THE GOOD, THE BAD AND THE UGLY

Matthew O'Regan

GSES®
global sustainable energy solutions

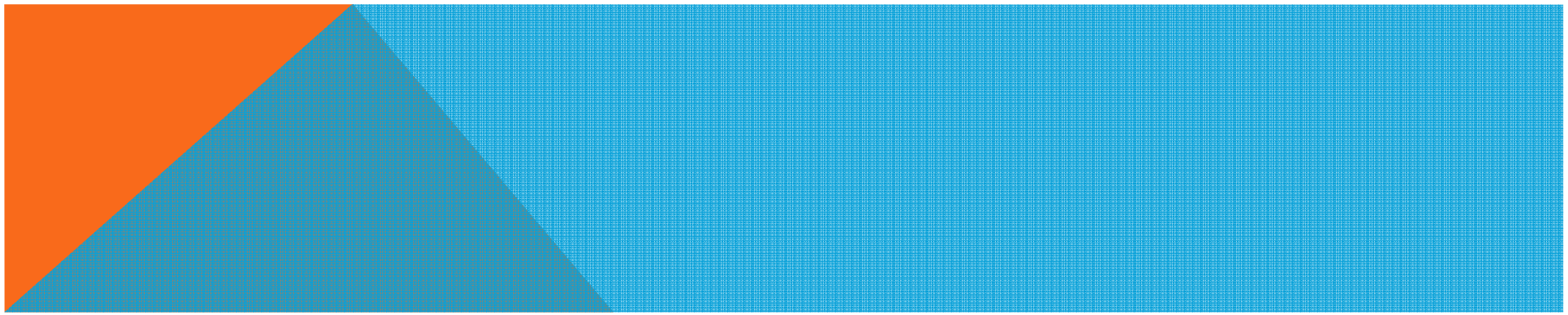

2013
clean
energy
week

THE GOOD

Best Practice Installations

THE GOOD

- Not the traditional “Good”
- Above and beyond the standards
- Only one example





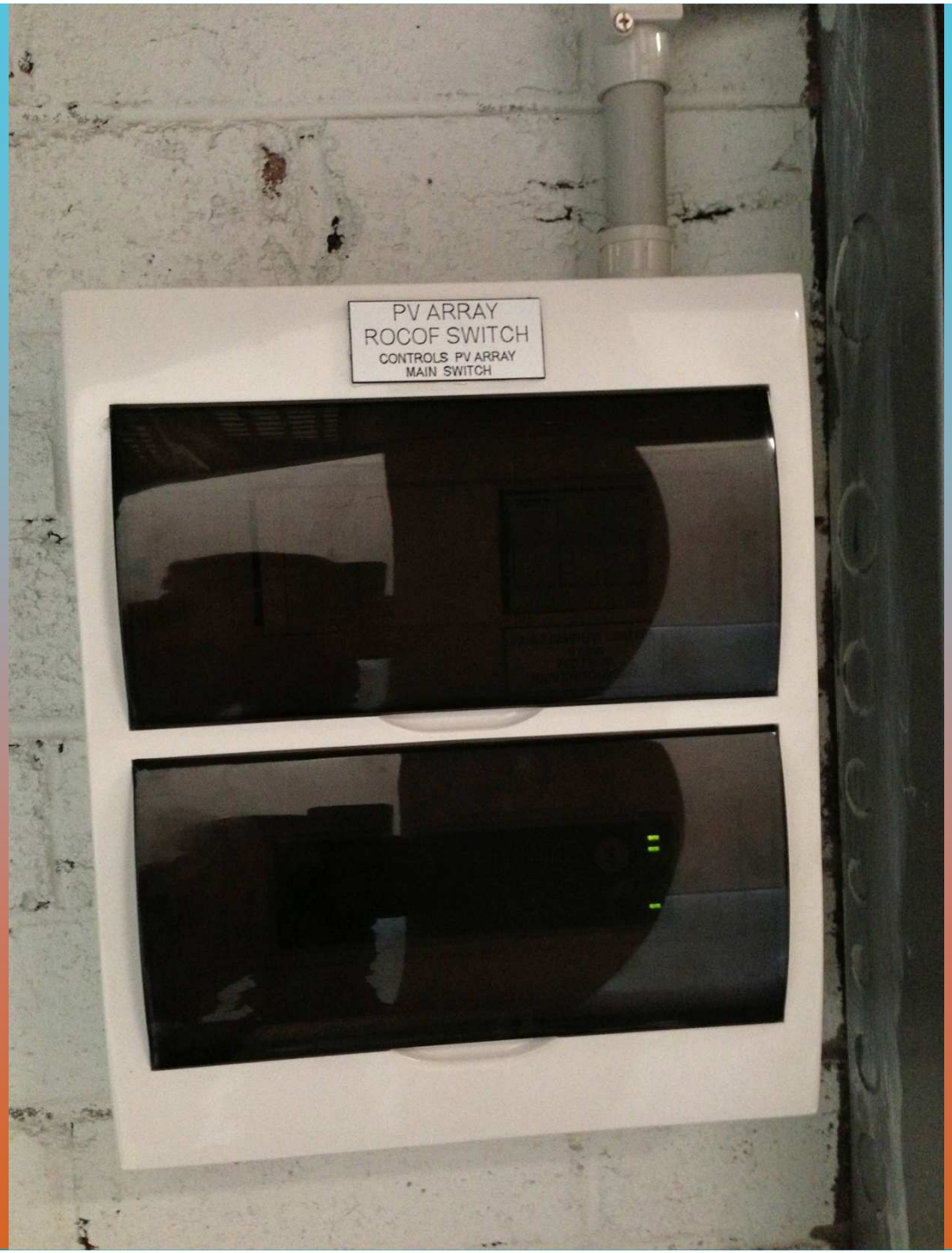

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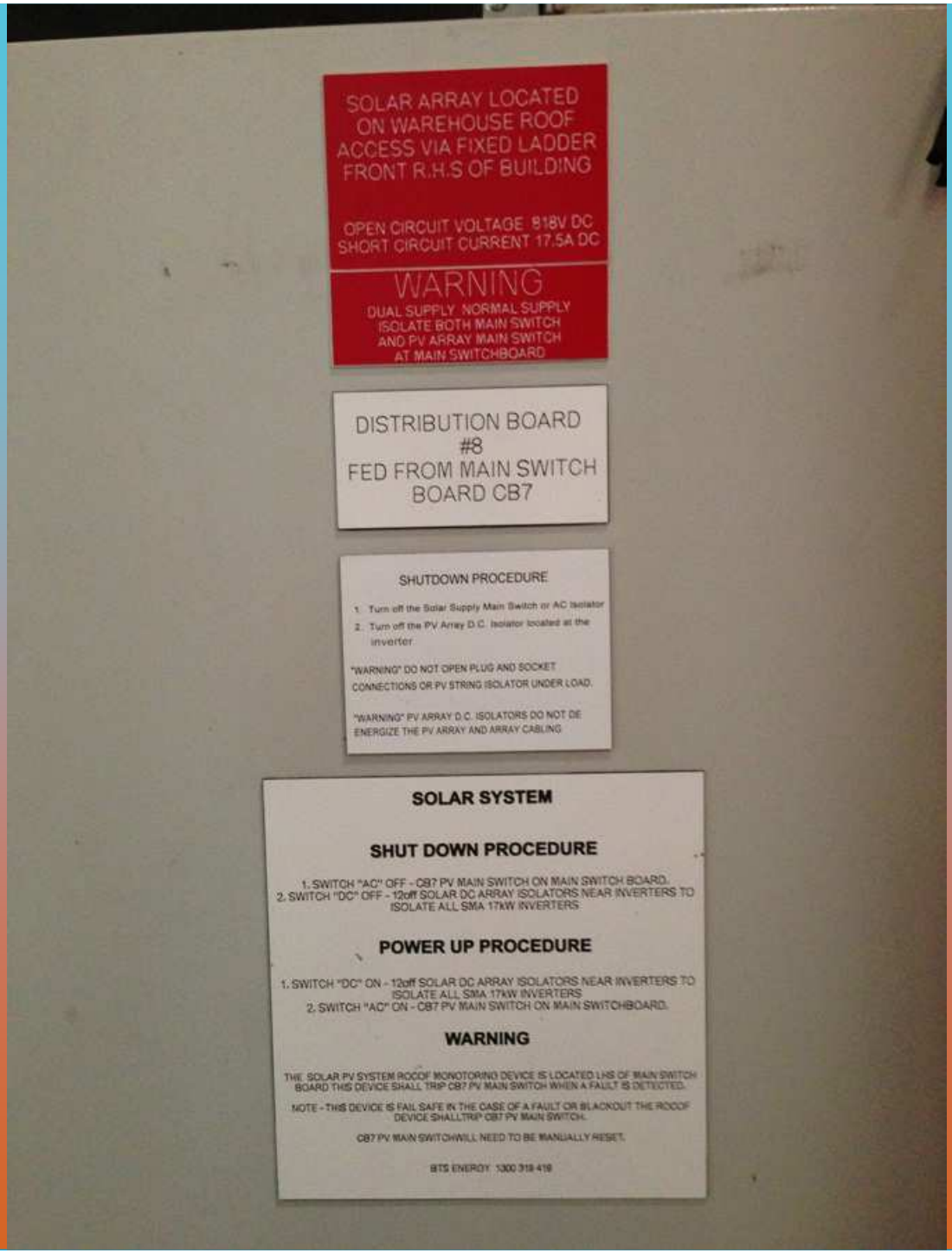

