Network Standard

NETWORK	Document No : NW000-S0085 Amendment No : 2 Approved By : Manager Primary Systems Approval Date : 22/12/2016

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NW000-S0085 NS196 MOBILE GENERATORS

ISSUE

For issue to all Ausgrid and Accredited Service Providers' staff involved with mobile generators is for reference by field, technical and engineering staff.

Ausgrid maintains a copy of this and other Network Standards together with updates and amendments on www.ausgrid.com.au.

Where this standard is issued as a controlled document replacing an earlier edition, remove and destroy the superseded document.

DISCLAIMER

As Ausgrid's standards are subject to ongoing review, the information contained in this document may be amended by Ausgrid at any time. It is possible that conflict may exist between standard documents. In this event, the most recent standard shall prevail.

This document has been developed using information available from field and other sources and is suitable for most situations encountered in Ausgrid. Particular conditions, projects or localities may require special or different practices. It is the responsibility of the local manager, supervisor, assured quality contractor and the individuals involved to make sure that a safe system of work is employed and that statutory requirements are met.

Ausgrid disclaims any and all liability to any person or persons for any procedure, process or any other thing done or not done, as a result of this Standard.

All design work, and the associated supply of materials and equipment, must be undertaken in accordance with and consideration of relevant legislative and regulatory requirements, latest revision of Ausgrid's Network Standards and specifications and Australian Standards. Designs submitted shall be declared as fit for purpose. Where the designer wishes to include a variation to a network standard or an alternative material or equipment to that currently approved the designer must obtain authorisation from the Network Standard owner before incorporating a variation to a Network Standard in a design.

External designers including those authorised as Accredited Service Providers will seek approval through the approved process as outlined in NS181 Approval of Materials and Equipment and Network Standard Variations. Seeking approval will ensure Network Standards are appropriately updated and that a consistent interpretation of the legislative framework is employed.

Notes: 1. Compliance with this Network Standard does not automatically satisfy the requirements of a Designer Safety Report. The designer must comply with the provisions of the Workplace Health and Safety Regulation 2011 (NSW - Part 6.2 Duties of designer of structure and person who commissions construction work) which requires the designer to provide a written safety report to the person who commissioned the design. This report must be provided to Ausgrid in all instances, including where the design was commissioned by or on behalf of a person who proposes to connect premises to Ausgrid's network, and will form part of the Designer Safety Report which must also be presented to Ausgrid. Further information is provided in Network Standard (NS) 212 Integrated Support Requirements for Ausgrid Network Assets.

2. Where the procedural requirements of this document conflict with contestable project procedures, the contestable project procedures shall take precedent for the whole project or part thereof which is classified as contestable. Any external contact with Ausgrid for contestable works projects is to be made via the Ausgrid officer responsible for facilitating the contestable project. The Contestable Ausgrid officer will liaise with Ausgrid internal departments and specialists as necessary to fulfil the requirements of this standard. All other technical aspects of this document which are not procedural in nature shall apply to contestable works projects.

INTERPRETATION

In the event that any user of this Standard considers that any of its provisions is uncertain, ambiguous or otherwise in need of interpretation, the user should request Ausgrid to clarify the provision. Ausgrid's interpretation shall then apply as though it was included in the Standard, and is final and binding. No correspondence will be entered into with any person disputing the meaning of the provision published in the Standard or the accuracy of Ausgrid's interpretation.

KEYPOINTS

This standard has a summary of content labelled "KEYPOINTS FOR THIS STANDARD". The inclusion or omission of items in this summary does not signify any specific importance or criticality to the items described. It is meant to simply provide the reader with a quick assessment of some of the major issues addressed by the standard. To fully appreciate the content and the requirements of the standard it must be read in its entirety.

AMENDMENTS TO THIS STANDARD

Where there are changes to this standard from the previously approved version, any previous shading is removed and the newly affected paragraphs are shaded with a grey background. Where the document changes exceed 25% of the document content, any grey background in the document is to be removed and the following words should be shown below the title block on the right hand side of the page in bold and italic, for example, Supersedes – document details (for example, "Supersedes Document Type (Category) Document No. Amendment No.").

