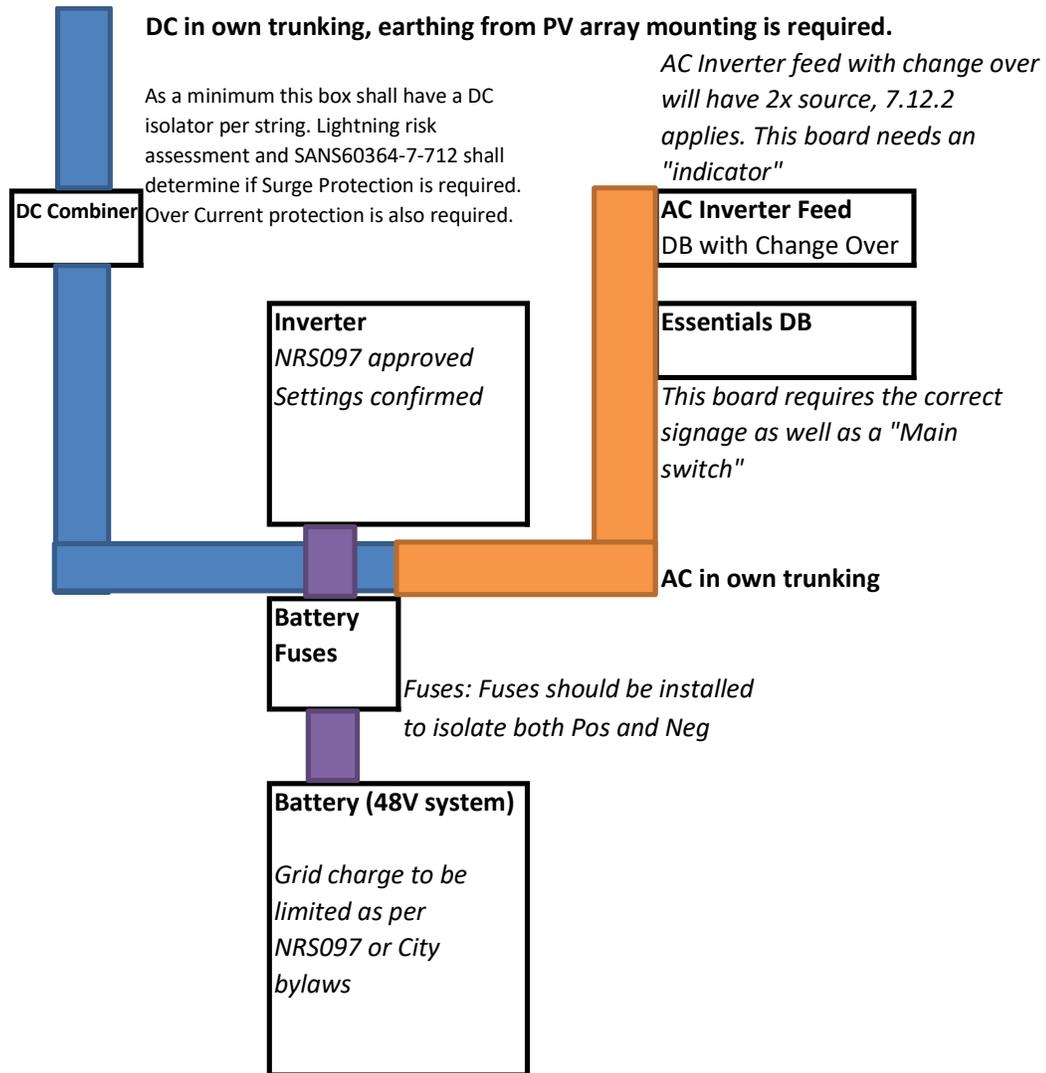


Compliance Requirements for discussion
SANS and IEC codes



Note the following pages is for quick reference during compliance checks only. This is not an installation guideline, design, ultimate standards guide. This, combined with other documentation, can assist in compliance completion. The author takes no responsibility if you do not comply to the relevant standards by using this document

Surge protection, fuse selection, DC Circuit breakers, AC configuration, etc. is up to the installer to determine.