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SOLAR D.C
ARRAY ISOLATOR

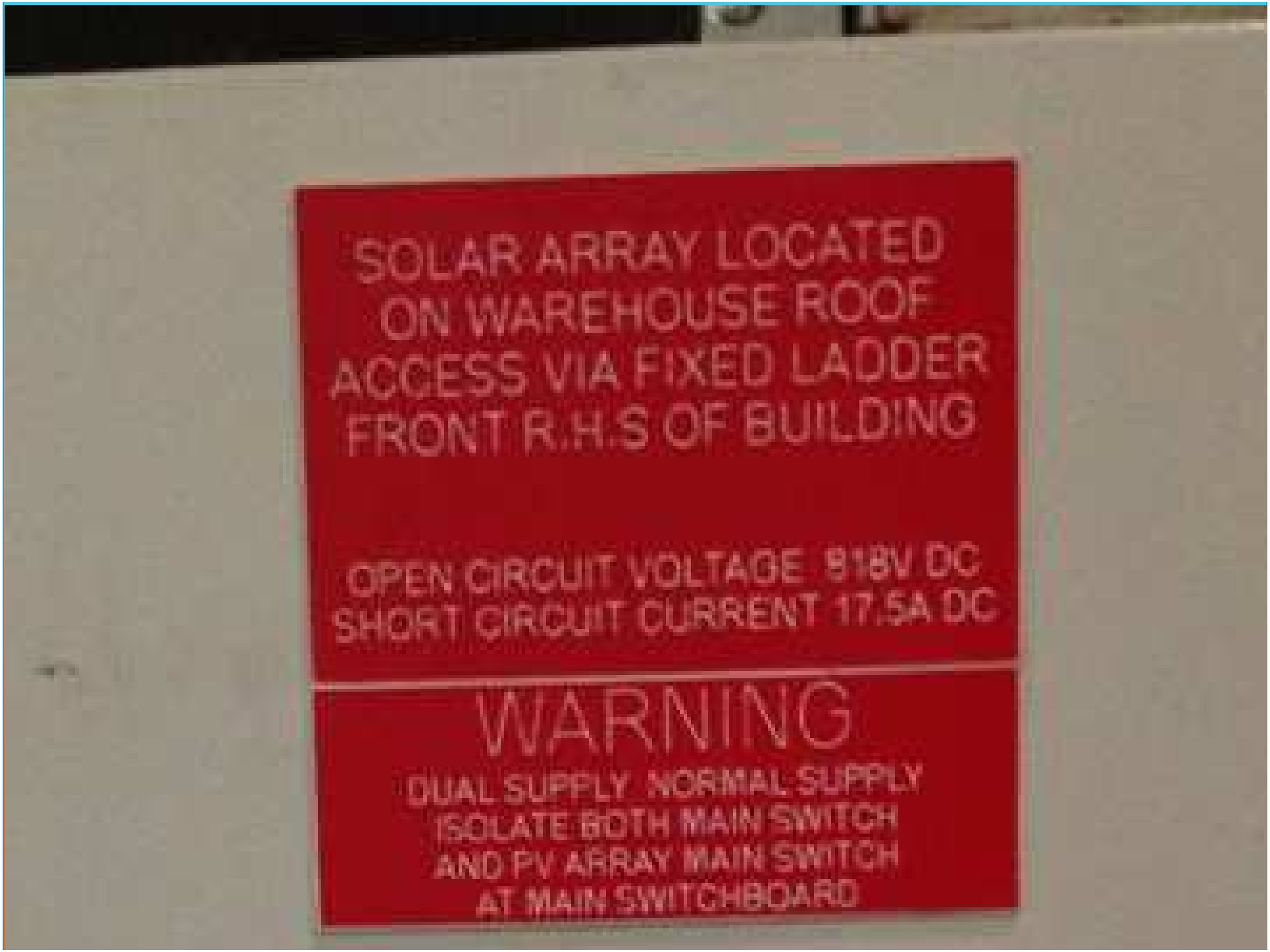


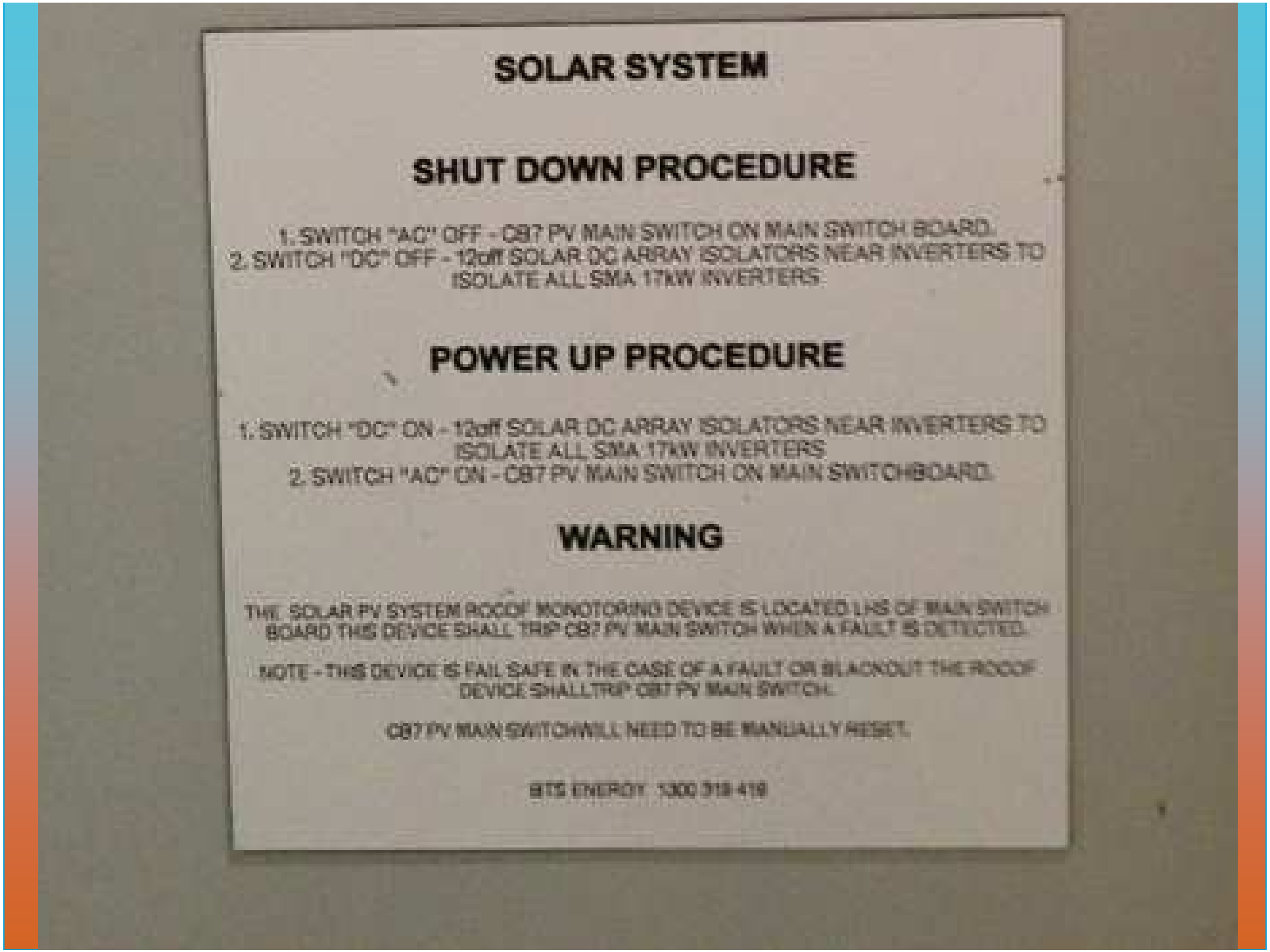

WARNING
1000V DC
SOLAR DC CABLE
H
SOLAR D.C
ARRAY ISOLATOR
G
F
SOLAR D.C
ARRAY ISOLATOR


SOLAR PV
INVERTER No 4
SMA 17kW


PV ARRAY
ROCOF SWITCH
CONTROLS PV ARRAY
MAIN SWITCH


SOLAR ARRAY LOCATED
ON WAREHOUSE ROOF
ACCESS VIA FIXED LADDER
FRONT R.H.S OF BUILDING
OPEN CIRCUIT VOLTAGE 818V DC
SHORT CIRCUIT CURRENT 17.5A DC
WARNING
DUAL SUPPLY NORMAL SUPPLY
ISOLATE BOTH MAIN SWITCH
AND PV ARRAY MAIN SWITCH
AT MAIN SWITCHBOARD
DISTRIBUTION BOARD
#8
FED FROM MAIN SWITCH
BOARD CB7
SHUTDOWN PROCEDURE
1. Turn off the Solar Supply Main Switch or AC Isolator
2. Turn off the PV Array D.C. Isolator located at the inverter
"WARNING" DO NOT OPEN PLUG AND SOCKET CONNECTIONS OR PV STRING ISOLATOR UNDER LOAD.
