

Inspections update: No. 23 - Small-scale Renewable Energy Scheme inspections program update 2024

Summary of key outcomes

In recent years, the direct current (DC) isolators have been a common point of failure in rooftop solar PV systems. The requirements under the new Australian standard, AS/NZ 5033:2021 introduced November 2021, have been amended to ensure a more appropriate use of DC isolators. The change in requirements has decreased DC isolator usage, creating a significant downwards trend in unsafe solar PV installations results in the latest inspections program.

The Clean Energy Regulator (CER) worked closely with the external service providers that carry out inspections to refine processes. Together we reviewed and adjusted the check list items on the inspection reports to better reflect the risks. For example, discretionary substandard results for solar PV systems are more appropriately reported as either adequate with minor noncompliance, substandard or unsafe.

Introduction

This inspections program update provides a summary (as of 30 June 2024) of the Small-scale Renewable Energy Scheme (SRES) inspections program. Results for the 2023–24 financial year covers the small-scale solar photovoltaic (PV) systems installed between 1 July 2022 and 30 June 2023.

This update is a continuation of a series of [published inspections updates](#)¹.

The SRES inspections program is administered by the CER under Section 23AAA of the *Renewable Energy (Electricity) Act 2000* (REE Act) and Part 7 of the Renewable Energy (Electricity) Regulations 2001 (Regulations).

¹ <https://cer.gov.au/schemes/renewable-energy-target/small-scale-renewable-energy-scheme/small-scale-renewable-energy-systems/small-scale-renewable-energy-system-inspections>



SRES inspections program

Under the REE Act, the CER is required to run the inspection program annually. The CER administers the inspections program on a significant selection of solar PV installations that have [small-scale technology certificates](#)² (STCs) created against them. Installations across Australia are randomly selected for inspection to make sure they conform with Australian standards, and any other standards or requirements relevant to the creation of certificates.

The CER may also inspect solar PV installations at any time when it is appropriate or necessary to do so.

Participation in the inspections program for system owners is voluntary. However, the CER and service providers encourage system owners to participate to help maintain the integrity of the SRES.

The CER provides the results to state and territory electrical safety authorities as well as to the current installer and designer accreditation body, [Solar Accreditation Australia](#) (SAA)³. The results are also used to identify areas of concern that are then addressed through industry education, stakeholder engagement and, when necessary, compliance action.

This program does not replace electrical safety laws, or the inspection and compliance programs administered by relevant state and territory authorities. This program compliments those laws administered by using a cross agency approach to communicate and address areas of concern. The CER has no direct powers to deal with electrical safety matters but may declare that designers and installers are ineligible to participate in the SRES.

Information gathered from the physical inspection and the checklist are used to create an individual inspection report. Regardless of rating, reports are provided to the system designer, installer, registered agent and the system owner or home occupier. This gives the designer and installer an opportunity to identify and fix installation noncompliance. It also provides the system owner or home occupier with quality assurance of their installation.

SRES inspections program ratings

The SRES inspections program uses a checklist developed with industry experts. The checklist items reflect regulations, standards and industry requirements.

Under the SRES inspections program framework, the inspectors assess compliance against the checklist items. Sometimes ratings are applied automatically, if certain checklist noncompliance items are ticked, or at the inspector's discretion. The overall installation is rated as one of the following categories:

- compliant/adequate
- substandard
- unsafe.

² <https://cer.gov.au/schemes/renewable-energy-target/small-scale-renewable-energy-scheme/small-scale-technology-certificates/create-small-scale-technology-certificates>

³ The CER announced Solar Accreditation Australia (SAA) as the accreditation body on 29 Feb 2024, <https://saaaustralia.com.au/>



Compliant solar PV installations

Compliant solar PV installations meet the required standards. Minor noncompliance may be identified.

Substandard solar PV installations

A substandard solar PV installation is one that does not:

- meet key clauses in the standards and industry guidelines for installation, which may lead to premature equipment failure
- pose a safety risk, but the installation work or equipment should be improved to meet relevant standards and industry guidelines.

Solar PV installations may be automatically rated substandard due to one or more medium-risk noncompliance items identified against the checklist.

Solar PV installations may also be rated substandard at the inspector's discretion. In this instance, the substandard rating would overwrite the automatic compliant rating. This is usually due to a combination of low-risk noncompliance items identified against the checklist.

Unsafe solar PV installations

Unsafe solar PV installations hold the highest risk rating in the SRES inspections program. An unsafe solar PV installation has a safety hazard. This may pose an immediate risk to a person or property, or it might develop into a risk if it is not promptly addressed.

On average, only a small number of inspections identify systems that pose an immediate safety risk.

An automatic unsafe rating will be applied against one or more of the following five checklist items:

- exposed live parts
- solar PV panel not securely mounted to the roof
- damage to the DC isolators near the inverter due to water ingress
- damage to the rooftop (array) DC isolators due to water ingress
- damage to cable junction boxes due to water ingress.

Solar PV installations can also be rated unsafe at the inspector's discretion. In this instance, the inspector applies an unsafe rating to overwrite the automatic substandard rating. This could be due to a combination of noncompliant items identified against the checklist.

