

## Technical guidance sheet 3.2

# Protection of wiring and wiring systems



Solar  
Victoria



This guidance provides further information to support installers' understanding of applicable requirements and obligations relating to d.c. wiring and wiring systems associated with a grid connected PV system.

### Standards referenced:

- » AS/NZS 3000:2018 *Electrical installations "Wiring Rules"*.
- » AS/NZS 4777.1:2016 *Grid connection of energy systems via inverters Part 1: Installation requirements*.
- » AS/NZS 5033:2021 *Installation and safety requirements for photovoltaic (PV) arrays*.

This guidance is part of a series we commissioned Grey Sky Solar Consulting to develop to help installers maintain compliance with Australian Standards. It includes installation advice and examples of installations that may not be meeting the requirements relating to the protection of wiring and wiring systems. Energy Safe Victoria has also reviewed this guidance.

### In series 3:

- 3.1 System documentation
- 3.2 Protection of PV wiring and wiring systems**  
*(this sheet)*
- 3.3 D.C. plug and socket connectors

## Wiring and wiring systems: For grid connected PV systems

Relates to the mandatory requirements in AS/NZS 3000:2018, AS/NZS and AS/NZS 5033:2021. Complying with these requirements is not only a legal obligation but it also ensures the safety of first responders in the event of a fire or other emergency.

### General requirements

For **all** d.c. wiring installed within **domestic buildings**, additional mechanical protection shall be provided.

All d.c. cables within a domestic building must be installed in metal or heavy-duty (HD) insulating conduit. If external to the building envelope or internal to the building but not concealed, medium-duty (MD) conduit can be used.

**Note:** for non-domestic installations, other methods may be used to achieve the above requirements. Refer to AS/NZS 5033:2021 Clause 4.4.5.2.2 for additional information

#### Standards referenced:

- » AS/NZS 5033:2021 Clause 4.4.5.2.2

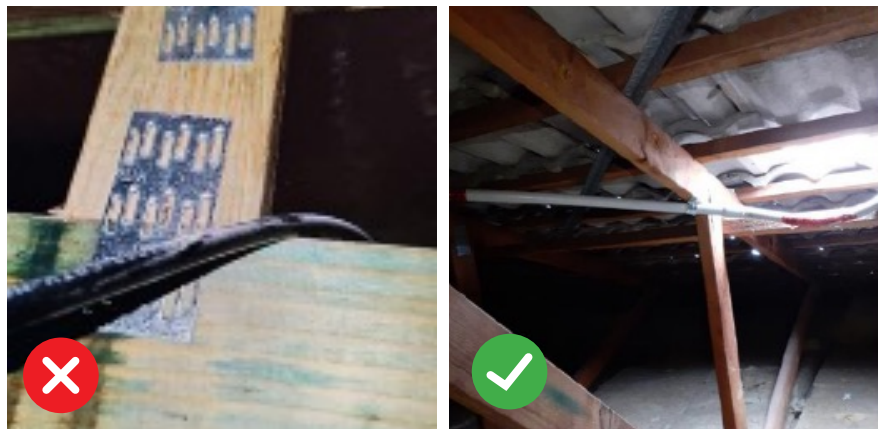


Figure 1.1

Where not installed directly behind and adjacent to the PV modules, the wiring system shall be identified by distinctive labels marked with the word "SOLAR" on the exterior surface over the length of the enclosure at intervals not exceeding 2 metres and be visible after mounting.

