
**BULLER ELECTRICITY LTD
DISTRIBUTED GENERATION ≤10KW CONNECTION STANDARD**

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1 GENERAL

1.1 Scope

This document describes the requirements (contractual, performance, operational, testing, commissioning, safety, installation, and maintenance) for the connection/operation of Distributed Generation (DG) rated 10kW or less to the BEL network. This standard has been written with the expectation that these small-scale generation systems will connect to the network using power electronic inverters.

1.2 Application

This standard applies to all existing or prospective DG that may operate in parallel with the BEL distribution network regardless of whether energy is exported or not.

1.3 Relevant Regulations and Standards

All electrical apparatus, materials and wiring which are part of the DG installation shall comply with the latest editions or substitutes of the relevant regulations and standards. In particular this would include the following:

AS4777.1-2005	Grid Connection of Energy Systems via Inverters Part 1 Installation Requirements
AS4777.2-2005	Grid Connection of Energy Systems via Inverters Part 2 Inverter Requirements
AS4777.3-2005	Grid Connection of Energy Systems via Inverters Part 3 Grid Protection Requirements
AS/NZS 3000:2007	Australia New Zealand Wiring Rules
EN 50438:2013	Requirements for micro-generating plants to be connected in parallel with public low-voltage distribution networks
EEA PQ – 2013 rev 3.8	EEA (NZ) Power Quality Guidelines
The Code	Electricity Industry Participation Code 2010 Electricity (Safety) Regulations 2010

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1.4 Definitions

BEL	Buller Electricity Limited – the local distribution network owner and operator to which DG is to be connected
COC	Certificate of Compliance – provides a statement of compliance with Regulation 39 of the Electricity (Safety) Regulations 2010
Consumer/Customer	Any person who is supplied, or who has applied to be supplied, with electricity from the network
Distributed Generation (DG)	Electrical equipment connected to the distribution network which produces electrical energy
Distributed Generator	The owner/operator of the DG system
Grid	For the purposes of this document the BEL Network
Grid-Tied	A DG electrically connected to and operating in parallel with the Grid
Inverter	A power electronic based system which converts electrical energy from DC to AC
Islanding	An undesirable Network condition where DG energises a portion of the BEL Network which is isolated from the Grid
Network	Electricity distribution system owned and operated by BEL
Point of Connection	The point at which a Consumer's premises connects to the Network (ownership boundary)
Retailer	Entity that buys and sells electricity

1.5 Copyright

The copyright of this publication is the property of Buller Electricity Limited. No part of this publication may be reproduced by photocopying or by any other means without the prior written permission of Buller Electricity Limited.

1.6 Enquiries Regarding this Document

Contact Person: Engineering Manager
 Buller Electricity Limited

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2 SYSTEM REQUIREMENTS**2.1 Inverters**

The inverter connecting to the BEL network must be labelled as 'Grid-Tied' and comply with AS4777. The Clean Energy Council provides a list of approved AS4777.2 inverters (see <http://www.solaraccreditation.com.au/products/inverters/approved-inverters.html>). For the purposes of administering the connection of DG under Part 6 of the Code, not all AS4777.2 approved inverters are pre-approved for connection to the Network. A list of inverters which are pre-approved for connection to the Network can be found in the companies 'Distributed Generation Policy' document.

BEL's minimum requirements for inverters are as follows:

- Total Harmonic Distortion must be less than 5%.
- Power factor must be within the range 0.8 leading and 0.95 lagging.
- Protection settings must be password or lock protected.

2.2 Grid Protection Devices

Grid Protection Devices shall be installed to ensure that the inverter is isolated from the network on loss of grid supply. This is an important safety feature preventing the Network from being livened by the inverter, and reducing the safety risk to the public and personnel working on the network. Grid protection devices are usually incorporated into the inverter control system and must meet AS4777.3 specifications for anti-islanding and reconnection.

BEL's minimum requirements for the Grid Protection Device are as follows:

- Auto-isolate on loss of Grid supply.
- At least one method of active anti-islanding protection shall be used.
- Once normal Grid supply is re-established reconnection will be delayed for at least one minute.

2.3 Overvoltage Protection

In addition to anti-islanding protection BEL requires protection against DG causing excessive voltage at the Point of Connection. In order to safe guard against potential damage to Network equipment and Consumer appliances:

- Inverter over voltage trip levels shall be set so that the voltage at the Point of Connection does not exceed the maximum allowable under the Electricity Industry Participation Code 2010 (that is 230 volts AC plus 6%, or 243.8 volts).
- Overvoltage tripping shall occur within 2 seconds of this limit being exceeded.
- Reconnection after an overvoltage tripping shall not occur until at least one minute after a tripping.

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- It is recommended that DG installers investigate the capacity of the Consumer's service to efficiently transport generated energy to the Network. Some installations may suffer degradation over time which results in poor earthing or high loop impedance. These conditions will inhibit the generators ability to export electrical energy and could lead to inverters tripping on high voltage at a local level.

2.4 Metering

The electricity meter installed at a connection with DG must be able to separately measure imported and exported energy, and comply with the Electricity Industry Participation Code, Part 10 Metering. The Consumer's Retailer will be able to organised the installation of appropriate metering.

2.5 Access

The Consumer shall provide BEL (or a BEL authorised service provider) safe and unobstructed access to the DG site and all upstream equipment at all reasonable times, providing:

- Access is required for matters concerning the generation circuit and its connection to the Network.
- BEL shall make a written request to the Consumer to access the site for scheduled works.
- BEL, or a BEL authorised service provider may not interfere with the Consumer's equipment without their express permission. This does not include methods of isolation.
- BEL, or a BEL authorised service provider may require immediate access to the Consumer's equipment in the event of an emergency e.g. to prevent a breach of safety or damage to property. BEL shall inform the Consumer of the circumstances and events as soon as practicable.

