

## Specific configuration requirements for certification of dc Isolators for use in solar PV installations

October 2020 #20-018

*This Information Bulletin was originally uploaded to the Electrical Regulatory Authority Councils website in November 2018. This notice applies from November 2018.*

### General

The definition of d.c. isolators in AS/NZS 4417.2 includes all d.c. isolators used in photovoltaic (PV) or other renewable energy installations. There are several different types of d.c. isolators configurations as set out below. These configurations align with installation situations of AS/NZS 5033:2014 Installation and safety requirements for photovoltaic (PV) arrays including amendments 1 and 2:

- 1) d.c isolator classified as 'enclosed indoor' with a dedicated individual enclosure
- 2) d.c isolator classified as 'enclosed indoor' without a dedicated individual enclosure
- 3) d.c. isolators classified as 'enclosed outdoors' with an individual dedicated enclosure
- 4) d.c. isolator installed within power conditioning equipment (PCE)
  - a) the PCE is only for mounting indoors
  - b) the PCE is for mounting outdoors in shaded position
  - c) the PCE is for mounting outdoors exposed to sunlight

**NOTE:** This document complements, and is read in conjunction with, the previously issued **Certification requirements for dc isolators for use in solar PV installations Notice #20-017** which lists the preferred options for use of standards listed herein, and the applicable certification times and other additional criteria for the different standards used.

### Requirement

**Specific detail for each type of d.c. isolator classification and details to be included on the certificate.**

1) d.c isolator classified as 'enclosed indoor' with a dedicated individual enclosure

That is the switchgear and the individual dedicated enclosure it was tested with when tested to AS 60947-3 or IEC 60947-3 ed. 3.2 as classification 'enclosed indoors' or if tested to AS/NZS IEC 60947-3 as 'for indoor use' – **in this situation the switchgear and its dedicated individual enclosure are certified together as the 'd.c. isolator'.**

For this classification the certificate will state:

- the standard the d.c. isolator was tested and is certified to; and
- d.c. isolator is only certified for use as '**enclosed indoor**'; and
- the model number of the switchgear and the model number of the enclosure and the model number of the combined switchgear/enclosure (if there is a separate model number), and
- IP rating; and
- if tested to AS 60947-3 or IEC 60947-3 Ed 3.2 –
  - that it is classified DC-PV2
  - the ratings for  $U_e$ ,  $I_{the}$ ,  $I_e$ ,  $I_{make}$  &  $I_{c(break)}$  for each combination of ratings
- if tested to AS/NZS IEC 60947-3 –
  - that it is classified DC21B
  - the ratings of voltage and currents for each configuration of poles

2) d.c isolator classified as 'enclosed indoor' without a dedicated individual enclosure

That is the switchgear is certified as the 'd.c. isolator' when tested to AS 60947-3 or IEC 60947-3 ed. 3.2 as classification 'enclosed indoors' or if tested to AS/NZS IEC 60947-3 as 'for indoor use', with condition to be

installed in an indoor mounted enclosure of not less than the dimensions specified in the test report. For this classification the certificate will state:

- the standard the d.c. isolator was tested and is certified to; and
- the d.c. isolator is only certified for use as 'enclosed indoor'; and
- the minimum dimensions of the indoor enclosure it must be installed in; and
- IP rating (of the uninstalled switchgear); and
- if tested to AS 60947-3 or IEC 60947-3 Ed 3.2 –
  - that it is classified DC-PV2
  - the ratings for  $U_e$ ,  $I_{the}$ ,  $I_e$ ,  $I_{make}$  &  $I_{c(break)}$  for each combination of ratings
- if tested to AS/NZS IEC 60947-3 –
  - that it is classified DC21B
  - the ratings of voltage and currents for each configuration of poles

3) d.c. isolators classified as 'enclosed outdoors' with an individual dedicated enclosure