"WARNING" PV ARRAY D.C. ISOLATORS DO NOT DE ENERGIZE THE PV ARRAY AND ARRAY CABLING
SOLAR SYSTEM
SHUT DOWN PROCEDURE
1. SWITCH "AC" OFF - CB7 PV MAIN SWITCH ON MAIN SWITCH BOARD.
2. SWITCH "DC" OFF - 12off SOLAR DC ARRAY ISOLATORS NEAR INVERTERS TO ISOLATE ALL SMA 17kW INVERTERS
POWER UP PROCEDURE
1. SWITCH "DC" ON - 12off SOLAR DC ARRAY ISOLATORS NEAR INVERTERS TO ISOLATE ALL SMA 17kW INVERTERS
2. SWITCH "AC" ON - CB7 PV MAIN SWITCH ON MAIN SWITCHBOARD.
WARNING
THE SOLAR PV SYSTEM ROOOF MONOTORING DEVICE IS LOCATED LHS OF MAIN SWITCH BOARD THIS DEVICE SHALL TRIP CB7 PV MAIN SWITCH WHEN A FAULT IS DETECTED.
NOTE - THIS DEVICE IS FAIL SAFE IN THE CASE OF A FAULT OR BLACKOUT THE ROOF DEVICE SHALLTRIP CB7 PV MAIN SWITCH.
CB7 PV MAIN SWITCHWILL NEED TO BE MANUALLY RESET.
BTS ENERGY 1300 319 419