For example, a system may have several noncompliant wiring items identified against the checklist that individually are not an immediate safety risk, but together make a system unsafe. The discretionary unsafe rating could also be due to noncompliant items that are not categorised under any particular checklist items, such as loose cable terminals resulting in overheating at various switches and connection points.

A system can also be rated unsafe by default if a solar PV panel or inverter is subject to a product recall and has not been fixed or replaced.



Inspections results – an overview

During the 2023–24 financial year inspection program, the CER conducted 2,862 solar PV inspections. These inspections included both random, and appropriate or necessary inspections.

Random inspections

From May 2011 (when the inspections program began) to 30 June 2024, 42,736 random inspections have been conducted on solar PV installations that occurred between 2010–2023 (Figure 1). The number of inspections, substandard installations and unsafe installations for each state and territory can be found in Table A1 in Appendix A.

During the 2023–2024 financial year, a total of 2,799 solar PV systems installed under the SRES between 1 July 2022 and 30 June 2023 were inspected. Of those, 1,464 were installed in 2022 and 1,335 in 2023 (Figure 1).

Of the 2,799 solar PV installations inspected:

- 1,079 (73.7%) in 2022 and 1003 (75.13%) in 2023 were **compliant**
- 360 (24.59%) in 2022 and 326 (24.42%) in 2023 were **substandard**
- 25 (1.71%) in 2022 and 6 (0.45%) in 2023 were **unsafe**.

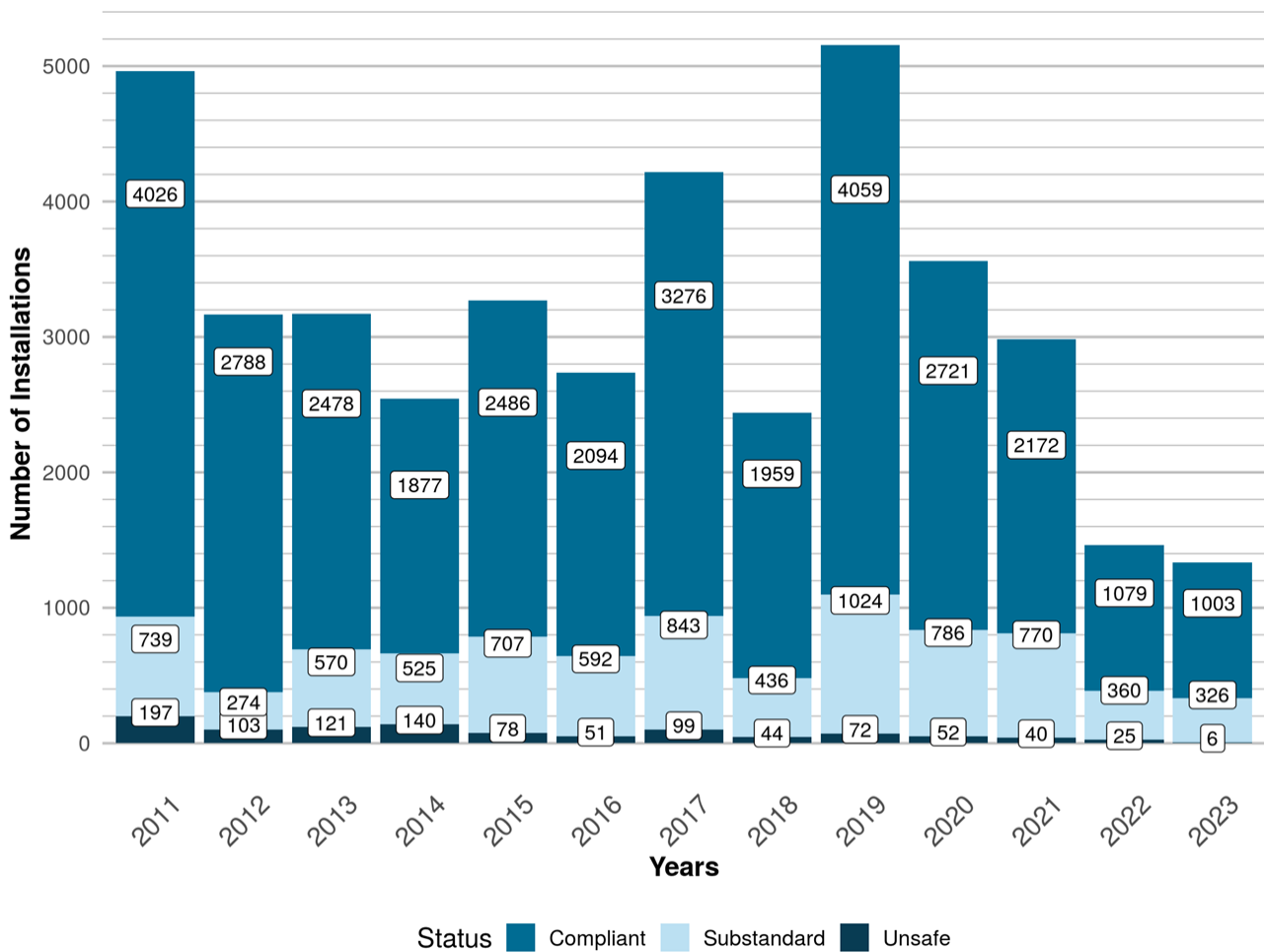
The number of inspections conducted in 2022 was lower than in previous years. This decrease was because of CER's decision to commence the inspections program on installations that occurred on or after 1 July 2022. The delay allowed for the implementation of the new Australian standards change, AS/NZS 5033:2021⁴. Compared to previous financial years, the inspection dates are now closer to installation dates to accommodate this change. As a result, the number of inspections on installations that occurred in 2023 will increase, with many inspections being carried out on in the 2023–24 financial year.