2.6 Warning Signs

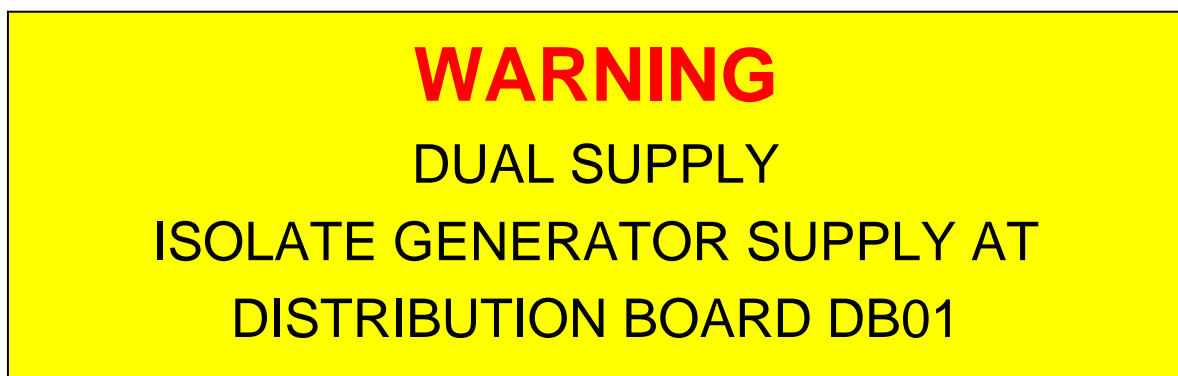
It is the Consumer's responsibility to ensure that the generating circuit is clearly labelled with warnings on the main switchboard and any sub-main switchboards it passes through.

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An example sign on the switchboard to which the DG is directly connected:



An example sign on all other switchboards within the premises:



An example label to be placed over the generator isolating switch:



A warning tag shall be placed on the Consumer's service fuse as a reminder to test and prove that the circuit is de-energised before carrying out any work on the Consumer's service. An example tag to be tied to the fuse holder of an underground pillar box or overhead service:

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WARNING

**THIS ICP CONTAINS DISTRIBUTED
GENERATION – TEST AND PROVE
DE-ENERGISED AFTER ISOLATING**

3 CONNECTION PROCESS

3.1 Before Installation

The form 'Application for Connection – Distributed Generation ≤10kW' must be completed and submitted to BEL before the DG is installed. This form can be found in the Buller Electricity 'Distributed Generation Policy' document.

3.2 After Installation

The form 'Notification of Connection – Distributed Generation ≤10kW' must be completed and submitted to BEL after the DG is installed. This form can be found in the Buller Electricity 'Distributed Generation Policy' document, and must be accompanied by:

- Final copy of the distributed generation circuit diagram
- Distributed generation test report
- Schedule of protection settings
- Certificate of Compliance
- Electrical meter(s) make and model
- Electrical contractors declaration and signature
- Distributed generation owner/operator signature

3.3 Testing, Commissioning, and Inspection

BEL requires that all new DG connections are inspected by a registered electrical inspector. In most circumstances BEL will arrange to observe the testing and commissioning of the DG when it is undertaken by the electrical contractor.

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3.4 System Operation and Maintenance

The Consumer must have received instruction on how to correctly operate the DG and be aware of their obligations and responsibilities. The Consumer must maintain their DG system in a state of good working order and ensure that it always meets the requirements detailed in this standard. If the inverter malfunctions it must immediately be disconnected from the Network and only reconnected once it has been checked and tested by a registered electrician.

If for any reason the inverter protection settings need to be changed, the changes must be pre-approved by BEL and carried out by a registered electrician. A signed COC detailing the changes implemented, including a schedule of the revised protection settings, must be submitted to BEL on completion.

Should the inverter need to be replaced, a replacement inverter need not be of the same type as the original, but the replacement inverter must meet the latest version of the this standard. The installation of a replacement inverter must be carried out by a registered electrician, with documentation submitted to BEL as required for a new installation.

3.5 BEL Contractual Agreement

Unless otherwise agreed by the DG owner and BEL, the contractual terms for the connection of DG to the Network will be as per the regulated terms (see Electricity Industry Participation Code 2010, Schedule 6.2 Regulated terms for distributed generation).

3.6 Retailer Contractual Agreement

The consumer must have an agreement in place with their Retailer for the export of electrical energy.

3.7 Change of Ownership or Occupancy

Should a premises with DG be sold, or someone else moves in, it is important that the new distributed generator understands the operation of the DG system and the safe connection to the Network.

The new DG owner/operator must complete a new 'Notification of Installation – Distributed Generation ≤10kW' form with updated details.

3.8 Failure to Comply

This standard has been prepared to ensure the safe operation of small-scale DG on the Network. Failure to comply with this standard may result in the disconnection of the DG from the Network.

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BULLER ELECTRICITY LTD STANDARD - DOCUMENT CHANGE REQUEST

**Memo To: Engineering Manager.
 Buller Electricity Ltd**

Change Details:

(Attach separate sheets as necessary).

Paragraphs Affected:

Priority: **Urgent** **Routine** **Low**
 (Within 1 week) (Within 12 months) (Next Review)

Submitted By (Print Name)	Date
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Document Change Request - Acknowledgement

Dear

Thank you for your suggestion regarding changes to the above mentioned document.

Your request has been noted and added to our works program. Should we require any additional information regarding your notification then we will be in contact with you.

Thank you for your contribution to improving the quality of Buller Electricity Ltd's documentation.

Regards,

.....
Engineering Manager

.....
Date