SOLAR ARRAY LOCATED
ON WAREHOUSE ROOF
ACCESS VIA FIXED LADDER
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STRING WIRING

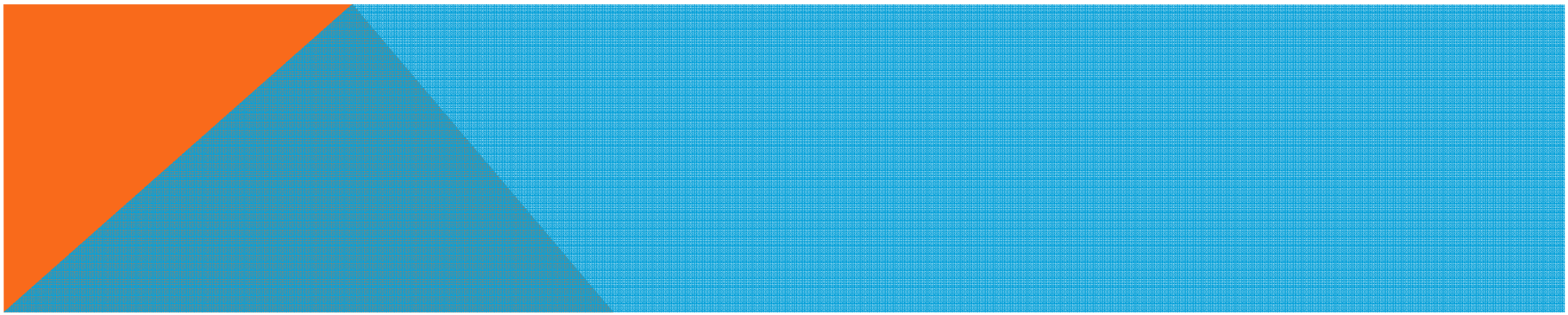
- AS5033:2012 Clause 4.4.4.4 (b)
- Cables shall be protected from mechanical damage.





RESTRICTED ACCESS

For non-domestic installations where the PV array maximum voltage $V_{OC\ ARRAY}$ exceeds 600 V the entire PV array and associated wiring and protection, shall have restricted access to allow access by only authorized persons.



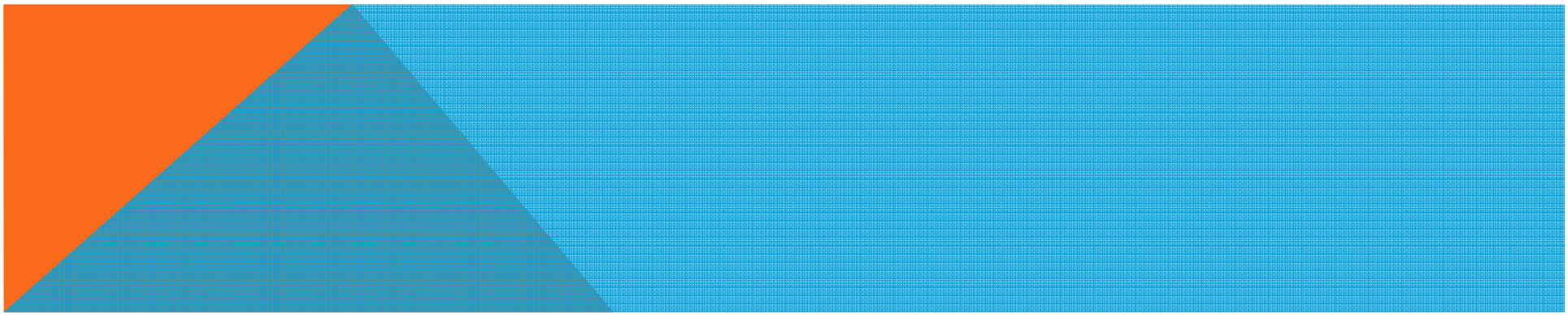


THE BAD

Things you may have missed

THE BAD

- Not the traditional “Bad”
- Some clauses of AS5033:2012 have been overlooked.




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THE OVERLOOKED CLAUSES – ENCLOSURE INSTALLATION

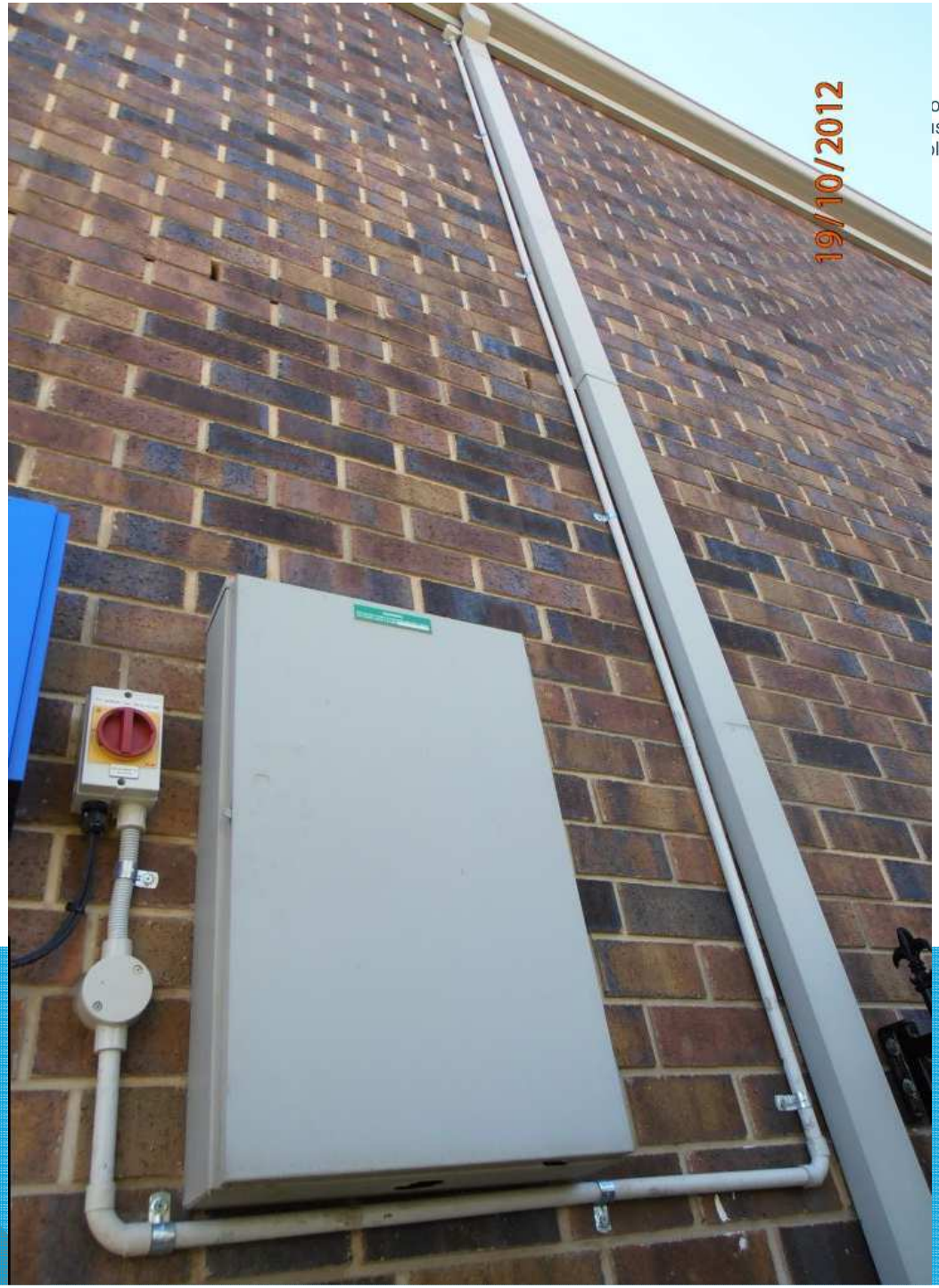
- Read AS5033:2012 4.3.3.1!
- Any flaps on enclosures required to achieve the IP rating shall latch automatically when released from the fully open position.
- Unless otherwise stated by the manufacturer the IP rating should be assumed to apply to a vertical mounting orientation.