KEY POINTS OF THIS STANDARD

Scope and Risks Addressed

This standard is limited to scope identified below and provides controls for associated risks as listed below:

- ☐ This standard applies to the connection of Mobile Generators to the Ausgrid network
- ☐ Using mobile generators to maintain the voltage within prescribed limits on the LV network during emergency and maintenance periods
- ☐ Using mobile generators to provide temporary supply to isolated sections of the LV distribution system;
- ☐ Using mobile generators to assist the Ausgrid network to supply load which cannot be held in LV parallel.

Where to for more information?

Section 1, 2

General

The following general requirements apply to the use of mobile generators:

- ☐ Requirements for staff training.
- ☐ Voltage regulation
- ☐ Methods for connecting to the Ausgrid network
- ☐ Ratings of the available mobile generators

Where to for more information?

Section 5

Tools and Forms

List any relevant tools or forms for this section

Siting, Installation, Connection and Operation

This section specifies the site requirements for using mobile generators including:

- ☐ Siting
- ☐ Installation
- ☐ Connection
- ☐ Operation
- ☐ Shutting down

Where to for more information?

Sections 6, 7 and 8

Tools and Forms

Annexure A – Sample Compliance Checklist

Network Standard
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Mobile Generators

Contents

1.0 INTRODUCTION

This Network Standard details the requirements for the connection and operation of Mobile Generators on Ausgrid's network.

Mobile Generators (MG) are used to: maintain the voltage within prescribed limits on the LV network during emergency and maintenance periods; provide temporary supply to isolated sections of the distribution network; and supply load which cannot be held in LV parallel.

The purpose of this document is to define Ausgrid's requirements relating to the connection and operation of Mobile Generators.

2.0 SCOPE

This document applies to the connection of Mobile Generators to: maintain the voltage within prescribed limits on the LV network during emergency and maintenance periods; provide temporary supply to isolated sections of the LV distribution system; and supply load which cannot be held in LV parallel.

3.0 REFERENCES

3.1 General

All work covered in this document shall conform to all relevant Legislation, Standards, Codes of Practice and Network Standards. Current Network Standards are available on Ausgrid's Internet site at www.ausgrid.com.au.

3.2 Ausgrid documents

- Bushfire Risk Management Plan
- Company Form (Governance) - Network Document Endorsement and Approval
- Company Procedure (Governance) - Network Document Endorsement and Approval
- Company Procedure (Network) – Network Standards Compliance
- Company Procedure (Network) – Production / Review of Engineering Technical Documents within document repository
- Customer Installation Safety Plan
- Distribution Guideline DG33 – Hot works and Total Fire Bans
- Division Workplace Instruction (Network) – Production /review of Network Standards
- Electrical Safety Rules
- Electricity Network Safety Management System Manual
- NS174 Environmental Procedures
- NS181 Approval of Materials and Equipment and Network Standard Variations
- NS212 Integrated Support Requirements for Ausgrid Network Assets

3.3 Other standards and documents

- AS 1742 – Manual of Uniform Traffic Control Devices
- AS 1939 – Degree of Protection Provided by Enclosures for Electrical Equipment (IP Code)
- AS 2790 Electricity Generating Sets – Transportable (up to 25kW)
- AS 3000 – Wiring Rules
- AS 3010 – Electrical Installations – Supply by Generation Set Part1: Internal Combustion Engine Driven Set
- ENA Doc 001-2019 National Electricity Network Safety Code

- Handbook HB 81 – Field Guide for Traffic Control
- Industry Safety Steering Committee Guideline ISSC 7 – Prevention of Unauthorised Access
- NSW Service & Installation Rules

3.4 Acts and regulations

- Electricity Supply (General) Regulation 2014 (NSW)
- Electricity Supply (Safety and Network Management) Regulation 2014
- Work Health and Safety Act 2011 and Regulation 2017

4.0 DEFINITIONS

Refer to NS001 Glossary of Terms

5.0 GENERAL

5.1 Staff

All staff involved in the installation, connection and operation of a MG shall be appropriately trained and qualified to perform the duties assigned.

