

FAQs for new AS/NZS 4777.1:2024 standard effective 23 February 2024

General

1. Why do we need to change to a new version of AS/NZS 4777.1?

In August 2024, Standards Australia released a new version of AS/NZS 4777.1 Grid connection of energy systems via inverters Part 1: Installation requirements (AS/NZS 4777.1:2024). The update saw a range of changes to improve the safety of electrical installations and support the security of the electricity supply network accounting for standardised improvements to inverter technology since the last release of the standard. These changes will support the continued increase of solar Photovoltaic (PV), batteries and electric vehicles.

2. When do I need to start installing systems compliant to the new AS/NZS 4777.1 standard?

From **23 February 2025** it will be mandatory for all inverters connected at low voltage to the distribution network to be compliant to AS/NZS 4777.2:2020 and installed in compliance with AS/NZS 4777.1:2024.

3. What DNSP standards do I need to meet?

In addition to AS/NZS 4777.1:2024 you will also need to meet all relevant distribution network service provider (DNSP) network standards. For the Ergon Energy Network and Energex distribution networks this, includes the relevant connection standards below:

- STNW1170 Standard for Small IES Connections
- STNW1174 Standard for Low Voltage Embedded Generating Connections
- STNW1175 Standard for High Voltage Embedded Generating Connections
- STNW3510 Dynamic Standard for Small IES Connections
- STNW3511 Dynamic Standard for Low Voltage EG Connections
- QECM Queensland Electricity Connection Manual

Applications and Connections

4. If I have a valid contract in place before the 23 February 2025, can I install to AS/NZS 4777.1:2016 after the 23 February 2025?

4.1. If your connection to the DNSP network is low voltage

No, it is mandatory from 23 February to install all inverters to AS/NZS 4777.1:2024 for a customer connected to the low voltage network in Queensland.

The date the contract for the inverter was established has no impact on the requirement to start installing inverters in compliance with AS/NZS 4777.1:2024 from 23 February 2025.

4.2. If your connection to the DNSP network is high voltage

For inverters which are connected to a low voltage network, even where the DNSP network connection is high voltage, it is mandatory from 23 February to install all low voltage connected inverters to AS/NZS 4777.1:2024.

Inverters connected directly at high voltage and all rotating machines are not required to meet AS/NZS 4777.1:2024 and shall refer to STNW1175 for compliance requirements.

5. What are the requirements for the submission of a Design Certification Report (DCR) and a Compliance Report (CR)?

A DCR or CR is required to be submitted for all embedded generating systems over 30 kVA at Energex and Ergon Energy. Please visit our [Energex](#) and [Ergon Energy Network](#) connection websites for templates.

6. Is there any change to the Registered Professional Engineer of Queensland (RPEQ) certification requirements in STNW1174, STNW3511 and STNW1175?

No, Energex and Ergon Energy still require RPEQ certification for design and commissioning of all embedded generating systems connecting to the distribution network with compliance to the DNSP standards STNW1174, STNW3511 and STNW1175.



Technical Changes

7. Changes to protection requirements

7.1. New terminology interface protection

There is a new term replacing 'central protection' from AS/NZS 4777.1:2016. In AS/NZS 4777.1:2024 the term interface protection is used to describe protection located downstream of the site main switch and upstream of the inverters.

7.2. Interface protection limits

Under AS/NZS 4777.1:2024, interface protection shall apply to Inverter Energy System (IES) or aggregate IES on electrical installation > 200 kVA.

There are some variations that apply to interface protection limits:

- Inverter power sharing devices (IPSDs) as per FAQ 15.
- Low voltage embedded networks as per FAQ 16.

8. What interface protection region settings do I need to meet?

The interface protection settings for Energex and Ergon Energy are region Australia A in AS/NZS 4777.1:2024.

Protective Function	Protective function value	Trip time delay	Max disconnection time
Over voltage (V>)	267 V	2.5 s	3 s
Under voltage (V<<)	69 V	2.5 s	3 s
Under voltage (V<)	179 V	11.5 s	12 s
Over frequency (F>)	52 Hz	1 s	1.5 s
Under frequency (F<)	47 Hz	2.5 s	3 s
Rate of change of frequency (df/dt)	±4 Hz/s	0.5 s	1 s



9. What is the maximum inverter capacity and export limit allowed for single-phase supply?

The maximum inverter capacity and export limit for single-phase supply is shown below, including input limits for dynamic connections.

Connection type	Network type	Max inverter capacity limit	Fixed export limit	Min export limit	Max export limit	Fixed import limit	Min import limit	Max import limit
Static Connection STNW1170	Single-phase	10 kVA	5 kW					
	Single-phase SWER	10 kVA	2 kW					
Dynamic Connection STNW3510	Single-phase	10 kVA PV + 10 kVA ESS	1.5 kW	1.5 kW	10 kW	1.5 kW	1.5 kW	18 kW
	Single-phase SWER	15 kVA PV + 15 kVA ESS	1.5 kW	1.5 kW	10 kW	1.5 kW	1.5 kW	10 kW

Note 1: For dynamic connections the maximum capacity applies to ports on the inverter as such the maximum capacity allowed for a multi-mode or hybrid inverter capacity would be 10 kVA.