#### Standards referenced:

- » AS/NZS 5033:2021 Clause 5.3.1.1

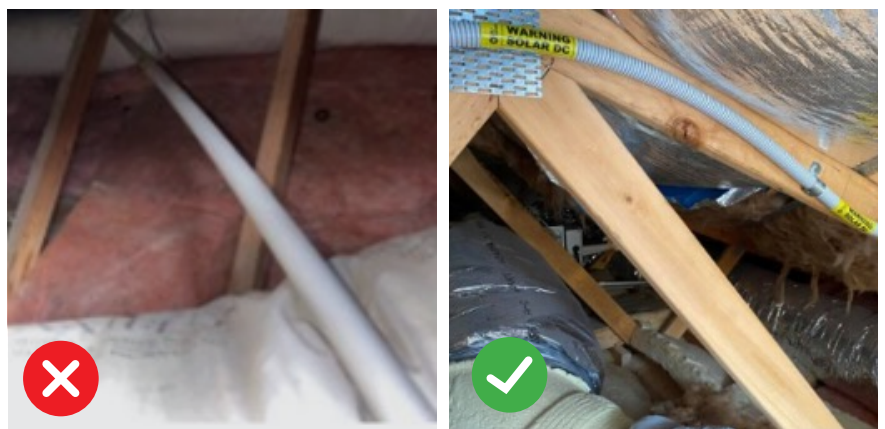


Figure 1.1.1

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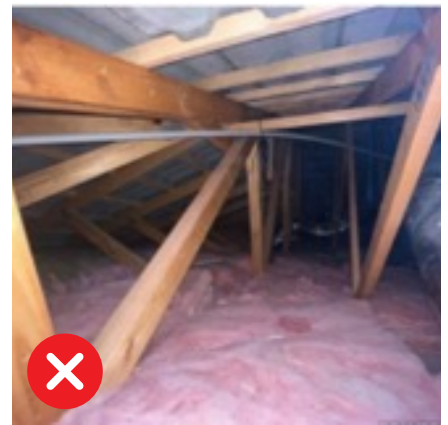
Wiring systems shall be fixed in position by suitable clips, saddles, or clamps or by means that will not damage the wiring system and that will not be affected by the wiring system material or any external influences.

Wiring systems installed within a ceiling space shall be secured to prevent inadvertent dislodgement from conduit support.

Electrical conduits shall be fixed and secured at intervals as specified by the manufacturer to prevent sag and fatigue leading to disconnection of joints.

**Figure 1.1.2**

*One cable tie is not adequate fixing for this span of conduit run. This can put pressure on unglued joints and expose d.c. cables.*



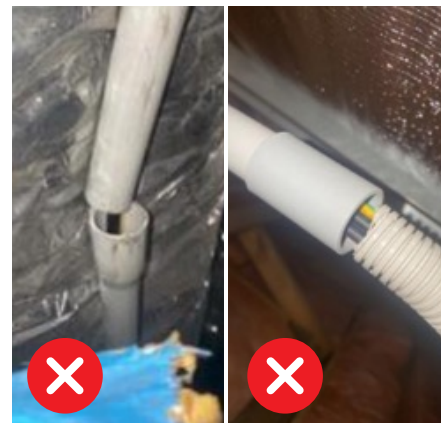
Where conduit systems are used as wiring enclosures containing d.c. cables, all parts shall be sealed appropriately (by methods such as glue) unless otherwise stated by the manufacturer.

**Standards referenced:**

- » AS/NZS 3000:2018 Clause 3.9.3.1
- » AS/NZS 5033:2021 Clause 4.4.5.1

**Figure 1.1.3**

*It is important to ensure the conduit that contains wiring is appropriately sealed to prevent significant issues, especially when it is placed on metal ducting, insulation, or a combustible material.*



## Wiring and wiring systems:

# For grid connected PV systems

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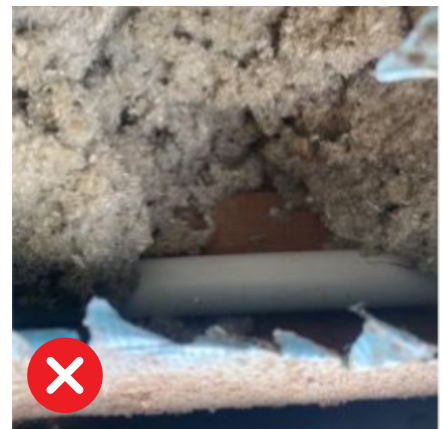
In addition to the above general requirements for d.c. wiring systems, wiring systems (including d.c. array and a.c. inverter cables) fixed and concealed within a wall, ceiling, or floor, shall require additional mechanical protection requirements if installed less than 50mm from the surface of wall, ceiling, or floor.

**Standards referenced:**

- » AS/NZS 3000:2018 Clause 3.9.4.2
- » AS/NZS 5033:2021 Clause 4.4.5.2.2

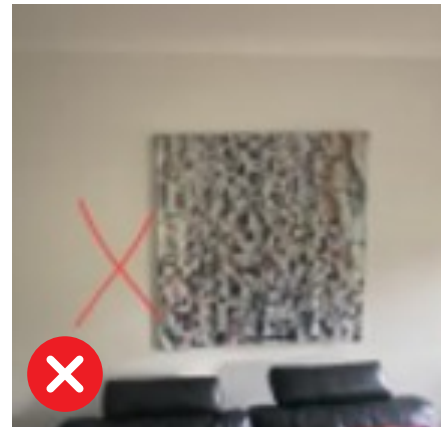
**Figure 1.1.4**

The image above shows a d.c. wiring enclosed in conduit laying on ceiling surface. This type of installation creates significant risk if anyone was to screw anything into the ceiling. The d.c. cables are not protected by safety switches and screwing or damaging the d.c. cables can lead to an electric shock or cause a fire.



