

Solar PV String Inverter System Inspection Report

Version Control			
Project			
Document Author	Issue Date	Version Number	Checked by
Michael Middlemast	31/05/2023	1.0	MM

Record of Revisions	
Revision No	Amendments
1.0	Original Issue



Project Name:	D. Jacobson & Sons Ltd	Contractors Name and Address
Installation Address:	Bacup Road, Rawtenstall, BB4 7PA	MBC Renewables Ltd 14 Fairview Drive Medomsley Edge Consett Co. Durham DH8 6QX
Tested by:	Michael Middlemast	Signature:
Project Reference:	JACOBSON001	
Commissioning Date:	2022	
Test Start Time:	29/05/2023 10:10 AM	
Test End Time:	30/05/2023 10:45 AM	
Rate kWp of plant:	100kWp	

System Details

Panel Details																
Panel Make & Model	Longi 375W Modules															
STC Isc (@1000W/m2 25C)	11.60A															
STC Voc (@1000W/m2 25C)	41.1V															
String Details																
Number of panels per string	20															
Expected Voc of String	840V +/- 5%															
Are strings paralleled?	No															
Expected Isc of String	@250W/m2	N/A	@500W/m2	N/A	@750W/m2	M/A										
Connection type	Connector	MC4 @ Inverter	Probes		Other											
Environmental Details																
Is there moisture on the array?	Yes															
Is it cloudy?	Partial															
Are the modules dirty? <small>Please rate 1-5 If 3 or above please include photos</small>	<table border="1" style="display: inline-table; vertical-align: top;"> <tr><td style="width: 20px; text-align: center;">1</td><td style="width: 100px; height: 20px;"></td></tr> <tr><td style="text-align: center;">2</td><td style="height: 20px;"></td></tr> <tr><td style="text-align: center;">3</td><td style="height: 20px;"></td></tr> <tr><td style="text-align: center;">4</td><td style="height: 20px;"></td></tr> <tr><td style="text-align: center;">5</td><td style="height: 20px;"></td></tr> </table>						1		2		3		4		5	
1																
2																
3																
4																
5																
1 (please see photos)																
Connection Details																
String Cable Direct	Yes															
At DC Isolator	N/A															
In Combiner Box	N/A															
String Box	N/A															
Mounting System																
Type of Array	Roof mounted array on trapezoidal cladding															
Roof Fixing Method	Trapezoidal solar PV roof clamp															
Roof Sheet	See spec.															
Panels fixed on long or short side?	Long	X	Short													
Panels fixed within the manufacturers fixing zones?	Yes															
Any signs of distress?	Yes, cabling is poking through gaps in modules															
Test Instruments																
	Seaward			Insulation Tester												
Make, Model	Seaward PV200			No proper equipotential bonding installed.												
Serial Number	JL22330															
Testing Function	Voc															
Last Calibration Date	2022															

General Installation (Electrical – ref IEC60364-6-61)			
	Yes	No	Score
Equipment Compliant with standards, correctly selected & not damaged		X	0
Equipment accessible for operation, inspection & maintenance		X	0
Equipment and accessories correctly connected		X	0
Particular protective measures for special location		X	0
Equipment and protective measures appropriate to external influences		X	0
System installed to prevent mutual detrimental influence		X	0
Conductors connected and identified	X		1
Conductors selected for current carrying capacity and voltage drop		X	0
Conductors routed in safe zone or protected against mechanical damage		X	0
Presence of fire barriers, seals and protection against thermal effects		X	0
Ventilation provided behind array to prevent overheating / fire risk		X	0
Array frame & material corrosion proof		X	0
Array frame correctly fixed and stable; roof fixing weatherproof		X	0
Cable entry weatherproof	X		1
Protection Against Overvoltage, Electric Shock			
Live parts insulated, protected by barrier / enclosure, placed out of reach or class II		X	0
Array frame equipotential bonding present (only relevant if required)		X	0
Surge protection devices present (only relevant if required)		X	0
RCD provided (only relevant if required)		X	0
Frame correctly integrated with existing LPS installation		X	0
D.C. System			
Physical separation of A.C. and D.C. cables		X	0
D.C. switch disconnecter fitted		X	0
D.C. cables – protective and reinforced insulation (only relevant if required)		X	0
All D.C. components rated for operation at max D.C. system voltage (V _{oc} STC x 1.15) (I _{sc} STC x 1.25)		X	0
PV strings fused or blocking diodes fitted (only relevant if required)	X		1
A.C. System			
A.C. isolators lockable in off position only	X		1
Inverter protection settings to G99	X		1
Labelling & Identification			
General labelling of circuits, protective devices, switches and terminals (to IEC60364-6-61)		X	0
PV system schematic displayed on site		X	0
Protection settings and installer details displayed on site		X	0
Emergency shutdown procedure displayed on site		X	0
A.C. isolator clearly labelled		X	0
D.C. isolator / junction boxes suitably labelled		X	0
Signs & labels suitably affixed and durable		X	0

System score 5/34

Quick Summary

Solar Modules & Inverter Connection

From a **visual inspection** the modules *appear* in good repair, however **electrically** the solar modules are in a bad state.

There are several **INSULATION FAULTS** within the cabling, this is stopping the system from working correctly and has also caused a **FIRE EVENT**:



SAMPLE

erters

Loose cables can be seen from the top side of the array.

These loose cables are then subject to the elements and movement over time. This loosens connections causing the insulation faults on the array.

The full width of cable trays has not been utilised and TAPE has been used to hold cables together (*see images*) this is not in line with code.