Note 2: Isolated systems embedded generation connection limits are negotiated.

10. Phase balance for multi-phase supply

For all multi-phase grid connections, the requirements in Appendix C in AS/NZS 4777.1:2024 apply including:

- Customers may have a combination of single-phase and/or three-phase inverters in compliance with AS/NZS 4777.2.
- All multi-phase phase IES shall have a balanced a.c. output.
- Where single-phase inverters are installed for both ESS and PV they shall be installed on the same phase.
- For IES with an aggregate rating ≤ 50 kVA the additional phase balance requirements in FAQ 11 below apply.
- For IES with an aggregate rating of > 50 kVA the additional phase balance requirements in FAQ 12 below apply.



11. Phase balance for connections with IES 50 kVA and under

11.1. General

- As per Table C.1 in AS/NZS 4777.1:2024 the limits for single-phase and balanced three-phase inverters on a multi-phase connection for an IES with an aggregate ≤ 50 kVA are:

Multi-phase DNSP connections with IES ≤ 50 kVA	Single-phase inverter aggregate rating limit	Balance three-phase inverter aggregate rating limit
Inverters with Solar PV	5 kVA per phase	50 kVA
ESS only inverters	5 kVA per phase	50 kVA
V2G or V2B only inverters ¹		
Aggregate of combined IES	10 kVA per phase	50 kVA

Note 1: The limit for single-phase inverter aggregate rating limit for V2G or V2B inverters may be met by a single-phase inverter using a higher nameplate rating as per the requirements described in FAQ 11.2 and the DNSP standards.

- As per 3.4 of this FAQ where single-phase inverters are installed for both ESS and PV they shall be installed on the same phase.
- Where there is a combination of single-phase inverters, the maximum rated apparent power imbalance of all IES shall not exceed 5 kVA between phases.
- Phase balance protection is not required for IES connections with an aggregate rating ≤ 50 kVA.

11.2. Generation Limit Control for phase balance

The limit for single-phase inverter aggregate rating limit for V2G or V2B inverters, as per Table C.1 in AS/NZS 4777.1:2024, may be met with a generation limit control inverter of a higher rating where:

- the single-phase inverter has a maximum nameplate rating of 8 kVA; and
- it is limited using single inverter generation limit control as specified in AS/NZS 4777.2; and
- the limit is set to ≤ 5 kW.

Generation limit control is not approved to achieve phase balance other than single-phase IES V2G or V2B. Generation limit control does not change the rated apparent power or nameplate rating of the inverter.

12. Phase balance for connections of IES greater than 50 kVA

- For multi-phase IES with an aggregate rating greater than 50 kVA each phase must meet the following phase balance limit requirement:

$$\frac{\text{The difference between aggregate single – phase rating of inverters on a phase (kVA)}}{\text{Aggregate rating of all inverters in multi – phase IES (kVA)}} \leq 10\%$$

- Phase balance protection is not required for IES connections > 50 kVA.



Special Cases

13. Vehicle to grid (V2G)

Vehicles capable of reverse power transfer are typically referred to as vehicle to grid (V2G) or vehicle to building (V2B) and require compliance as an IES with AS/NZS 4777.2:2020. A V2G (or V2B) is an approved inverter registered with CEC as a supplementary supply inverter, alternative supply inverter or independent supply inverter with an energy source of EV.

The release of AS/NZS 4777.2:2020 And 2:2024 has clarified that Electric Vehicle Supply Equipment (EVSE) capable of reverse power transfer are not categorised as a battery energy storage system that need to conform with AS/NZS 5139:2019.

Refer to FAQ 11.1 for more information on requirements for single-phase inverters for phase-balance on multi-phase connections.

14. Supplementary supply, substitute supply, alternative supply, independent supply

AS/NZS 4777.1 has introduced new terminology for the types of supplies associated with inverters to support safe installation and operation of inverters particularly when inverters are supplying circuits which are isolated from grid supply. These supply types also assist in identifying when inverters are considered grid connected and are required to meet DNSP technical requirements, inverter compliance requirements and need approval from the DNSPs prior to connection.

There are four supply types described in AS/NZS 4777.1:2024:

- **Supplementary supply** – normally grid-connected and capable of supplying to the electrical installation in parallel with supply from the grid.
- **Alternative supply** – Capable of supplying to the electrical installation when isolated from the grid. There are two types of alternative supply a) one that is connected to the grid and will supply through an alternate supply port only when isolated from the grid b) one that is always isolated from the grid behind a manual change over switch.
- **Substitute supply** – a dedicated socket outlet supplied from the inverter which is an electrically separated supply system to the electrical installation and has a max rating of 15A.
- **Independent supply** – an inverter that is normally grid-connected that specifically conforms with Clause 3.4.4 and Appendix M of AS/NZS 4777.2:2020. These inverters do not meet standard AS/NZS 4777.2:2020 functions required for network or system support such as power quality and protection. Due to the different protection capability, the device is not able to supply electricity into electrical installation through the grid port connection of the device which means it will also prevent any export.