**Figure 1.1.4.1 (a)**

The inverter on this site is installed in the garage, behind the wall shown in the picture and marked on the image with the red cross. There is an a.c. cable supplying the inverter concealed in the wall cavity.



**Figure 1.1.4.1 (b)**

The thickness of the wall means there cannot be more than 50mm between the surface of the plaster and the cable. The cable would therefore require additional means of mechanical protection. This is to prevent damage and injury should someone screw something into the wall, e.g. mounting a shelf or hanging a picture.



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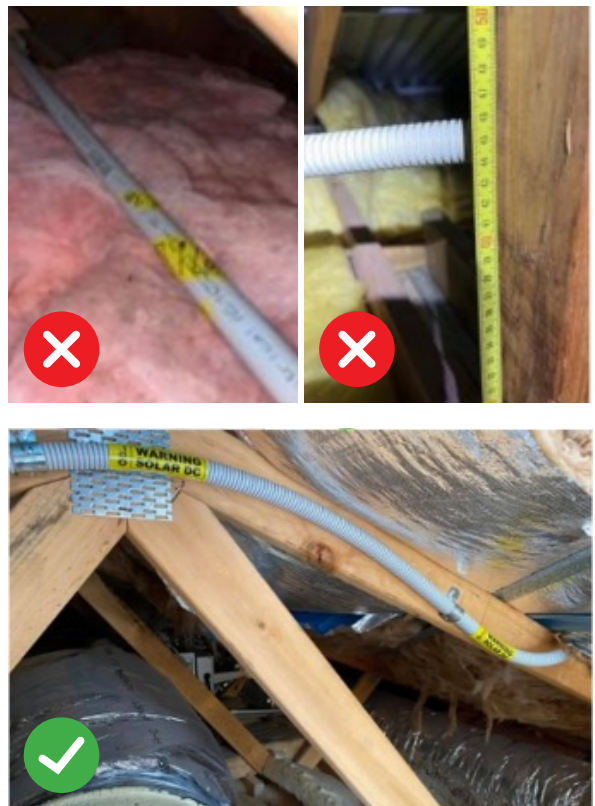
In addition to the requirements above, the following mandatory requirements apply when installing rooftop disconnection point/s (DP) instead of a load breaking disconnection device (Rooftop Isolator – RTI).

The wiring system **shall not be located within 0.6m above the surface of the ceiling** unless within 1m of the internal surface of an external wall, or if located within 1m to 1.5m from the internal surface of the external wall, it must be secured to the roof structure e.g. ceiling truss.

**Standards referenced:**

- » AS/NZS 5033:2021 Clause 4.4.5.2.3 and Figure 4.6 provides a drawing representation of a compliant installation.

Figure 1.2



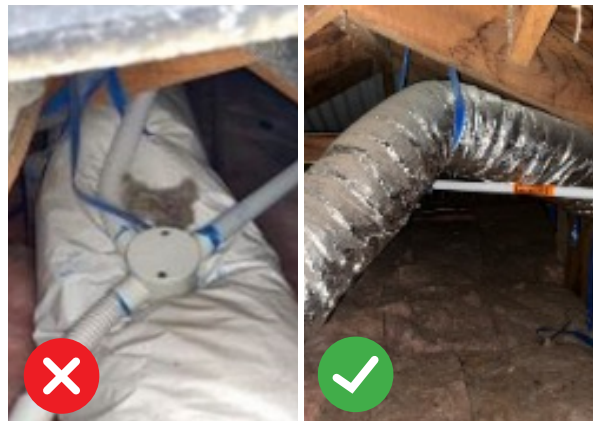
This requirement also applies to PV d.c. wiring between non-adjacent groups of PV modules.

For example, d.c. cable between an east and west array.

**Standards referenced:**

- » AS/NZS 5033:2021 Clause 4.4.5.2.4

Figure 1.2.1



## More information

For more information about Solar Victoria's commitment to safety and quality, including our audit program, checklists, and training and workforce development visit: [solar.vic.gov.au/industry](https://solar.vic.gov.au/industry)

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