PV ARRAY
MAIN SWITCH
HT 2-5WAY
IP65
SOLAR DEPOT

THE OVERLOOKED CLAUSES – CONDUIT LABELLING

- Conduit must be labelled!
- Cable: Every 2 metres
- Conduit: Every change of direction and at either end.

INCORRECT



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CORRECT



THE OVERLOOKED CLAUSES – THE “PV” LABEL

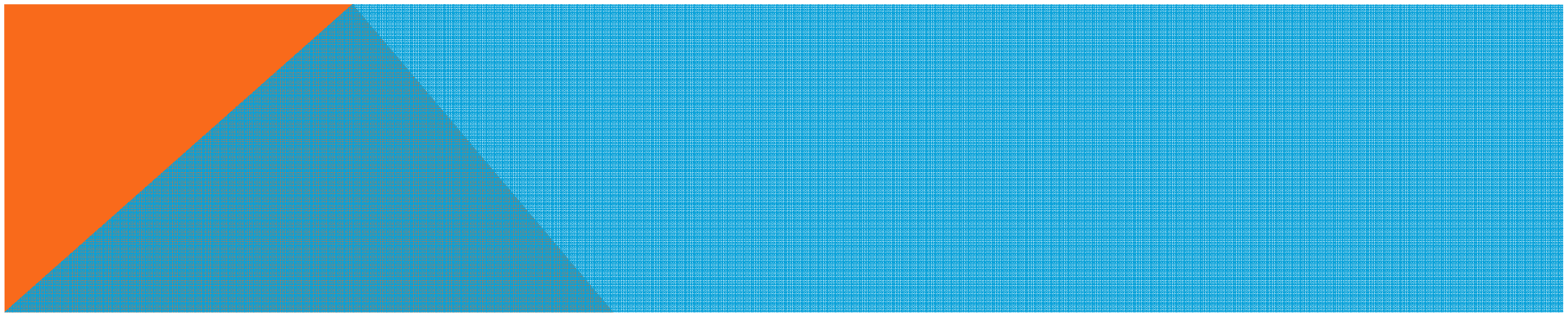
- Seemingly hard to get right.
- Must be reflective.
- Must be greater than 70mm in diameter.
- On or immediately adjacent to the meter box and switchboard.


PV
SHUTDOWN PROCEDURE
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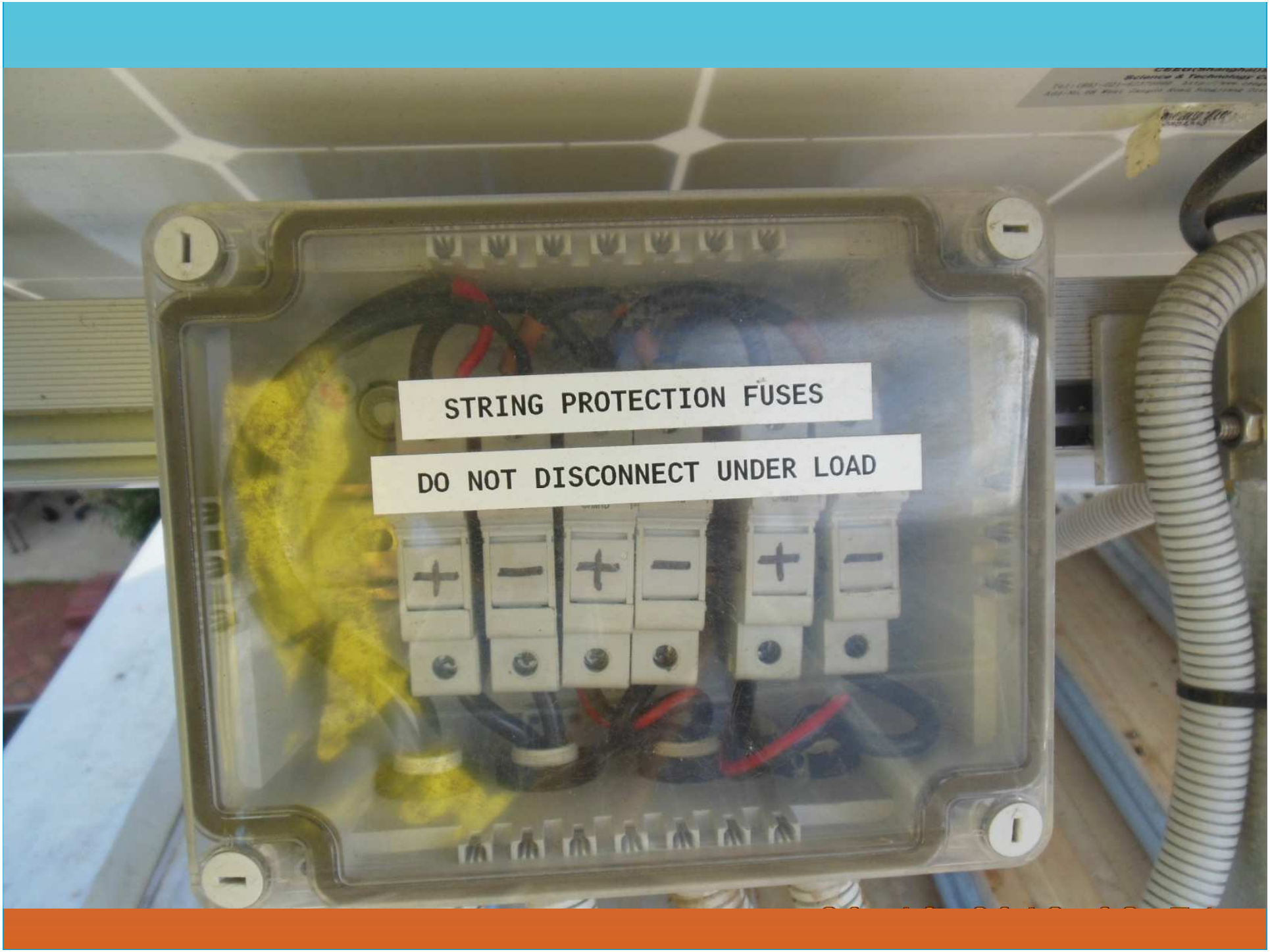

