

INFORMATION BULLETIN

December 2019
#0022

APPLICABLE SAFETY STANDARDS AND REQUIREMENTS FOR SOLAR DIVERTERS

Part 1 – General

The following information is general information on safety requirements and may not be all that need to be applied for any particular situation or product. While any review of individual product should not be expected to indicate the information below is not required, the review may identify additional requirements to be applied.

To assess the equipment in terms of determining if it is electrically safe, some of the risks you need to mitigate are:

- Effects on the installation upstream of the device (e.g. some devices affect waveshape and so may affect the quality of supply, affect operation of RCDs and anti-islanding),
- Effects on the installation and equipment downstream (e.g. will it affect installation protection from operating, will direct current damage contacts of an AC thermostat, will it run hotter and affect temps, affect pressure of tank)
- Environmental conditions -suitability for the Australian and local environment, (e.g. IP, UV, high ambient)
- User interaction (installation instructions, maintenance requirements, instructions for use, end of life)

Applicable safety standards and requirements for solar diverters:

1. Full assessment to IEC 60730.1 as a Type 1 or 2 action controller , including:
 - a. If intended to be mounted on a roof or exposed to weather or sunlight IP56, if mounted outdoors on a wall but not intended to be exposed to sunlight or weather then IP55 – see Clause 6.5; and
 - b. Number of cycles of operation being at least 10 000 – see Clause 6.11; and
 - c. Ambient temperature to be 60°C if equipment will be exposed to UV radiation, or 40°C if located in a shaded position outdoors – see Clause 17; and
 - d. Compliance to either Class B or Class C control function requirements – see Appendix H.

2. Assessment to following requirements within AS/NZS 4777.2:2015 , to ensure there is no issue with power quality, supply wave shape or harmonics that may adversely affect the connected appliance or reflect into the installation or network:
 - a. Clause 5.4 *Compatibility with electrical installation*
 - b. Clause 5.5 *Power factor*
 - c. Clause 5.6 *Harmonic currents*
 - d. Clause 5.7 *Voltage fluctuations and flicker*
 - e. Clause 5.8 *Transient voltage*
 - f. Clause 5.9 *DC current injection*
3. Solar diverters connected to more than one energy source e.g. grid supply and PV array supply, must have a form of back-feed voltage protection, such as specified in clause 4.6 of IEC 62109-1.
4. Solar diverters that incorporate additional functionality such as UPS, direct PV array port connection, must comply with the additional applicable product safety standards.

Additional requirements:

1. An electric pressure storage water heater with integral solar diverter is Declared, Prescribed or Level 3 equipment, requiring mandatory Australian certification prior to sale.
2. The solar diverter instructions shall state the following installation requirements:
 - a. The solar diverter circuit shall be protected by a 30 mA RCD and of the Type specified by the manufacturer. The RCD shall be installed in accordance with AS/NZS 3000.
 - b. An isolating switch in accordance with clause 4.8.2.3 AS/NZS 3000:2018 shall be installed for the water heater.
 - c. Where more than one circuit can supply the water heater, a warning sign shall be installed within the installation switchboard that the solar diverter circuit originates, and on the water heater.
NOTE: The installation of a solar diverter can introduce an unforeseen hazard, where if the grid supply to the water heater is isolated at the switchboard, the diverter may still be able to supply power to the water heater.

The warning sign shall state the following: WARNING solar diverter installed.
Isolate all supplies before working on water heater
The following is an example of a warning sign:



Background

There has been a recent emergence of solar diverters in the marketplace; these products are intended to be interconnected to a household resistive type water heater.

Solar diverters can throttle the power supply to a water heater, to match the available solar PV power generation, to avoid or minimise consuming power from the grid. This is achieved by modifying the grid a.c. 50 Hz supply to the water heater through various switching methods such as burst control, phase control, pulse width modulation etc.

The modified supply output from solar diverters, is not the same as the supply characteristics from the grid (AS 60038), and may damage or contribute to premature failure of the connected appliance. Such equipment can also negatively affect the quality of supply within the electrical installation and the network. In some situations these issues could result in a safety hazard.

Currently there are no recognised international standards for solar diverters.

This information bulletin is to provide guidance on what would be expected to be the minimum product safety requirements for all types of solar diverters, with electricity conversion such as a.c. to d.c., d.c. to d.c. and a.c. to a.c.

A solar diverter with a direct current output is not permitted to be connected to an electrical installation or appliance which is not intended, designed and tested as suitable for direct current supply.

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.