Type of inverter supply being installed		AS/NZS 4777.1 references	Inverter compliance requirements	DNSP approval required
Supplementary supply		Section 2, Section 3, Section 5, Figures 2.1, 2.2, 5.1 or 5.2	AS/NZS 4777.2:2020	Yes
Alternative supply	Normally grid-connected and able to be isolated from grid	Section 2, Section 3, Clause 5.3 and Figure 5.1 or 5.2	AS/NZS 4777.2:2020	Yes
	Not connected to the grid	Section 2, Clause 5.3 and Figure 5.3 and 5.5		No
Substitute supply¹		Section 2, Section 3, Clause 5.2	AS/NZS 4777.2:2020	Yes
Independent supply²		Section 2, Section 3, Clause 5.4 and Figure 5.4	Clause 3.4.4 and Appendix M of AS/NZS 4777.2:2020	Yes

Note 1: Any inverter capable of substitute supply will be either a supplementary supply or an alternative supply which is normally grid-connection. Approval is required for connection of the inverter as either supplementary supply or alternative supply.

Note 2: There are not currently any approved independent supply (AS/NZS 4777.2:2020 Appendix M) inverters for use on Energex or Ergon Energy's network at this time. If you wish to apply to connect an independent supply inverter this would be a negotiated connection application.

15. Inverter power sharing device (IPSD)

15.1. What is an IPSD?

An inverter power sharing device (IPSD) is a device used to share the supplementary supply from an inverter or multiple inverters to provide supplementary supplies to a number of electrical installations that are part of a multiple electrical installation.



15.2. Application requirements for an IPSD

In Energex and Ergon Energy an IPSD:

- may only have a single embedded generation connection agreement with the DNSP.
- A primary retail customer may apply for solar sharing with an approved IPSD. The primary customer must obtain agreement from the other parties connected to the IPSD as part of the connection arrangement.
- All applications for IPSD require Registered Professional Engineering Queensland (RPEQ).
- A DCR and CR is required for IPSD as per FAQ 5.
- For more information on applying to connect an IPSD please email the DNSP using the contact details from FAQ 19.
- Alternate technologies for sharing with an IPSD may be considered on application.

15.3. Requirements for installing an IPSD

- Any installation will need to meet the mandatory requirements of AS/NZS 4777.1 including:
 - Interface protection for IPSDs with a connected aggregated inverter rated apparent power > 30 kVA.
 - An IPSD cannot be used with alternate supply, substitute supply or independent supply types.
- All installations of IPSD require design and commissioning from a Registered Professional Engineering Queensland (RPEQ).

16. Interface protection requirements for LV DNSP connected embedded networks

For LV DNSP connected embedded networks (bulk metered connections) the following applies:

- IES installed to electrical installations as properties within an LV bulk metered connection which classify as a 'detached house' Class 1a building as defined under the National Construction Code will not need Interface Protection.
- A single interface protection device compliant with the DNSP standards is required for the aggregate connected IES ≥ 200 kVA. The interface protection device shall be located downstream of the site main switch and upstream of all of the inverters.
- A single interface protection device compliant with the DNSP standards is required for the connected rotating machines.

17. Generation Limit Control

- Generation limit control is a control function of an IES to control the active power of the IES to less than the total rated apparent power of the IES such that it does not exceed a predetermined generation level.
- Generation limit control does not change the rated apparent power, or nameplate rating of an inverter.



- Generation limit control is supported in the following scenarios:
 - to support single-phase V2G and V2B IES <50 kVA on multi-phase connections meet phase balance requirements as per FAQ 11.
 - as negotiated for High Voltage (HV) connections.
 - to support dynamic connections in the 39 communities supplied by Ergon Energy's Isolated Power Stations and the stability of the power station operation.
- Generation limit control may be used for other connections however, it may not be used to reduce the rated apparent power or nameplate rating of an inverter being connected to Ergon Energy or Energex distribution network.
- Inverters shall be tested and certified by an authorised testing laboratory as being compliant with AS/NZS 4777.2. The inverters shall be registered with CEC as approved grid connect inverters. The inverters shall be installed in compliance with AS/NZS 4777.1.

18. Voltage rise calculation

Voltage rise calculations shall meet the requirements of AS/NZS 4777.1:2024 clause 3.3.3.

Voltage rise calculations now allow for three methods of calculation which can be used, full IES nameplate rating, export limited, and generation limited.

Voltage rise calculation method	Voltage rise calculation requirements
Full nameplate IES	This method shall be used where the DNSP has approved connection with full export.
	This method shall be used for dynamic IES unless otherwise advised by the DNSP.
Export limited	This method shall only be used where an IES has approval for export limiting that is static (not dynamically managed).
	A system designer should consider that systems with a reduced site export limit, may be later permitted to have a greater export limit and that value should be considered.
Generation limited	This method shall be used where V2G IES has been approved for connection with a generation limit control, see FAQ 11 for more information.

19. DNSP contact details

Contact us at the below email addresses should you have any questions.

Energex: energexgeneration@energyq.com.au

Ergon Energy: ergongeneration@energyq.com.au



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