PV
WARNING
DUAL SUPPLY
ISOLATE BOTH NORMAL AND
SOLAR SUPPLIES BEFORE
WORKING ON THIS SWITCHBOARD

THE OVERLOOKED CLAUSES – FUSE LABELLING

Quiz time!




SOLAR ARRAY DC
ISOLATOR


STRING PROTECTION FUSES
DO NOT DISCONNECT UNDER LOAD
+
−
+
−
+
−

THE OVERLOOKED CLAUSES – SHUTDOWN PROCEDURE WORDING

- All isolators must have the same name in both the shutdown procedure and on the isolator itself
- Can not be ambiguous
- Must include:

  “Warning: PV array d.c. isolators do not de-energize the PV array and array cabling”

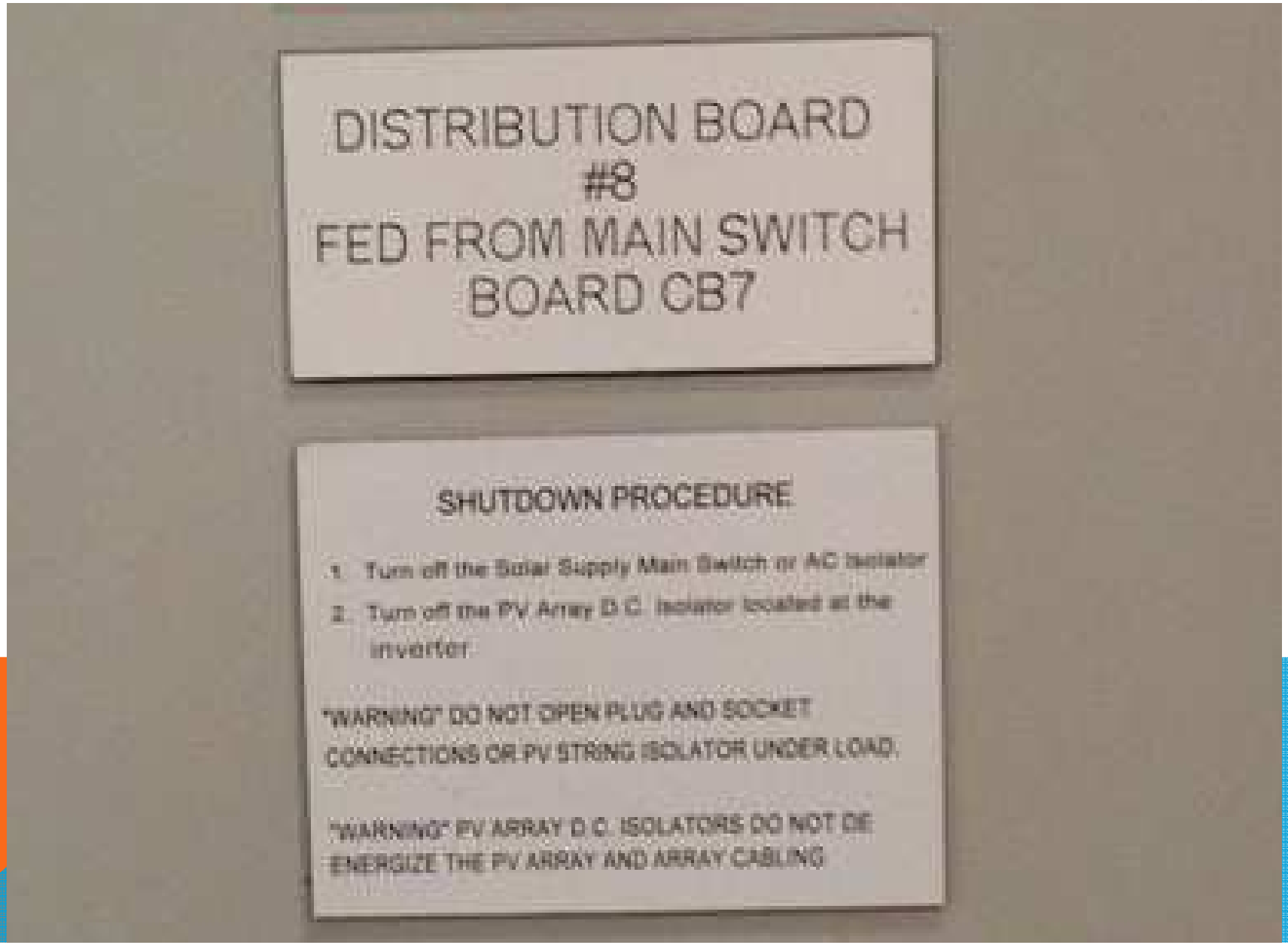
INCORRECT



INCORRECT


SHUTDOWN PROCEDURE
1 . TURN OFF THE INVERTER A.C . MAIN CONVERTER
2 . TURN OFF THE P.V ARRAY ISOLATER NEXT TO THE INPUT TERMINALS OF THE INVERTER
3 ."WARNING" DO NOT OPEN PLUG AND SOCKET CONNECTORS OR P.V OR STRING ISOLATER UNDER LOAD
Grid Tie Solar Inverter

CORRECT


DISTRIBUTION BOARD
#8
FED FROM MAIN SWITCH
BOARD CB7
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"WARNING" PV ARRAY D.C. ISOLATORS DO NOT DE-ENERGIZE THE PV ARRAY AND ARRAY CABLING

HD CONDUIT

- Prevalence of non- UV rated HD conduit outside the building
- Clause 4.3.6.3.1 & 4.3.6.3.2
- Outside: UV-rated conduit
- Inside the building envelope: HD conduit