5.2 Voltage and frequency regulation

All MGs shall be automatically regulated for both voltage level and frequency, within the defined limits (voltage: 220V – 260V, frequency: 49.75Hz – 50.25Hz). The automatic voltage and frequency regulation systems should be tested and calibrated at least every 12 months to ensure correct operation and that voltage and frequency levels are kept within the specified ranges.

5.3 Connection direct to customers' installations

Where a MG is to be connected directly to a customer's installation the MG and its connections shall be in accordance with:

- Section 8 (Alternative Sources of Supply) of the NSW Service and Installation Rules;
- the principals of AS 2790 (Electricity Generating sets – transportable (up to 25kW)), (irrespective of the size of the MG);
- Section 2 of Australian Standard AS 3010.1 (Electrical Installations– Supply by Generating Set Part 1: Internal combustion engine driven set);
- where changeover switches and/or connection facilities are provided on the customer's installation the additional requirements of AS 3010.1 Section 4 shall be applied.

5.4 Connection to overhead mains

Where a MG is to be connected to the network via portable overhead mains connecting equipment (to allow attachment of connecting equipment in advance), the connecting equipment shall be connected via HRC fuses rated to match the rating of the overhead mains (typically 400amp). The lower contacts of the portable overhead mains connecting equipment shall be shielded and positioned to be inaccessible to the general public, ie comply with ISSC 7 "Prevention of Unauthorised Access" (typically no closer to the ground than 3 metres).

Refer to Clause 6.2.1.3 in respect of connection integrity requirements.

5.5 Connection to kiosk substations

When a MG is required to supply a distributor from a kiosk substation that feeds an underground LV network, connection may be made via suitable stub tails bolted directly to the distributor to be supplied or a spare (WDNO) distributor if available. The MG cables are connected to the stub tails and connection to the live equipment must be made in accordance with the Electrical Safety Rules and Section 6.3 of this instruction.

5.6 Rating of generators

MGs should be rated to match as closely as practicable the load to be supplied. The table below shows the rated output current for various kVA rated MGs.

Table 1

MG Rating (kVA)	Rated Current (A/phase @ 240V)
250	347
300	417
320	444
400	556
500	694
650	903
800	1111
1000	1389

6.0 SITING, INSTALLATION AND CONNECTION

6.1 Siting

6.1.1 General

The location for siting of a MG should be such as to cause as little inconvenience as possible to local residents, the general public, and Ausgrid personnel working nearby. Every effort should be made to avoid locating a MG at the same location more than once a month.

Sites should be managed in accordance with the relevant Environmental Procedures as outlined in Network Standard NS174.

6.1.2 Bushfire hazard areas

When selecting sites for locating an MG consideration is to be given to potential bush fire risk and whether the site is within a Bush fire prone area or likely to constitute a Bush fire hazard. Utilise alternate suitable sites without bushfire risk where they exist.

Where it is necessary to site the MG within a Bush fire hazard area then appropriate controls such as those set out in Distribution Guideline DG33 shall be undertaken.

6.1.3 Consultation

Where practicable the relevant Local Council and customers who are directly affected, should be consulted prior to siting a MG.

Where a MG is to be sited on public or private land, permission/agreement should be sought from the owner/controlling authority before proceeding.

6.1.4 Noise and fumes

The noise generated by a MG shall be minimised. Appropriate control measures may need to be employed to mitigate or manage the noise. Siting of MGs in sensitive locations such as near schools, kindergartens, hospitals etc, or in residential areas should be avoided, particularly where it is intended to operate the MG throughout the night and this is likely to disturb the sleep of residents.

Under no circumstances should the MG be sited such that exhaust gases smoke or fumes could either reach dangerous concentrations, enter rooms occupied by persons or otherwise cause damage or nuisance.