The CER now aims for 6-18 months between system installation and inspection, this differs from previous years of 12-18 months as this was to allow safety issues to occur (water ingress) with DC isolators after an agent claims STCs (which may be created up to 12 months after installation). The shorter period between installation and inspection will highlight electrical safety risks or trends sooner that we can communicate to state and territory electrical authorities and the SAA.

⁴ AS/NZS 5033:2021 standard was an update to the installation and safety requirements that was published on 19 November 2021. The implementation of the standard dates differs for different states and territories. For New South Wales, the implementation was on the date of publishing. Tasmania, implementation was on 10 June 2022. For remaining jurisdictions, the implementation was on 19 May 2022.



Figure 1: Yearly PV inspections over the life of the program for installations from 2010 to 2023



*Data for the 1,730 solar PV installations inspected in 2010 is not displayed in Figure 1 or in this update.

Appropriate or necessary inspections

The CER may also conduct inspections on solar PV installations at any time when considered appropriate or necessary to do so.

The CER continues to work with the state and territory electrical safety authorities and Solar Accreditation Australia to identify appropriate and necessary inspections and educate industry in key compliance areas identified through the inspections program.

Information and results from the CERs appropriate or necessary inspections is at Appendix B.

Analysis on random inspections

The following analysis of random inspection results separates the inspection findings for years 2022 and 2023 installations. Initial results have shown:

- a drop in unsafe solar PV systems from the adoption and implementation of new industry standards
- an increase in compliant solar PV installations attributed to the quality assurance reviews and changes to the checklist items and systems appropriately reported on.



The solar PV systems inspected in the 2023–24 financial year were installed from 1 July 2022 to 30 June 2023. Compared to the inspections in previous financial years, the inspection dates are closer to installation dates to accommodate the change in Australian standards.

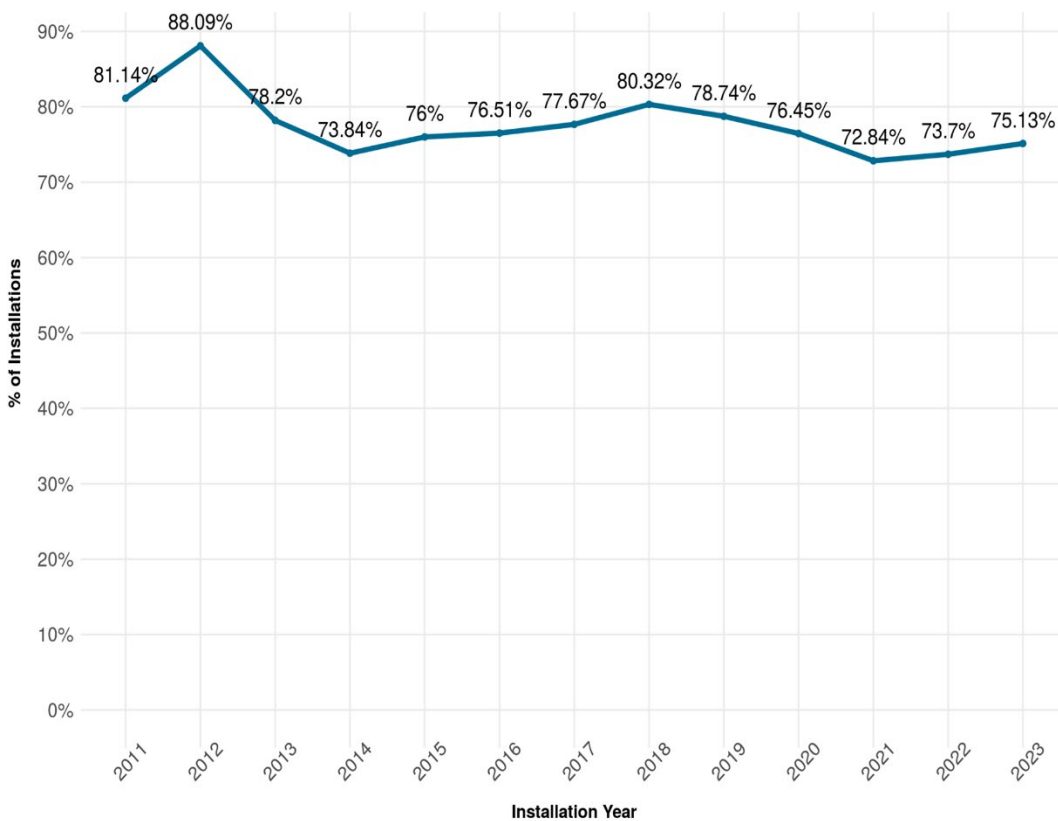
Compliant PV installations

For the 2023-24 inspections, the following solar PV systems were compliant (Figure 2):

- for 2022 installations: 1,079 of 1,464 (73.70%)
- for 2023 installations: 1,003 of the 1,335 (75.13%).