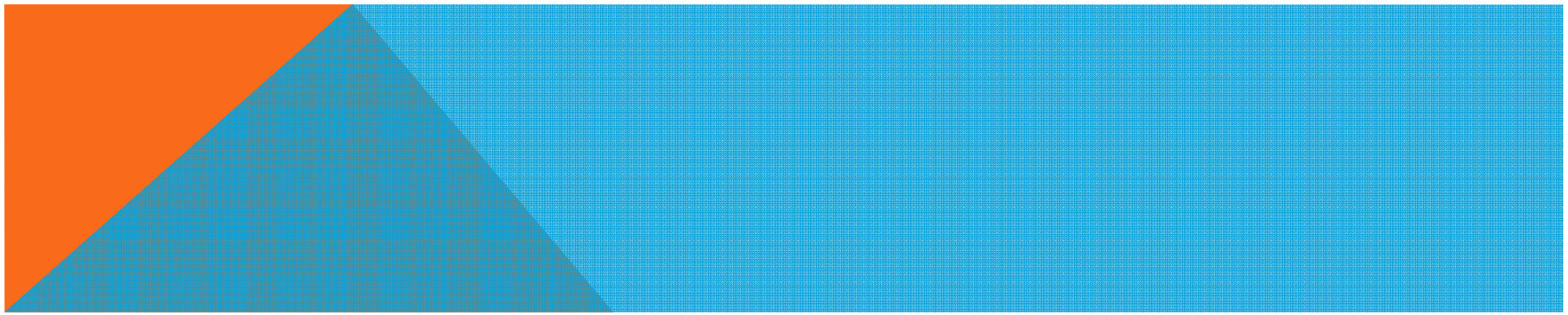


THE UGLY

Don't try this at home

THE UGLY

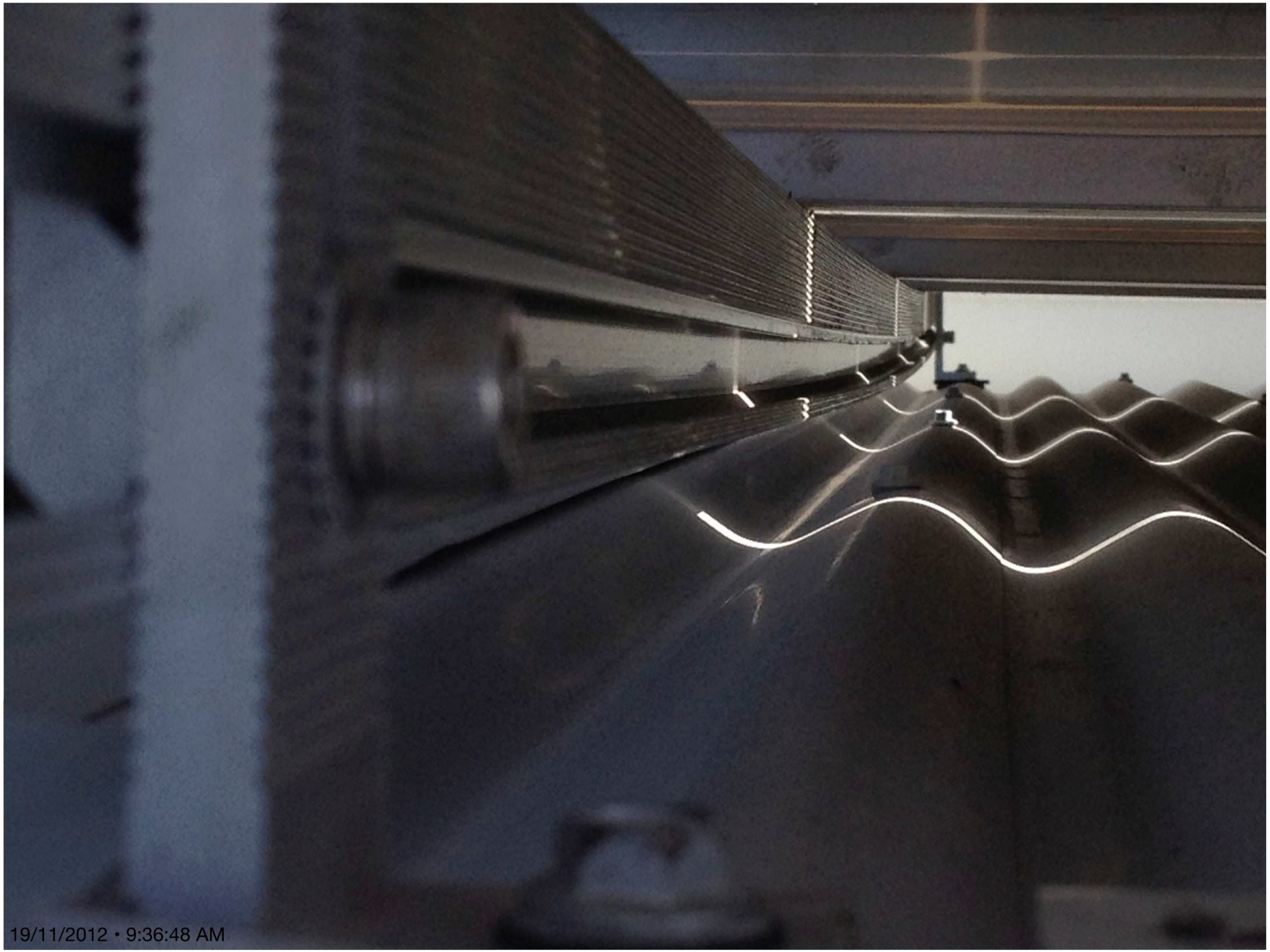
- The traditional “Ugly”
- Two causes:
  - Lazy installers
  - Solar MacGyver