That is the switchgear and an individual dedicated enclosure it was tested with when tested to AS 60947-3 or IEC 60947-3 ed. 3.2 as classification 'enclosed outdoors' or if tested to AS/NZS IEC 60947-3 as 'for outdoor use' – in this situation the switchgear and its dedicated individual enclosure are certified together as the 'd.c. isolator'

For this classification the certificate will state:

- the standard the d.c. isolator was tested and is certified to; and
- the d.c. isolator is certified for use as 'enclosed outdoor'; and
- IP rating, and
- the model number of the switchgear and the model number of the enclosure and the model number of the combined switchgear/enclosure (if there is a separate model number), and
- if tested to AS 60947-3 or IEC 60947-3 Ed 3.2 –
  - that it is classified DC-PV2 3 v2.0
  - the ratings for  $U_e$ ,  $I_{the}$ , (at 40C ambient and 60C ambient),  $I_e$ ,  $I_{make}$  &  $I_{c(break)}$  for each combination of ratings
- if tested to AS/NZS IEC 60947-3 –
  - that it is classified DC21B
  - the ratings of voltage and currents for each configuration of poles and ambient temperatures

4) d.c. isolator installed within power conditioning equipment (PCE)

**NOTE:** For d.c. isolator pre-installed within a PCE tests to AS 60947- 3:2018 or IEC 60947-3 ed 3.2, are still being classified as 'DC-PV2' for purposes of certification, however the actual voltage and current ratings used for testing the d.c. isolator are as specified by the PCE manufacturer, with the PCE manufacturer taking into account the actual voltages and currents the pre-installed d.c. isolator will be required to switch. This is allowed where the actual voltage and current is controlled/limited by the PCE for each situation and the pre-installed d.c. isolator only has one side that requires, or is connected to, installer connected cables. This may mean a different  $I_e$ , current rating for the supply and load terminals in one connection of PV array cables to the terminals of the PCE, and a different (possibly lower)  $I_e$ , current for the supply and load terminal interchanged (reverse polarity) for the DV-PV2 rating tests of D.7.2.4.1. This would occur if the PCE manufacturer can confirm by tests on the PCE that the PCE will always have this lower current in that reverse polarity situation. Similarly the  $I_{make}$  &  $I_{c(break)}$  current may be tested at a different value to the  $4 \times I_e$ , at  $1.05 \times U_e$  value of table D.5 if the PCE is proven, by tests conducted by PCE manufacturer, to limit that current and voltage combination to lower values for all situations. This includes the PCE manufacturer assessing and assigning maximum PV array ratings to be connected to the PCE, in doing this the PCE manufacturer must verify the voltages and currents that would occur within the PCE and required to be switched by the d.c. isolator in each direction of connection (normal and reverse polarity) and for switching for all earth fault situations.

**a) the PCE is only for mounting indoors**

The switchgear is tested in the related PCE enclosure to AS 60947.3 or IEC 60947-3 ed 3.2 as 'enclosed indoor' with the following exceptions:

- the voltage and current ratings (for  $U_e$ ,  $I_{the}$ ,  $I_e$ ,  $I_{make}$  &  $I_{c(break)}$ ) of the switchgear are values as specified for the PCE the switchgear will be installed in (as per AS/NZS 5033 amendment 2) instead of any values required in AS 60947-3 or IEC 60947-3 ed 3.2

If tested to AS/NZS IEC 60947-3 there are no exceptions to requirements. For this classification the certificate will state:

- the standard the d.c. isolator was tested and is certified to; and
- the d.c. isolator is certified for use as 'enclosed indoor'; and
- for use only in PCE model number \*\*\*\* (listing model or models of PCE that are suitable as per the test report); and
- the model number of the switchgear; and
- if tested to AS 60947-3 or IEC 60947-3 Ed 3.2 –
  - that it is classified DC-PV2
  - the ratings for  $U_e$ ,  $I_{the}$ ,  $I_e$ ,  $I_{make}$  &  $I_{c(break)}$  (as determined by the ratings of the PCE and listed in test report)
- if tested to AS/NZS IEC 60947-3 –
  - that it is classified DC21B
  - the ratings of voltage and currents and related configuration of poles tested