6.1.5 Security

The security of MG sites shall be considered. This includes the prevention of unauthorised access to overhead mains, substations, customer switchboards, and MG switchboards, etc.

Some MGs may be fitted with an external emergency shutdown device. Care shall be taken to prevent unauthorised operation of this device, particularly where the MG is to be left to operate unattended. However at no time should the emergency shutdown device be bypassed, locked or otherwise made inoperative or inaccessible by authorised operators.

Where considered necessary any or all of the following measures should be implemented, particularly in locations frequented by the general public:

- installation of locks on gates and/or doors;
- erection of temporary warning signs;
- erection of temporary fencing;
- assignment of around-the-clock supervision/security personnel for the duration of the MG operation.

Where the MG is to be operated during night time hours consideration should be given to providing adequate lighting and reflective signage for security and to make the MG visible for pedestrian and vehicular traffic.

6.1.6 Access and traffic control

When selecting a site, consideration shall be given to accessibility for refuelling and the impact on motor vehicle and pedestrian traffic (flow, visibility, etc). Where vehicle and/or pedestrian traffic is affected, a suitable traffic management plan in accordance with AS 1742 and the relevant HB 81 “Field Guide for Traffic Control” shall be developed and implemented.

6.2 Installation

6.2.1 Cables

6.2.1.1 Rating

The cables used to connect a MG shall be rated to at least match the rated output of the MG.

6.2.1.2 Support and protection

Cables shall be suitably supported and protected from mechanical damage on the ground, up poles, and as they enter substations and switchboards, etc.

Suitable measures shall be taken to ensure that cables do not pose a trip-hazard to the public or Ausgrid employees.

6.2.1.3 Connections to LV overhead bare conductor mains

Prior to making connections to bare overhead conductors the connection area of the conductors shall be cleaned by scratch brushing to remove oxidation and prepare the contact surface. The MG cable line clamps shall be checked to ensure that all clamps have correctly seated and are firmly fastened to the conductors.

Where the MG cables are to remain connected to the network for an extended period of time such as multiple days, the fastening of connections shall be checked prior to each use of the MG or daily where practical.

6.2.2 Earthing and bonding

6.2.2.1 General

The MG should have the following parts electrically bonded together to form the MG frame bonding system: the engine frame, the generator frame, all exposed metal enclosing electrical equipment or

wiring, the “earth” terminal of all socket outlets, any residual current device (RCD), and the main frame terminal (marked “FRAME”).

The generator of the MG also has a winding neutral or star point. Some MGs may be fitted with a removable connection or link for the purpose of connecting the frame bonding system to the winding neutral or star point.

Where an RCD is fitted, the connection between the frame bonding system and the winding neutral or star point is necessary to permit correct operation of the RCD device. However, this arrangement is unsuitable for connection to a fixed MEN connection (where the neutral and earth are connected together on the load side of the device) because the RCD device would trip on load due to the diversion of current between the neutral and earth connections to the installation. For this reason, when the MG is to be connected to a fixed MEN installation, the connection between the frame bonding system and the neutral or star point should be left connected and the RCD disabled.

6.2.2.2 MG Connection direct to Ausgrid LV OH mains or UG mains pillar

Where a MG is connected directly to Ausgrid’s LV OH mains network a connection shall be made between the MG frame bonding system and the generator winding neutral or star point and the RCD shall be disabled. This is illustrated following in Figure 6-1.

The MG frame bonding system shall be earthed by means of a suitable earth lead and standard earth electrode. Following obtaining designated underground asset information provider plans the electrode must be driven into consolidated ground, to a depth of at least 500 mm, in accordance with Clause 6.2.2.6.