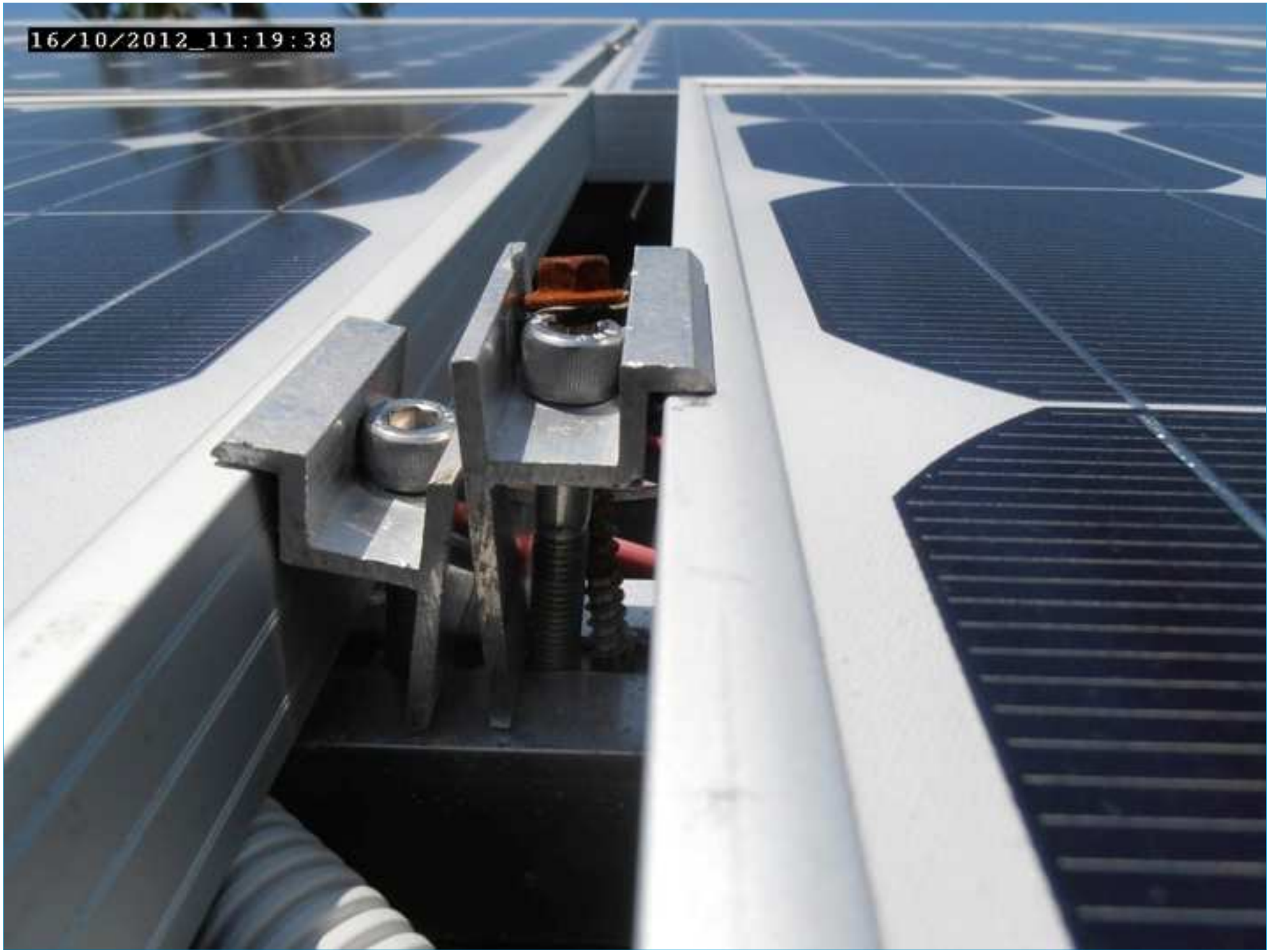



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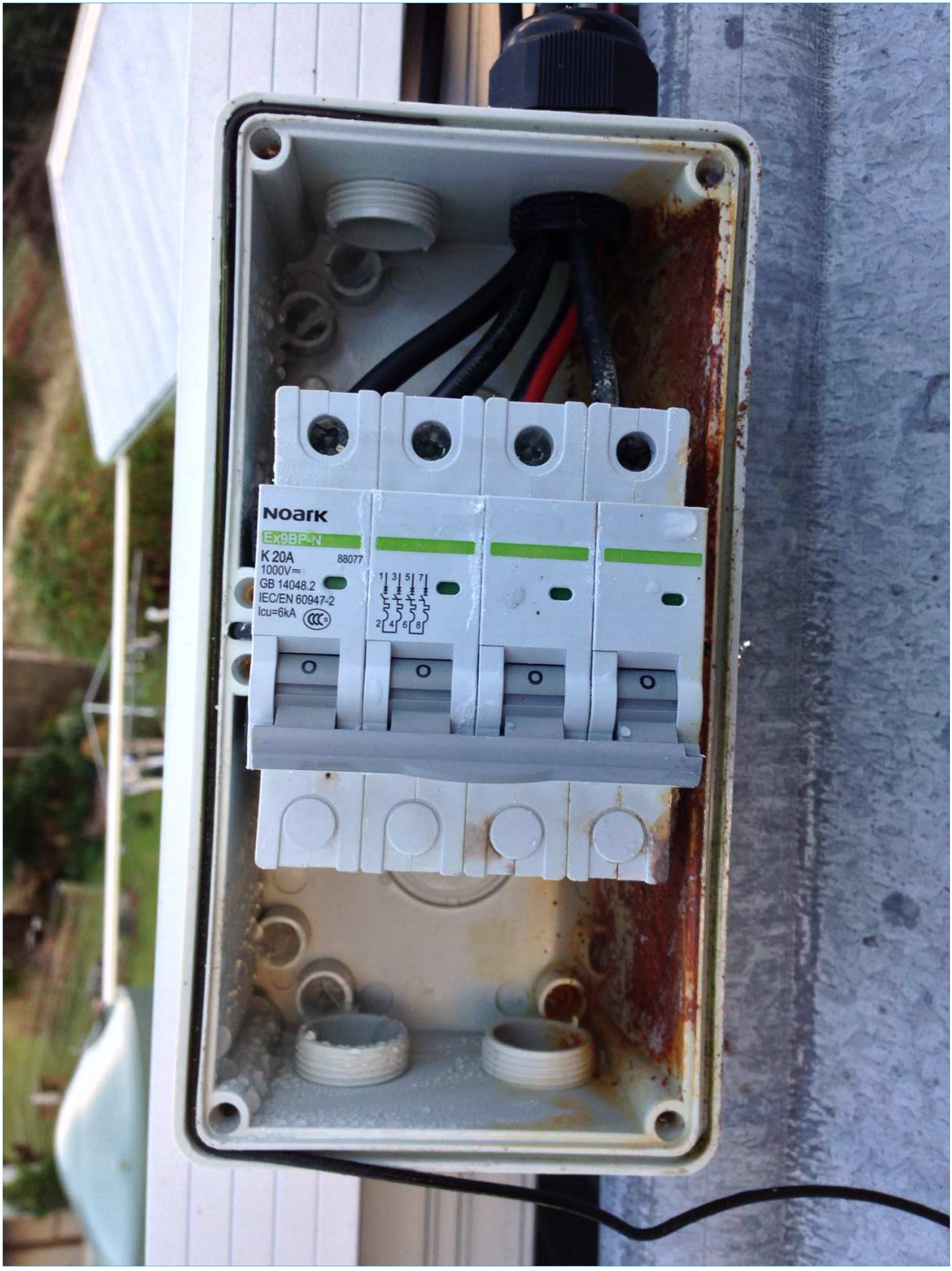

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DC 150-MAX


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Ex9BP-N
K 20A
88077
1000V=
GB 14048.2
IEC/EN 60947-2
Icu=6kA
1 3 5 7
2 4 6 8


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ARRAY


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Questions and Comments

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