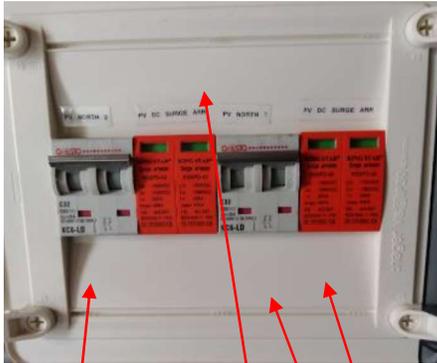
To offer a partnership in PV compliance | Pr. Eng doing compliance, so if you have comments on this discussion doc, send to below email.
engage@offrian.com

DC String installation & DC Combiner

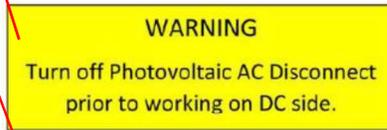
7.12.7.3 The rated voltage of each circuit shall be clearly indicated at all ends of the circuit.

7.15.1 Selection of equipment and circuits

7.15.1.1 All equipment and protection devices in d.c. installations shall be specified to operate on the specific d.c. voltages and shall be suitably rated.



Signs required:

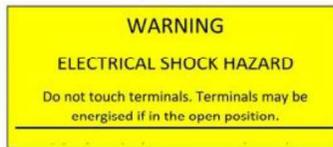


Sign: Golden Yellow (B49)
Text: Black

Drq.1134s

Figure B.10 — Label denoting solar PV combiner boxes and dc isolation devices

Sign : Golden yellow
Text : Black



Drq.1134n

Sign: Golden Yellow (B49)

Figure B.3 — Label indicating that terminals of a disconnect may be energized in the open position

If using fuses as point of isolation or non-load isolator:



Drq.1134t

Sign: Golden Yellow (B49)
Text: Black

Figure B.11 — Label for non-load DC isolation devices



Trunking in general:

6.1.10 Conductors that form part of a d.c. installation shall not be run in the same wireway as conductors that form part of an a.c. installation.

What can be done if there is no option?

- 1) Use of Physical/Mechanical separation : Sprague
- 2) Where AC and DC cross, use of cut-off trunking or other isolating media for electrical installations

A bit more on wireways:

6.1.7 If conductors that operate at different voltages run in the same wireway, the insulation of each conductor shall be able to withstand the highest conductor voltage in the wireway. Alternatively, the conductors shall be separated by a continuous barrier of insulating material or earthed metal.

What does this mean? You CANNOT put DC battery cable (100V rated in most cases) in the same wireway as cables coming from PV Array (1000 or 1500Vdc rated, but used between 200Vdc to 500Vdc in most residential installs)

Can we install the Communication or CT coil cable in the same trunking as the AC and/or DC? Nope
Verv strict interpretation of 6.4.1 (b)...

b) in the same wireway as the cables or wires of telecommunication, radio and signalling circuits that are not covered by this part of SANS 10142,

Labelling:



Sign: Golden Yellow (B49)
Text: Black

Drg.1134t

Figure B.11 — Label for non-load DC isolation devices

B.15 Electrical metallic tubing, conduit and or cableways, shall be marked by a label such as the one shown in figure B.11 in no less than every three meters, at every turn and above and below penetrations.

As good practice one can add labelling in terms of warning similar to:



Battery Protection (Fuses)