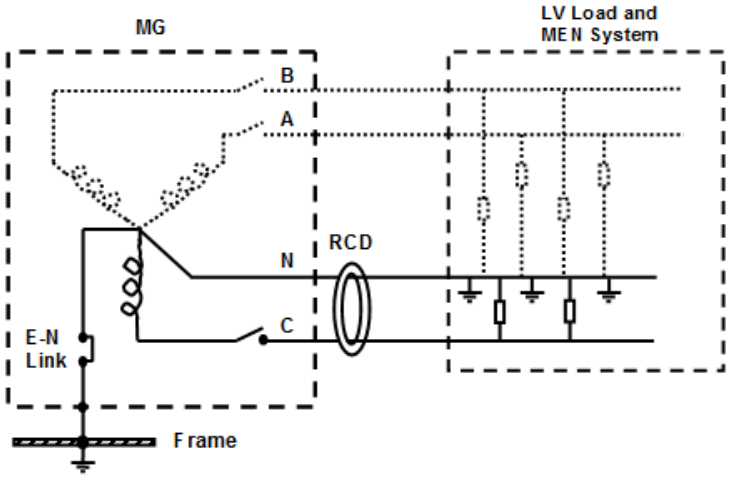

Figure 6-1: Configuration for connection to Ausgrid LV mains

6.2.2.3 MG connection direct to Ausgrid kiosk substation

Where a MG is connected directly to an Ausgrid’s kiosk substation a connection shall be made between the MG frame bonding system and the generator winding neutral or star point and the RCD shall be disabled.

The MG frame bonding system shall be earthed by means of a suitable earth lead connected to the Low Voltage earthing system of the kiosk substation.

6.2.2.4 MG connection direct to customer installation with earthing system

Where a MG is connected directly to a customer’s installation that incorporates an earthing system (eg customer’s main switchboard), a connection shall be made between the MG frame bonding system and the generator winding neutral or star point connection and the RCD shall be disabled.

Following obtaining designated underground asset information provider plans the MG frame bonding system shall be earthed by means of a separate earth electrode, driven into consolidated ground, to a depth of at least 500mm in accordance with Clause 6.2.2.6. The neutral or star point of the generator windings shall be connected to the neutral conductor of the customer’s installation. This is illustrated following in Figure 6-2.

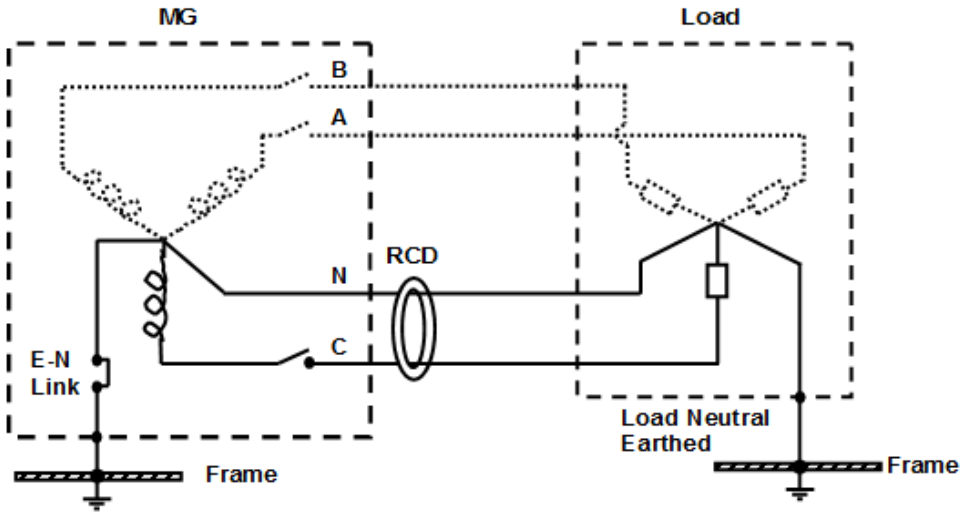

Figure 6-2: Configuration for direct connection to customer installation with earthing

6.2.2.5 MG connection direct to customer installation without earthing system

Where a MG is connected directly to a customer's installation that does not incorporate an earthing system, (eg supply to individual item of equipment or a distribution switchboard remote from a main switchboard) a connection shall be made between the MG bonding system and the generator winding neutral or star point connection. This is irrespective of whether the MG is fitted with a residual current device. Where the MG is fitted with a RCD, it shall be enabled. The MG bonding system shall be earthed by means of a separate earth electrode and the MG bonding system shall be connected to all exposed metal of each item of equipment being supplied by the MG. This is illustrated following in Figure 6-3. Following obtaining underground asset plans the earth electrode must be driven into consolidated ground, to a depth of at least 500mm in accordance with Clause 6.2.2.6.