Inverters are exposed to the elements and harsh environment. This is not in line with the manufacturer's suggested installation instructions and **will void any warranty**. Suggest installation of housing and protective cover.

System is not properly grounded (*see images*)

Around the installation is litter from the installation crew and old installation manuals (*see images*). This poses further fire risk and suggests "bad practice" culture amongst installers.

The above is covered under General Installation (Electrical – ref IEC60364-6-61)

ENGINEER NOTES:

"During the site visit I made rudimentary efforts to ensure the electrical safety of the solar PV array. I also made the site contact aware of these efforts and warned that the system should only be inspected by a competent person.

After testing two strings the fire damage was noted. It was not safe to continue testing at this time in case of pulling joints or electrical arcs.

On site contact stated that AC cable to home run was HOT. This also suggests internal electrical faults on the AC side.

Higher grade of PPE required

Suggest original installer properly isolate and disconnect system from grid until remedial works are complete"



Your Solar MOT

RED – Immediate concern

ORANGE – Suggested works

GREEN – Annual service

- Prepare correct PPE for works
- Perform pre-IEC62446 tests Category 1 and 2, record results
 - o Module level testing
 - o String level testing
- Modules cleaned, obstructions removed and inspect roof
- Install equipotential earth bonding
- Calculate and install correct size of cable for DC cable runs, 6mm not 4mm?
- Replace damaged inverters – check new inverter warranty status
- Correctly string the modules to inverters in line with code
- Re-run AC cabling to internal DB (*Approx 60/80M length*)
- Upgrade all switch gear
- Add Schematic, shut down procedure etc.
- Add inverter housing
- Perform post-IEC62446 test Category 1 and 2, record results
- Clear area of obstructions and litter
- Add Greenworld communications system for safety and monitoring
- Add avian deterrents, netting
- Perform annual visual inspection and IEC62446 testing
- Perform annual cleaning routine

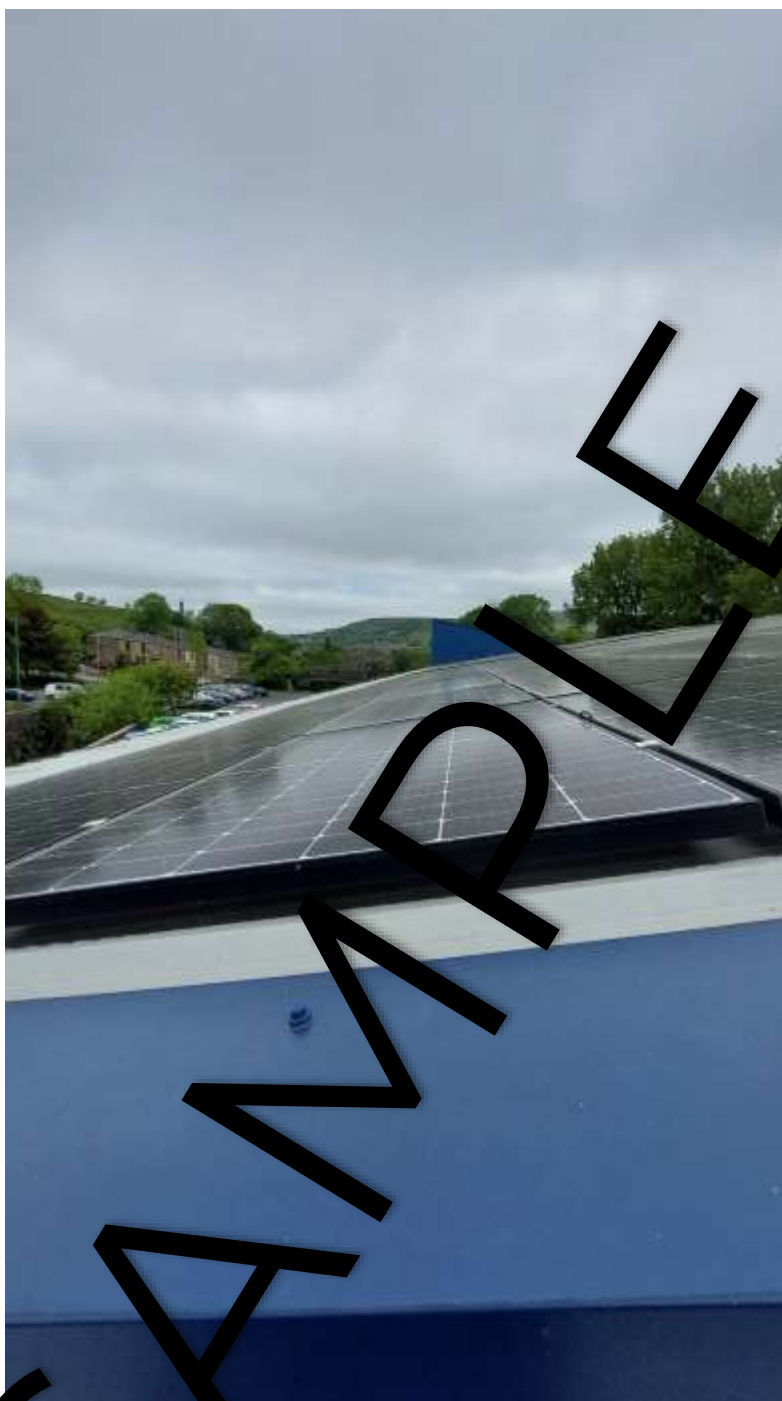
SAMPLE
SITE IMAGES

















**MORE IMAGES
AVAILABLE.**

SAMPLE

END OF REPORT