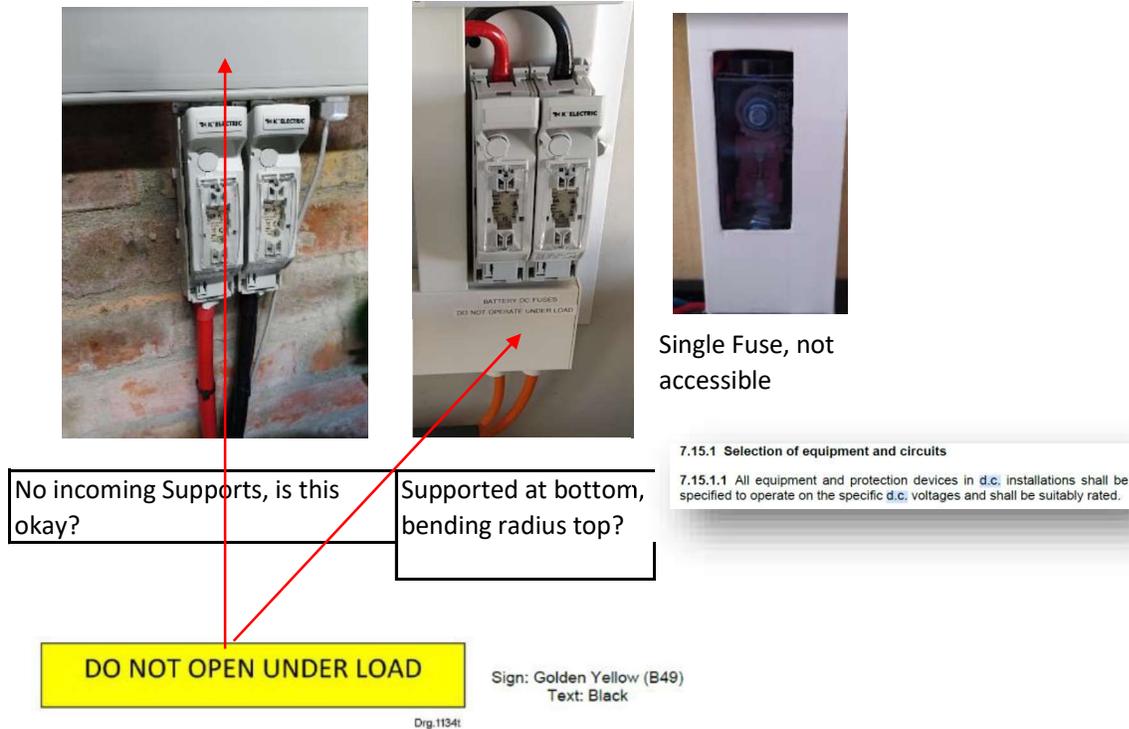


Figure B.11 — Label for non-load DC Isolation devices

Can I only fuse one of the poles with the other pole directly connected?

No, both poles of the battery shall be able to be disconnected.

7.12.7.5 In addition it shall be recognised that the supply from each inverter battery arrangement and PV panel (or identified clustered group), constitute a supply, and requires arrangements similar to point of supply, which shall include switch-disconnection arrangements and shall comply with 7.12.5.

6.9.3.3 The disconnecting device shall be a switch-disconnector that disconnects all the phase conductors, however

- a circuit-breaker may be used instead of a switch-disconnector if overcurrent protection is also required (see also 6.8.1), or
- another device may be used instead of a switch-disconnector, where specified in this part of SANS 10142 for a particular application.

Further clarification from SANS10142-1-2 (retracted, but does give more clarity)

6.1.4 Disconnectors and circuit breakers — DC

6.1.4.2 Fault protection — Battery storage systems

6.1.4.2.1 A circuit-breaker or fuse shall be installed on the output terminals of the battery storage system. This device shall:

- interrupt both positive and negative cables;

Warning – Beware of switching under load.

My battery has a DC breaker installed in the device, is this sufficient and can I skip the fuse install?

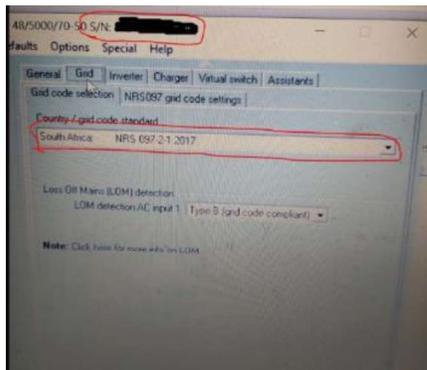
No, battery is seen as a fixed appliance or energy source in its entirety. SANS require EXTERNAL protection to an appliance or source.

Compliance Requirements for discussion
SANS and IEC codes

Inverter



Essential Setting on the inverter for NRS compliance:



From NRS097-2-1:

4.2.2.3.2 Overvoltage and undervoltage

The embedded generator in sub-category A1 and A2 shall cease to energize the utility distribution system should the network voltage deviate outside the conditions specified in table 2. The following conditions shall be met, with voltages in r.m.s. and measured at the POC.

Table 2 — Response to abnormal voltages for SSEG in sub-categories A1 and A2

1	2
Voltage range (at point of connection)	Maximum trip time
V < 50 %	S
50 % ≤ V < 85 %	0,2 s
85 % ≤ V ≤ 110 %	10 s
110 % < V < 115 %	Continuous operation
115 % ≤ V < 120%	40 s
120 % ≤ V	2 s
	0,16 s
NOTE: If multi-voltage control settings are not possible, the more stringent trip time should be implemented, e.g. 2 s between 110% and 120% of voltage.	

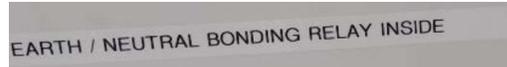
- 120% = 276V
- 115% = 264.5V
- 110% = 253V
- 85% = 195.5V
- 50% = 115.0V

The purpose of the allowed time delay is to ride through short-term disturbances to avoid excessive nuisance tripping. The generator does not have to cease to energize if the voltage returns to the normal utility continuous operating condition within the specified trip time.