Compliant solar PV installations are trending up, as shown between 2021 and 2023, which could be a result of the major updates to AS/NZS 5033:2021 standards that were published in November 2021. One of the changes is the replacement of rooftop DC isolators by DC disconnectors (disconnection points) in most solar PV installations.

Figure 2: Compliant solar PV systems by year 2011-2023



Substandard PV installations

For 2023-24 inspections, the following installations we rated substandard (Figure 3):

- for 2022 installations: 360 of the 1,464 (24.59%)
- for 2023 installations: 326 of 1,464 (24.42%).

Figure 4 shows that the 2022 and 2023 installations that were rated substandard were mostly due to issues with:

- wiring (9.08% for 2022 and 7.94% for 2023)



- PV array mounting (5.53% for 2022 and 5.84% for 2023)
- PV array earthing (6.76% for 2022 and 6.59% for 2023)
- disconnection point (6.08% for 2022 and 5.62% for 2023).

Substandard installations due to rooftop DC isolators dropped in comparison to 2021 installations. This is because DC disconnection points replaced rooftop DC isolators under the AS/NZS 5033:2021 standards.

Figure 3: Substandard solar PV systems by year 2011-2023

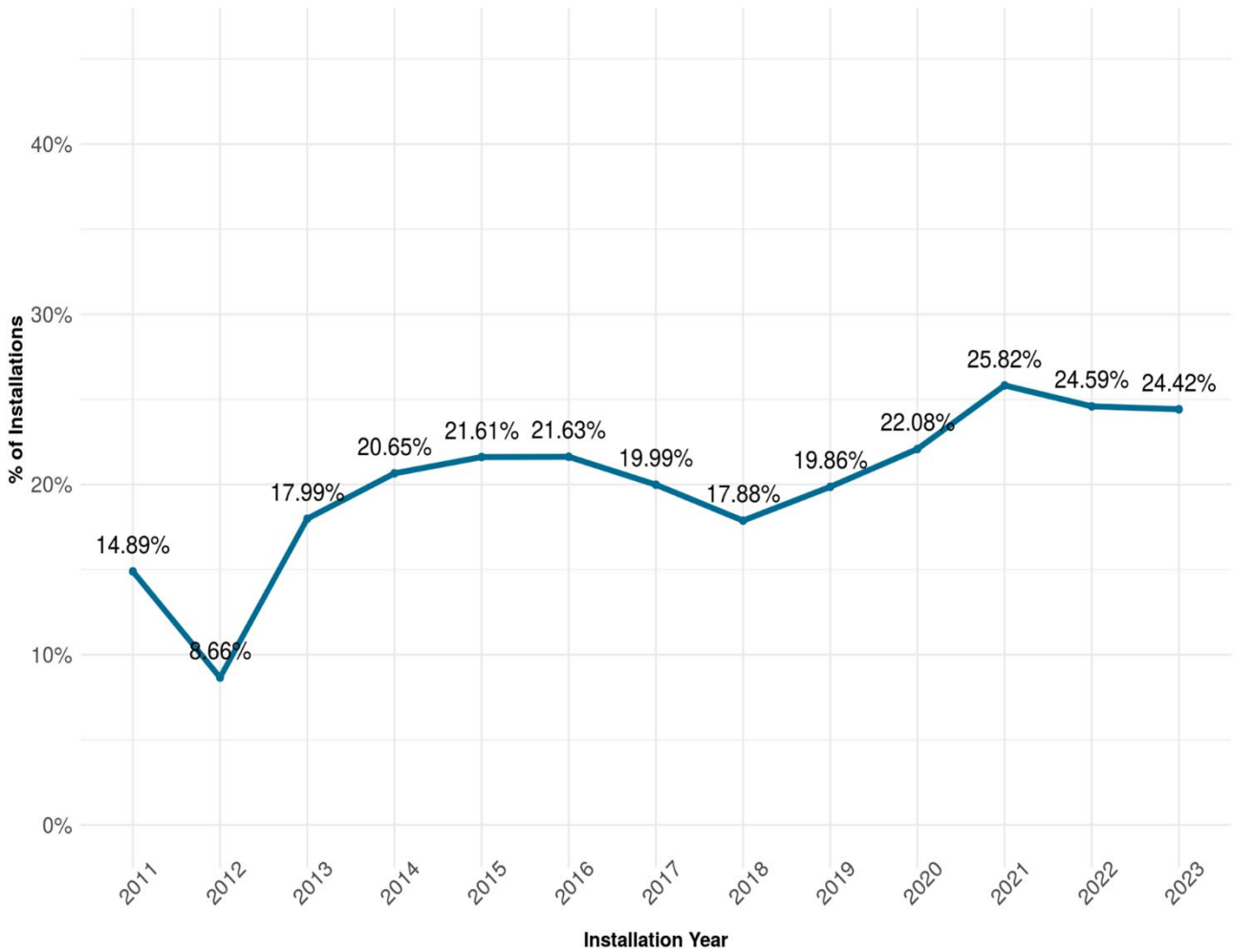
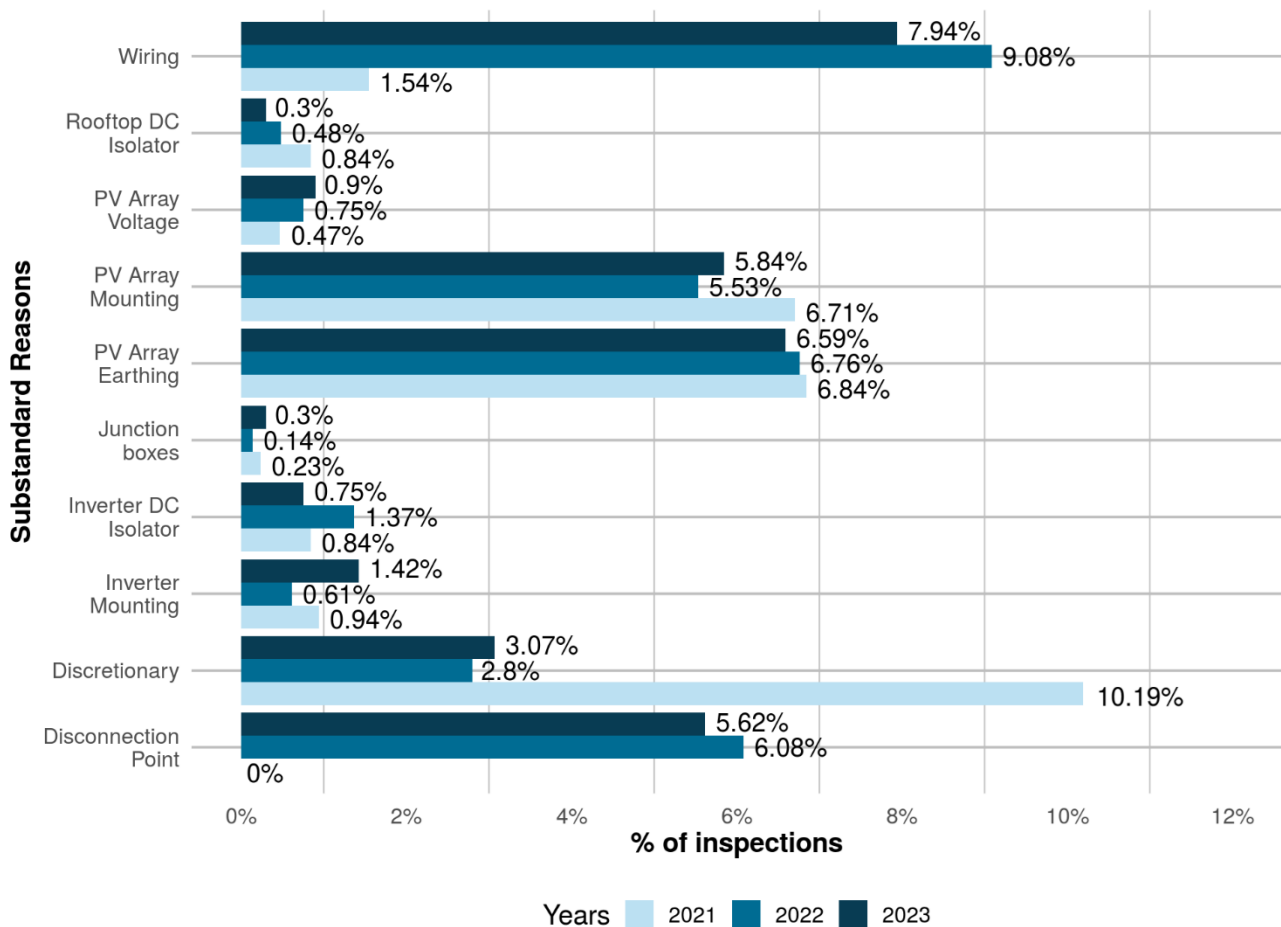




Figure 4: Causes of substandard installations conducted 2021–2023



Note: Total percentages of causes for substandard installations are greater than the substandard totals in Section 5.2 because one or more noncompliance checklist items may be selected in an inspection to make a single system substandard.

Discretionary substandard installations

A solar PV installation can be rated substandard at the inspector’s discretion by updating the automatic rating. The inspectors assess combinations of multiple low-risk noncompliance against the SRES inspections checklist items.

Substandard reasons are now more accurately categorised because of:

- improved quality assurance reviews of inspection reports
- updates to the checklist items to better reflect risks, this removed ambiguity and allows inspectors to properly categorise a system for accurate reporting.

As a result, discretionary substandard percentage had a sharp decline from 10.19% in 2021 to 2.8% in 2022 and 3.03% in 2023.

For 2023-24 inspections, the following systems were rated as discretionary substandard (Table 1):

- for 2022 installations: 42 of 1,464 (2.8%)
- for 2023 installations: 42 of 1,335 (3.14%).



The following low-risk noncompliance items that were identified against the checklist:

- for 2022 installations: 159
- for 2023 installations: 178.

Issues mostly related to cabling, signage, PV array earthing, DC isolators and disconnection points.