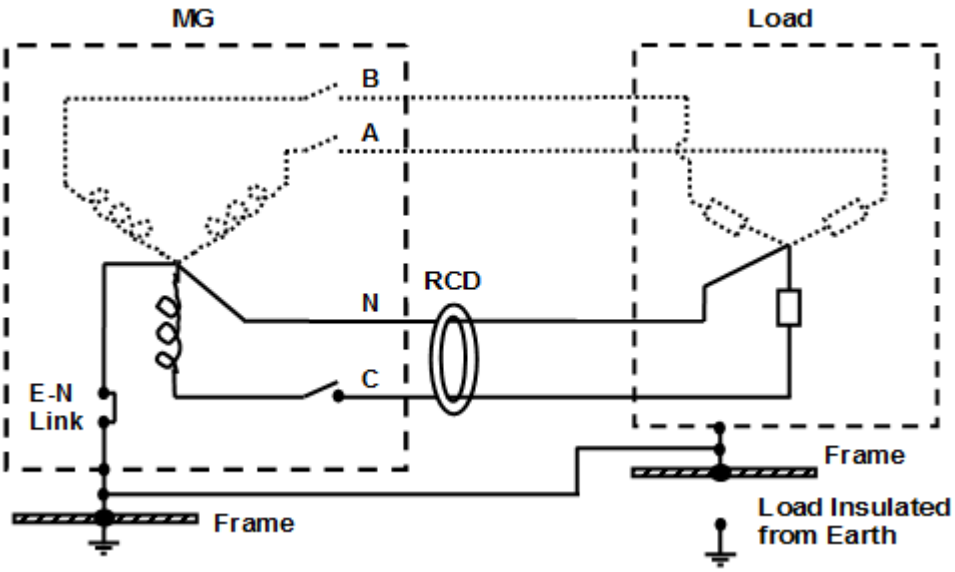

Figure 6-3: Configuration for direct connection to customer installation without earthing

6.2.2.6 Establishing earth electrode

Earth electrodes must be established so that their resistance to earth is low enough (<3000Ω) to allow sufficient current to flow and operate protective devices during a fault. Local soil conditions around the generator will determine the required electrode depth to achieve a sufficiently low electrode resistance. The following Table 2 identifies typical soil types and the driven depth required.

Table 2: Required electrode depth for varying soil types

Soil Type	Required Depth (mm)
Loam	500
Clay + Gravel mix	500
Sandy Loam	500
Sandstone	500
Sand	1000

Where generators are setup in rocky areas, pre drilling may be required for the electrode hole. This should be backfilled with an earthing medium 'Goodearth' prior to inserting the electrode.

6.2.3 Prevention of contact with live parts and ingress of water

Care shall be taken to prevent contact with live parts of the MG installation. Special attention should be paid to situations where substation or switchboard doors may need to be left open to facilitate connection of MG cables. Consideration should be given to erecting temporary barriers and warning signs. Care should also be taken to prevent the ingress of water that could cause the failure of connections. Typically, a minimum degree of protection of IP 24 should be achieved (ie protection of fingers against access to hazardous parts and protection against splashing and spraying from all possible directions).

6.2.4 Electrical protection systems

6.2.4.1 Over-current and short circuit protection

As a minimum a MG should be fitted with over-current and short circuit protection (circuit breaker).

6.2.4.2 Anti-islanding

Where a MG is operated in parallel with the network, suitable protection systems must be provided to prevent the MG islanding (ie continuing to supply power to the network) in the event of a network power failure.

