHORISATION : I, ……

CEC Accreditation number …… verify that the following system has been installed to the standard indicated by these guidelines and complies with all applicable Australian Standards

Name of the person for whom the system was installed ……..

Location of system ……..

signed …….. Date : / / *Attach a separate sheet detailing any departures*

TESTING and COMMISSIONING

PV ARRAY- DC

NOTE : where there is only 1 string and no array junction box, then the following tests will be conducted between the strings and the d.c main switch at the inverter.

Isolate PV string and array wiring

CHECK that there is no voltage on input ☐
OR output sides of any array junction box (where installed)

CHECK
Continuity between strings and array junction box

- String 1 +ve ☐
- String 1 -ve ☐
- String 2 +ve ☐
- String 2 -ve ☐
- String 3 +ve ☐
- String 3 -ve ☐
- String 4 +ve ☐
- String 4 -ve ☐

Continuity between
array junction box and PV DC main switch ☐

CHECK
Polarity of PV string and array wiring

- String 1 ☐
- String 2 ☐
- String 3 ☐
- String 4 ☐
- Array +ve ☐
- Array -ve ☐

Polarity of wiring between
array junction box and PV DC main switch ☐

WARNING:
IF POLARITY OF ONE STRING IS REVERSED, THIS CAN CAUSE A FIRE IN THE ARRAY JUNCTION BOX.

RECORD PV string open circuit Voltage

String 1 V
String 2 V
String 3 V
String 4 V

WARNING:
The following procedures describe how to measure short circuit currents - the voltages can be very high and if the procedures are not followed then arcing and damage to components could occur.

Note : Some projects require that short circuit currents are recorded as part of the contractual commissioning, otherwise a record of the actual operating current of each string is sufficient.
This could be done by using the meter on the inverter or by using a clamp meter when the system is operational.

Where short circuit currents are required then to do the following tests safely:

1. Ensure each string fuse (where required) is not connected or that LV array is still broken into ELV segments
2. Leave solar array cable connected to the main solar DC switch.
3. Remove the cable from the DC main switch to the inverter.
4. With the DC switch off- put a link or small cable between the positive and negative outputs of the DC main switch.
5. Install the string fuse for string 1 or connect the ELV segments to complete the wiring of the string. Turn on DC main switch - using a DC clamp meter measure the DC short circuit current for String 1. Turn off DC main switch. Disconnect string fuse for string 1 or remove links to break string into ELV segments..
6. Repeat point 5 for each string
7. After each string has been individually measured – ensure DC main switch is off- then install all string fuses or connect the ELV segments of each string. Turn on DC switch and measure DC Array current using clamp meter. Turn off switch and remove link in output of DC main switch.

Where short circuit currents are **not** required then record the operating current/s after Start-Up of System.

RECORD
Short circuit Currents (where required) String 1 .....A
String 2 ..... A
String 3 ..... A
String 4 .....A
Array ..... A

With the PV DC main switch **OFF**

CHECK
Continuity between PV DC. main switch and inverter
Array +ve ☐
Array -ve ☐

CHECK polarity between
the PV d.c. main switch and inverter ☐

RECORD
Open circuit voltage at input side
of the array DC main switch V

WARNING: If polarity is reversed at the inverter damage may occur which is generally not covered under warranty

INVERTER – AC

Ensure that the AC grid supply is isolated and
the Solar AC main switch is OFF

CHECK
Continuity between Inverter & Solar AC main switch
Line ☐
Neutral ☐

CHECK
Continuity between Solar AC main switch & kWh meter
Line ☐
Neutral ☐

CHECK polarity at the Inverter
and the Solar AC main switch ☐

CHECK polarity at the output
of Solar AC main switch from the kWh meter ☐

RECORD the voltage at the output
of the Solar AC main switch V

Initial reading of kWh meter .....

Start-Up of System

Refer to system manual for the inverter and follow start-up procedure.

This generally involves turning on the PV DC main switch followed by the Solar AC main switch but the procedures as recommended by the inverter manufacturer must be followed.

System connects to grid [after 60 seconds] ☐
When the AC main switch is turned ON
- follow the inverter start-up procedure -

Voltage at d.c. input of inverter V

Voltage is within operating limits of inverter ☐

Voltage at a.c. output of inverter V

Input power of the inverter (where available) .....W

Output power of the inverter (where available) .....W

Output power as expected ☐

Turn AC main switch OFF
System immediately disconnects from grid ☐

PV Operating current

1. Where there's only one string in the array record the operating current after Start-Up of System.
2. If more than one string - turn off the inverter, the a.c. main switch and d.c main switch. Isolate all strings.
3. With one string connected at a time turn system back on and record the operating current of that string.

Repeat 2 and 3 above
until all string currents have been recorded

NOTE: Any string current tests should be performed on a bright sunny day with no cloud.
This is to avoid varied readings due to cloud cover.

RECORD
Operating Currents : String 1 .....A
String 2 ..... A
String 3 ..... A
String 4 .....A
Array ..... A