In comparison, in 2021, 304 solar PV installations were rated discretionary substandard for 618 low-risk noncompliant checklist items that mostly relate to cabling, signage, PV array earthing and mounting (Table 1).

The CER has worked with inspectors in the 2023–24 financial year to reduce the percentage of inspections rated as discretionary substandard.

Table 1: Low risk noncompliance checklist items contributing to discretionary substandard rating of solar PV systems installed during 2021–2023

	2021 installations	2022 installations	2023 installations
Cabling	212	42	42
Signage	173	39	35
PV array earthing	135	22	26
PV array mounting	60	21	20
Inverter DC isolator	10	2	3
Rooftop DC isolator	9	6	15
AC circuit breaker	19	3	3
Disconnection point	0	24	34
Total	618	159	178

Note: The totals here are greater than the totals of discretionary substandard installations in Section 5.3 because multiple checklist items may be selected for individual installations.

Actions taken for substandard installations

The following actions are taken for both random, and appropriate or necessary inspections.

- The owner or occupier of the premises is advised by the inspector of the nature and extent of the risk posed by the substandard issues at the time of the inspection.



- The system owner or home occupier, designer, installer and STC agent are provided a copy of the final report.
- The state and territory electrical safety authorities are provided a copy of the final report.

The CER is working with state and territory electrical safety authorities and SAA to further analyse and address noncompliance.

The CER may, under the regulations, declare that designers and installers are ineligible to participate in the SRES.

Unsafe installations

For 2023-24 inspections, the following solar PV systems were rated unsafe (Figure 5):

- for 2022 installations: 25 of the 1,464 (1.71%)
- for 2023 installations: 6 of the 1,335 (0.44%).

The 2022 and 2023 installation that were rated unsafe were caused by the following safety hazards:

- exposed live parts (0.61% in 2022 and 0.22% in 2023)
- inverter DC isolator (0.14% in 2022 and 0% in 2023)
- rooftop DC isolator (0.07% in 2022 and 0% in 2023)
- panel mounting (0.07% in 2022 and 0% in 2023).

In comparison to 2021 installations, unsafe rated installations caused by DC isolators have dropped in 2022 and 2023 due to the removal of rooftop DC isolators in most PV installations (Figure 6).



Figure 5: Unsafe PV installations by year, 2011-2023.