6.2.4.3 Over/under frequency protection

MGs should be fitted with protection systems that isolate the MG in case of the output frequency going beyond the prescribed limits.

6.2.4.4 Residual current device

Where an RCD is fitted, the connection between the frame and the winding neutral or star point is necessary to permit correct operation of the device. This arrangement is unsuitable for connection to a fixed MEN connection (where the neutral and earth are connected together on the load side of the device) because the device would trip on load due to the diversion of current between the neutral and earth connections to the installation. The connection between frame and neutral or star point should be left connected and the RCD disabled when the MG is to be connected to a fixed MEN installation.

6.3 Connection

6.3.1 Standard systems (3-phase, 4 wire)

MGs shall be connected to standard (3-phase, 4 wire) systems with attention given to checking correct phase rotation and polarity.

6.3.2 Non-standard systems (single phase, 2 or 3 wire)

MGs shall not be paralleled with non-standard systems. Load must be interrupted prior to connection of the MG.

For single-phase 2 wire systems the network shall be supplied from the MG by one phase and neutral. For single-phase 3 wire systems the network shall be supplied from two phases and neutral.

6.3.3 MG/network phase sequence check and synchronisation

Before connection, the phase sequence of the network and MG shall be checked to ensure that they are the same.

Where the MG is to be paralleled with the network, prior to paralleling the MG with the network it shall be synchronised with the network using a Synchroscope or Synchronising Lamps.

7.0 OPERATION

7.1 Interruption of supply to customers

Where disconnection of supply would result in an interruption of a minor nature (up to 30 amps) arrangements should be made for an interruption to connect a MG. For planned interruptions in accordance with NECF requirements a minimum of four business days-notice must be provided to any affected customers.

For loads in excess of 30 amps and for loads of a sensitive or critical nature, wherever practicable, arrangements should be made to connect the MG without an interruption to supply. In such situations the MG will need to be started and synchronised with the network, before closing the MG main circuit breaker to make the final connection.

7.2 Power factor

A MG shall be operated such that the machine's power factor matches that of the load supplied. This should be between 0.75–98 lagging depending on the nature of the load (typically 0.98–0.90 Domestic, 0.85–0.80 Commercial, 0.85–0.75 Industrial).

7.3 Refuelling

Where a MG is installed and operated for an extended period of time, consideration should be given to developing a refuelling schedule to ensure continuous operation. The frequency of refuelling will depend on the size of the MG's fuel tank and rate of fuel consumption.

7.4 Operation to maintain voltage levels

When a MG is used to maintain the voltage level on a parallel LV network, it is only to be operated to ensure that the voltage does not fall below minimum requirements. Unless otherwise specified, a minimum voltage of 220V is to be assumed, as measured at the customer's switchboard – not the MG. A MG must not be operated if the above minimum voltage can be attained without it.

If the MG is operated to maintain minimum requirements, it must be run at approximately 230V (or maximum current, whichever is first attained).

Where a MG is operated to maintain voltage levels in this manner, periodic checks shall be made (approximately every half hour) to determine if the minimum voltage can be attained without the MG, and if so arrangements shall be made to shut down the MG.

Note: Unless large motors and welders, etc, are involved, MGs to supply extensive radial rural networks must be run isolated. When, in rural areas, it is necessary to operate in parallel with the LV network, extreme care is required to avoid excessive loading and instability of the machine. This would be due to the introduction of phase shift and hence circulating current associated with long, light-section, paralleling paths.

7.5 Isolated system

7.5.1 Earthing

When supplying isolated systems, a dangerous condition can exist if the customer's neutral is disconnected from the substation earthing. This can arise if the MG is connected directly to the

customer's LV board to allow replacement or rearrangement of a substation LV panel. Under this condition a separate cable is to be run from the generator neutral direct to the substation earthing installation.