Labels:



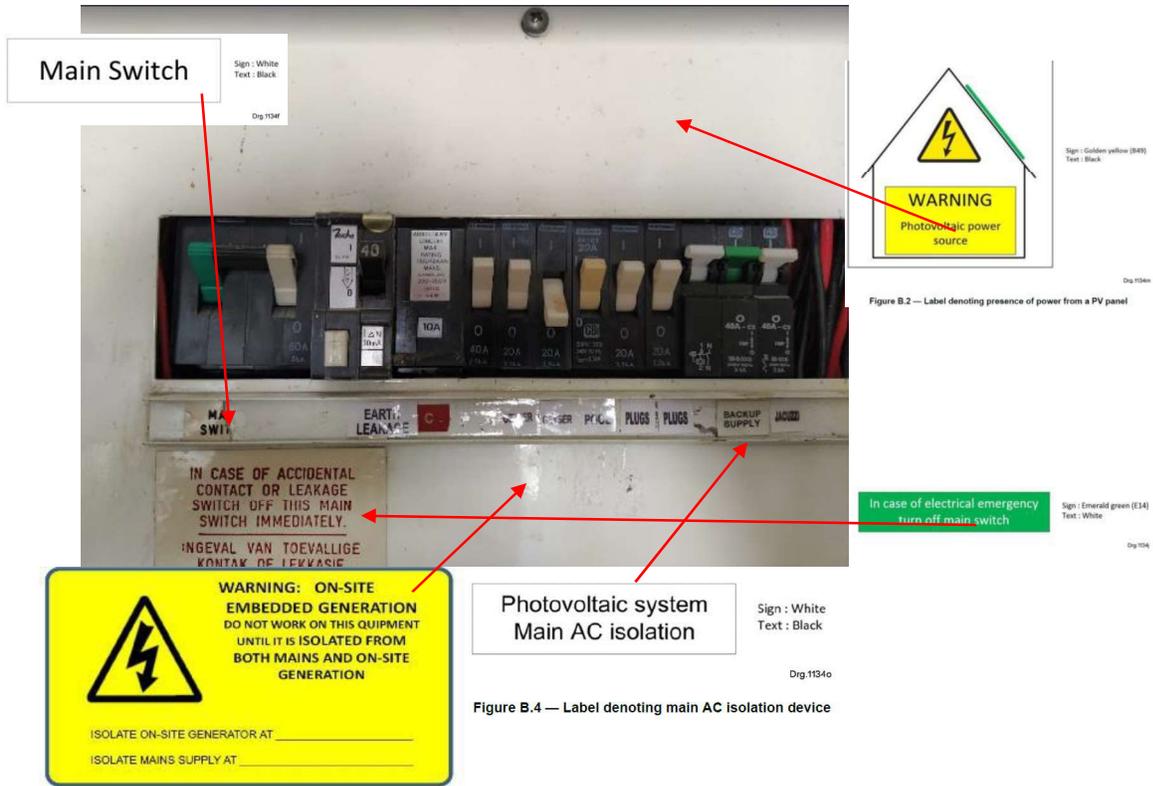
Where Earth-Neutral bond is installed:



Above can also be done on an external box

7.12.3.1.3 Where alternative supplies are installed remotely from the installation, or from one another, and where it is not possible to make use of a single neutral bar or neutral conductor which is earthed, the neutral of each unit shall be earthed at the unit and these points shall be bonded to the consumer's earth terminal (see 6.12.4). The supply from each unit which supplies the installation or part of the installation, shall be switched by means of a switch that breaks all live conductors operating substantially together (see figures P.2 and P.4), to disconnect the earthed neutral point from the installation neutral when the alternative supply is not connected (see also 6.1.6).

Main Distribution Board (1st from Utility)