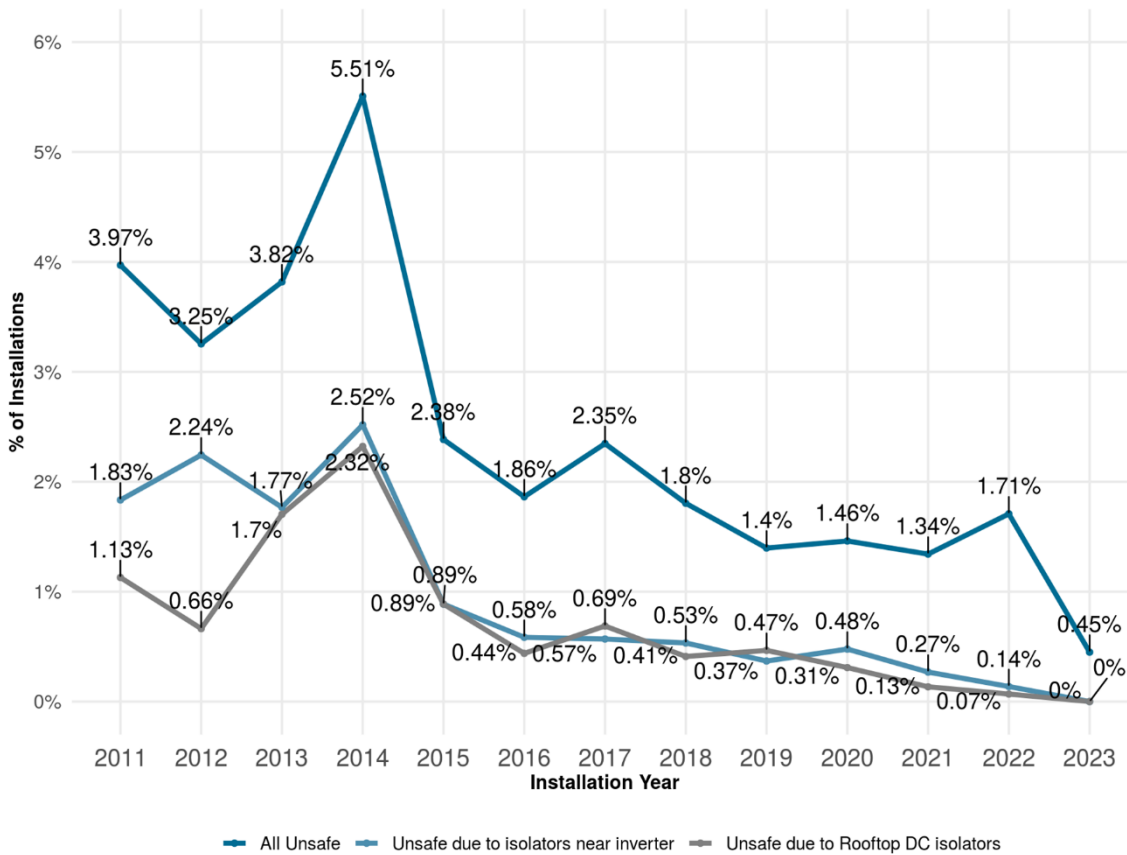
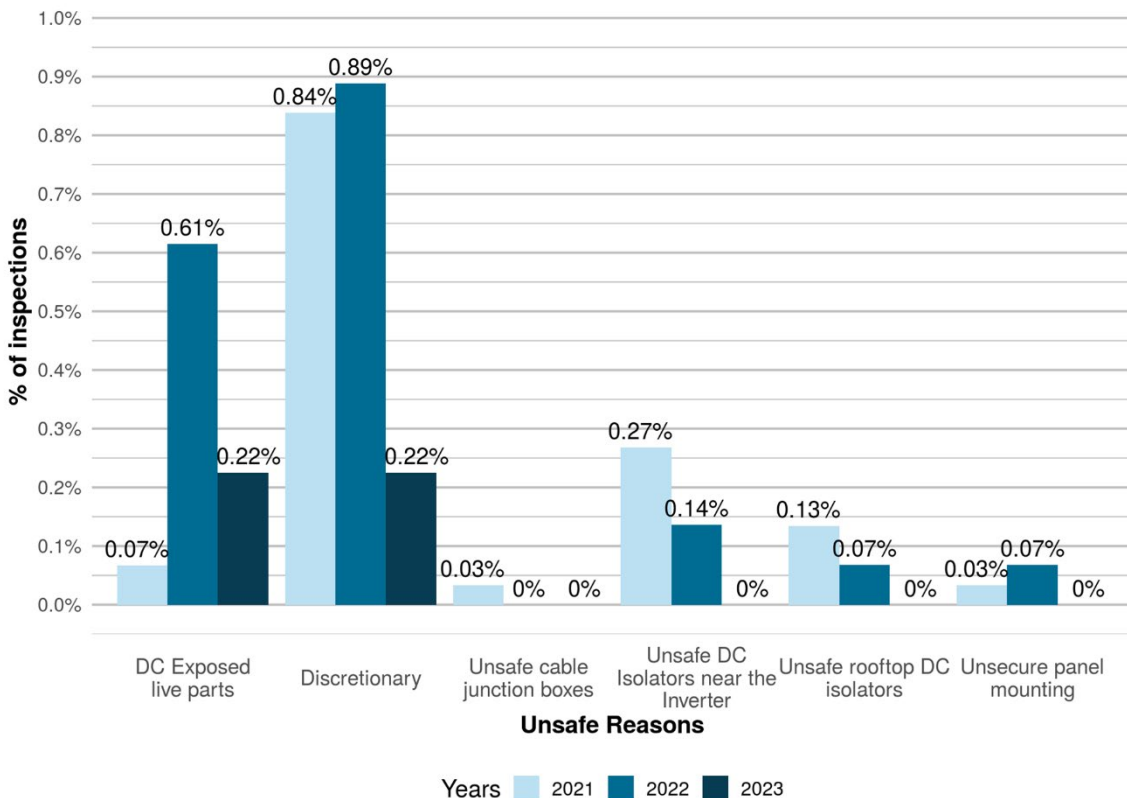


Figure 6: Causes of unsafe solar PV systems installed during 2021–2023





Note: The total percentages of unsafe solar PV installations in Figure 6 may be greater than the unsafe totals in Section 5.5 because one or more noncompliance checklist items may be selected in an inspection to make a single system unsafe.

Discretionary unsafe installations

A solar PV installation can receive an unsafe rating at the inspector’s discretion as noted in Section 3.3. In 2022 and 2023 respectively, 0.89% and 0.22% of installations inspected were rated unsafe at the inspector’s discretion.

The inspectors assess the combined effect of medium-risk noncompliance against the SRES inspections checklist items. The inspectors then rate these PV installations unsafe by changing the automatic rating under the SRES inspections framework. Table 2 compares the categories of noncompliance against checklist items for discretionary unsafe installations in 2021, 2022 and 2023.

For the 2023-24 inspections, the following installations were rated as discretionary unsafe (Table 2):

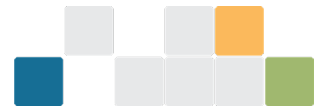
- for 2022 installations: 13 of the 1,464 (0.89%)
- for 2023 installations: 4 of the 1,335 (0.22).

In 2021, as a comparison, 25 of the installations were rated discretionary unsafe against noncompliant checklist items. The issues mostly related to cabling, signage, PV array earthing, disconnection points and AC circuit breakers (Table 2). Some of the items were also selected for the automatic unsafe ratings. However, for discretionary unsafe installations the noncompliance is of lower risk.

The CER has worked with inspectors in the financial year 2023–24. This has reduced the percentage of discretionary unsafe ratings.

Table 2: Noncompliance contributing to discretionary unsafe rating of solar PV systems installed during 2021–2023

	2021 installations	2022 installations	2023 installations
Cabling	25	13	4
Signage	11	7	2
PV array earthing	9	9	4
PV array mounting	5	3	0
Inverter DC isolator	0	1	0
Rooftop DC isolator	1	0	0
AC circuit breaker	0	1	3



Disconnection point	0	6	2
Total	51	40	15

Note: The totals here are greater than the totals of discretionary unsafe installations in Section 5.6 because multiple checklist items may be selected for individual installations.