**b) the PCE is for mounting outdoors in shaded position**

The switchgear is tested in the related PCE enclosure to AS/NZS 60947.3 or IEC 60947-3 ed 3.2 as 'enclosed outdoor' with the following exceptions:

- IP56NW is not required (the IP rating of the PCE will be applied to the PCE enclosure with the switchgear installed)
- Temperature rise verification with solar effects is not required
- The voltage and current ratings (for  $U_e$ ,  $I_{the}$ ,  $I_e$ ,  $I_{make}$  &  $I_{c(break)}$ ) of the switchgear are values as specified for the PCE the switchgear will be installed in (as per AS/NZS 5033 amendment 2) instead of any values required in AS 60947-3 or IEC 60947-3 ed 3.2

If tested to AS/NZS IEC 60947-3 there are no exceptions to requirements. For this classification the certificate will state:

- the standard the d.c. isolator was tested and is certified to; and
- the d.c. isolator is certified for use as 'enclosed outdoor'; and
- for use only in PCE model number \*\*\*\* (listing model or models of PCE that are suitable as per the test report); and
- only for installation in a shaded position as per AS/NZS 5033
- the model number of the switchgear; and
- if tested to AS 60947-3 or IEC 60947-3 Ed 3.2 –
  - that it is classified DC-PV2
  - the ratings for  $U_e$ ,  $I_{the}$ ,  $I_e$ ,  $I_{make}$  &  $I_{c(break)}$  (as determined by the ratings of the PCE and listed in test report)
- if tested to AS/NZS IEC 60947-3 –
  - that it is classified DC21B
  - the ratings of voltage and currents and related configuration of poles tested

**c) the PCE is for mounting outdoors exposed to sunlight**

The switchgear is tested in the PCE enclosure to AS 60947.3 or IEC 60947-3 ed 3.2 as 'enclosed outdoor' with the following exceptions:

- IP56NW is not required (the IP rating of the PCE will be applied to the PCE enclosure with the switchgear installed)
- the voltage and current ratings (for  $U_e$ ,  $I_{the}$ ,  $I_e$ ,  $I_{make}$  &  $I_{c(break)}$ ) of the switchgear are values as specified for the PCE the switchgear will be installed in (as per AS/NZS 5033 amendment 2) instead of any values required in AS 60947-3 or IEC 60947-3 ed 3.2

**NOTE:** for this configuration the “Temperature rise verification with solar effects” is required with the switchgear tested installed in the PCE enclosure

If tested to AS/NZS IEC 60947-3 there are no exceptions to requirements For this classification the certificate will state:

- the standard the d.c. isolator was tested and is certified to; and
- the d.c. isolator is certified for use as ‘enclosed outdoor’; and
- for use only in PCE model number \*\*\*\* (listing model or models of PCE that are suitable as per the test report); and
- suitable for installation exposed to sunlight as per AS/NZS 5033
- the model number of the switchgear; and
- if tested to AS 60947-3 or IEC 60947-3 Ed 3.2 –
  - that it is classified DC-PV2
  - the ratings for  $U_e$ ,  $I_{the}$ ,  $I_e$ ,  $I_{make}$  &  $I_{c(break)}$  (as determined by the ratings of the PCE and listed in test report)
- If tested to AS/NZS IEC 60947-3 –
  - that it is classified DC21B
  - the ratings of voltage and currents and related configuration of poles tested.

Information contained in this bulletin is supplied to give guidance on application of requirements in the following jurisdictions:

*Australian Capital Territory, New Zealand, Northern Territory, Queensland, South Australia, Tasmania, Victoria and Western Australia.*

Information contained in this bulletin may not reflect provisions of legislation in the following jurisdictions (please contact the jurisdiction for further information): *New South Wales*