4.2.9.4 The absence of emergency shutdown capabilities will be indicated on signage in accordance with 4.2.2.

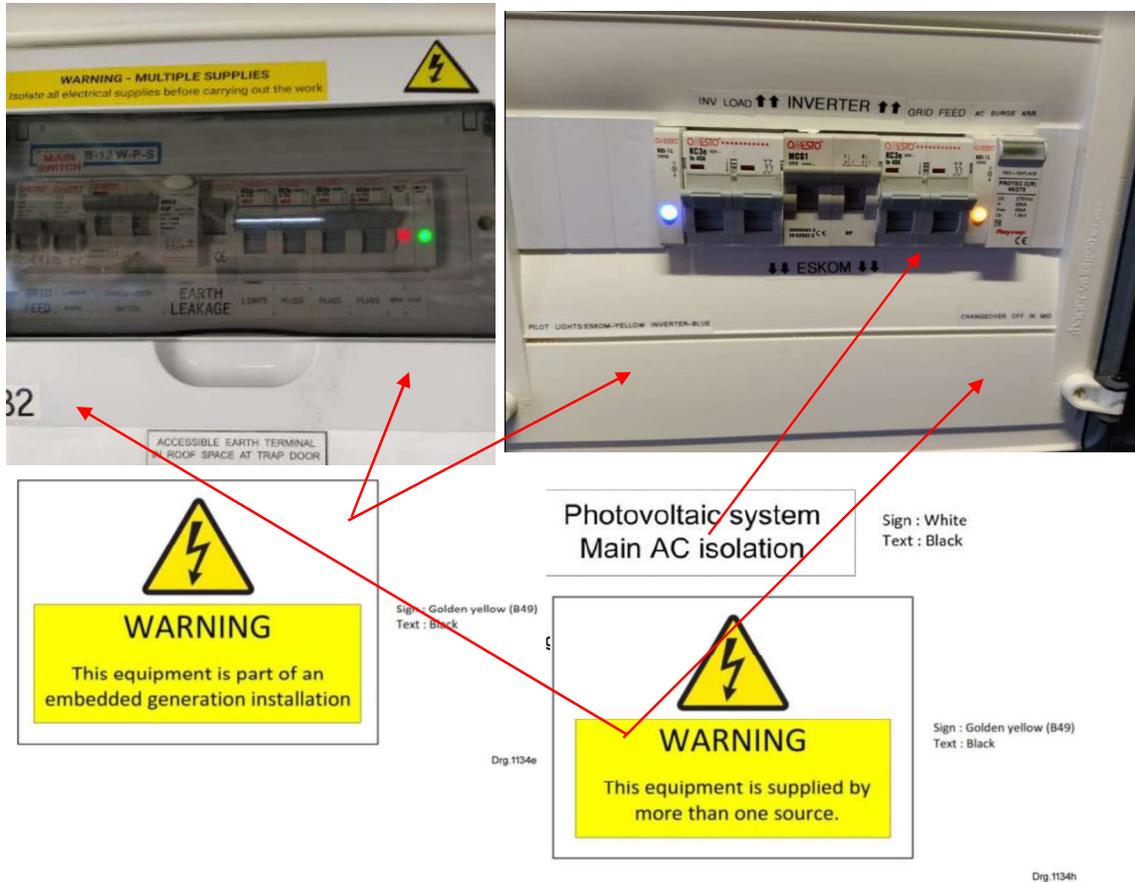
Note: AC to the Embedded generation (if not going to sub-DB) shall be a 2-pole isolator/breaker.

6.9.3.3 The disconnecting device shall be a switch-disconnector that disconnects all the phase conductors, however

- a circuit-breaker may be used instead of a switch-disconnector if overcurrent protection is also required (see also 6.8.1), or
- another device may be used instead of a switch-disconnector, where specified in this part of SANS 10142 for a particular application.

b) in the case of the main or first distribution board of an installation, be labelled as “main switch”,

Sub Distribution Board (From Main DB and/or Inverter)



Any and ALL DBs with 2 or more supplies shall have the below installed (lights)

7.12.2 Requirements for alternative sources of supply

7.12.2.1 Where any form of alternative supply (emergency supply, UPS, other static inverters, or wind turbine inverter generators), is connected to an electrical installation, a notice to this effect shall be displayed at the main switch of the installation, and where such supply

- a) supplies power only to certain circuits in a distribution board, a power-on indicator (visible or audible) shall be provided on each such distribution board as well as a notice indicating that the standby power main switch shall also be switched off in an emergency,

Labelling of Sub DB components are essential. Both the DB shall be labelled correctly as well as the components (circuit breakers)

- d) in the case where an alternative supply is installed (emergency supply, uninterruptible power systems (UPS), etc.), be labelled as required in 7.12.2.1, and

Earth Leakage shall be installed for all alternative sources (output), this makes the Earth-Neutral bonding relay essential as the earth leakage unit may not work if there is an elevated neutral

Note: Where the "Essential" circuits and "Non-Essential" circuits are installed in the same distribution board, both circuits shall be grouped and labelled accordingly. All requirements for Alternative Supply DBs shall apply to the shared DB. Neutrals shall be split between Essential and Non-Essential circuits as the Source of Power differs.