Actions taken for unsafe installations

The following actions are taken for both random inspections, and appropriate or necessary inspections.

- The system is shut down or otherwise rendered safe by the inspector.
- The owner or occupier of the premises is advised by the inspector of the nature and extent of the safety risk.
- The relevant state or territory electrical regulatory authorities, Solar Accreditation Australia and the energy network provider are advised by the inspector of the nature and extent of the safety risk.
- The system owner, consent provider, designer, installer and STC agent are provided a copy of the final report.
- The state and territory electrical regulators are provided a copy of the final report.

The CER is working with state and territory electrical safety regulators as well as Solar Accreditation Australia to analyse noncompliance issues and develop actions to address these issues.

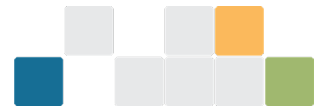
CER may, under the regulations, declare that designers and installers are ineligible to participate in the SRES.



Appendix A

Table 3: Number of inspections completed, substandard and unsafe installations for states and territories up to 30 June 2024 (over the life of the program)

	Number of inspections	Substandard installations	Unsafe installations
ACT	538	77	15
NSW	10,440	2,143	293
NT	236	40	7
QLD	11,817	2,591	328
SA	4,676	860	65
TAS	490	79	20
VIC	8,541	1,300	233
WA	5,998	1,212	154
Total	42,736	8,302	1,115



Appendix B

Appropriate or necessary inspections results

The CER conducted 63 appropriate or necessary inspections on installations completed by a cohort of 9 installers in the 2023–24 financial year, of the PV systems inspected (Figure 7):

- 33 systems installed were compliant
- 29 systems installed were substandard
- 1 system installed was unsafe.

From the cohort, 7 installers were identified to have 1 or more substandard including an installer identified to have 1 unsafe system installed.

Automatic substandard ratings were mostly due to issues with the following (Figure 8):

- disconnection point (22.2%),
- PV array mounting (22.2%), cabling (14.3%),
- PV array earthing (12.7%)
- inverter DC isolators (4.8%).

The inspectors may also update the automatic ratings and apply discretionary substandard or unsafe ratings. The only discretionary substandard installation was due to noncompliance against checklist items relating to disconnection point and cabling.

The one unsafe installation was rated at the inspector’s discretion due to noncompliance in PV array earthing.

Figure 7: Percentages of compliant, substandard and unsafe installations identified through appropriate or necessary inspections

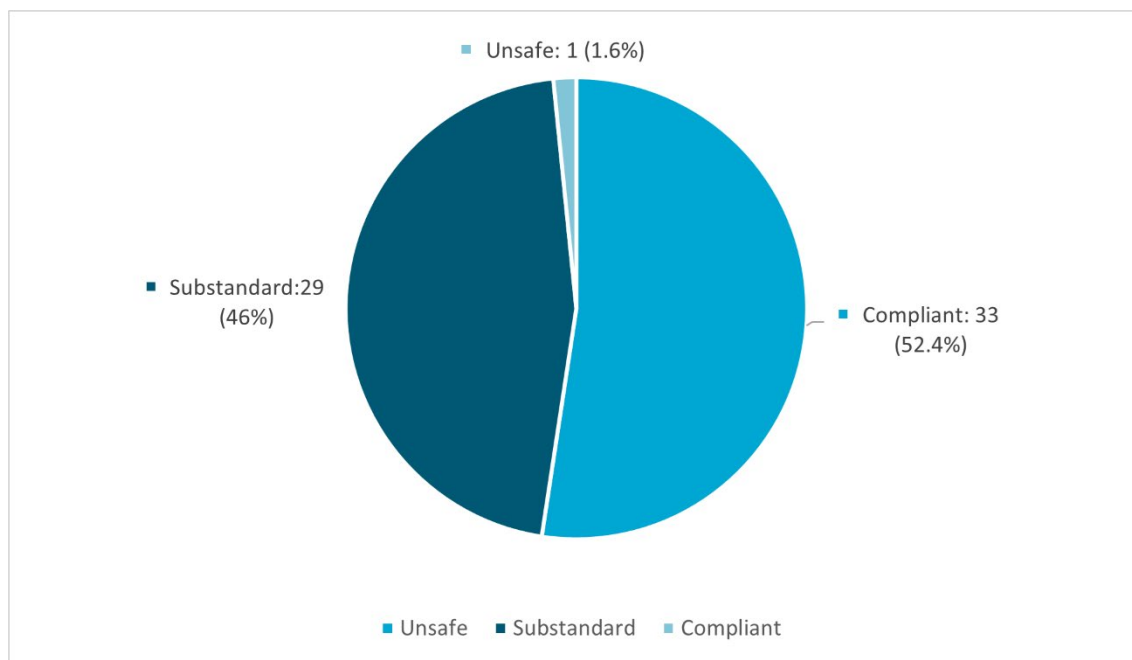




Figure 8: Causes of substandard installations identified through appropriate or necessary inspections