7.5.2 Synchronising before isolation (3-phase systems only)

Synchronising before isolation is used at a non-paralleling centre where it is possible to connect the MG cables to an accessible point on the customer's live switchboard. The MG is to be started and synchronised. Switching is then to be carried out to isolate the generator and load from the system.

7.5.3 Interruption to connect

When an interruption is required to connect a MG to an isolated system, attention must be given to checking the customer's phase sequence before isolating from normal supply, typically by opening the customer's main switch. Once the MG cables are installed the MG can be started and MG main circuit breaker closed to enable the phase sequence, voltage and frequency of the MG to be checked before making the final connection by closing the customer's main switch.

7.5.4 Running isolated

Adjustment of frequency and voltage may be required after the generator has taken load. MGs with automatic speed and voltage regulation should not vary greatly with moderate changes in load. Large load fluctuations caused by lift motors, welding machines, etc will require adjustments of frequency and voltage.

Note: As it depends upon the type of load, the power factor cannot be changed while running isolated.

The voltage should be maintained as close to 230V as possible. The load current should not exceed the MG rating. If the load exceeds this value, the customer should be requested to reduce their load.

WARNING: MGS MUST NEVER SUPPLY A LEADING POWER FACTOR.

Unstable voltage conditions can occur if the isolated load is capacitive (leading power factor). Power factor correction capacitors should be disconnected before connecting the MG to the load, to ensure that the MG is not supplying a leading power factor. However, if after connection an unduly low, lagging power factor is apparent, some or all of the capacitors may be reconnected.

7.5.5 Synchronising before disconnection

Synchronising before disconnection of the MG is used to reconnect the load to the system without interrupting supply to the customer, and may be carried out provided suitable paralleling facilities are available and it is safe to do so under the conditions prevailing at the time. The MG and load is to be synchronised with the incoming supply from the system before switching is carried out to reconnect the load and MG to the system. The MG can then be disconnected. Three-phase synchronising is essential eg via a transformer LV circuit-breaker. Two-phase synchronising is not permissible.

7.5.6 Interruption before disconnection

Where synchronising facilities are not available, supply to the load must be interrupted when restoring to normal mains supply.

7.6 MG running to supply load

When a MG is operated to supply load that cannot be held in LV parallel, the load required must be nominated by the officer organising the project. The voltage level must be adjusted within the limits of 220V to 256V to maintain the load requested.

7.7 Multiple MGs running in parallel with each other

7.7.1 General

When multiple MGs are operated in parallel to supply a load, they may be required to:

- run in parallel with the system; or
- run together to feed an isolated load.

7.7.2 Multiple MGs running in parallel with the system

If the load is concentrated at one point, and assistance is available from the network, the amount one MG will affect the other(s) will depend on the amount of network assistance available, and the distance between the MGs. If network assistance is small, the power factor of the MGs will be greatly influenced by the power factor of the load.

Correction of power factor above 0.85 lag should not be attempted.

In other cases, where the load is more evenly distributed, and the network assistance is larger, each MG will be able to run as if it were running independently, in parallel with the system.

7.7.3 Multiple MGs running in parallel to feed an isolated load

In this mode, the MGs must be connected to the load in accordance with Clause 7.5 'Isolated System'.

If it is intended to synchronise before isolation, each machine should be synchronised independently.

If the load is to be interrupted before connection, one MG will be started first, as outlined in clause 7.5.3. Before taking load, the other MG(s) must be synchronised with those already synchronised, then all MGs, running in parallel, can be loaded together.

7.8 Records of voltage and current

The MG voltages and currents should be monitored on a Running Sheet every 30 minutes. The Running Sheet should be returned the officer who requested the MG connection for future reference.

8.0 SHUTTING DOWN A MG

8.1 MG paralleled with network

When shutting down a MG that is paralleled with the network, the load being supplied by the MG should be reduced to a minimum by reducing the engine throttle, whilst still maintaining a constant power factor. The MG main circuit breaker should then be opened.

8.2 MG supplying isolated load

When shutting down a MG that is supplying load that is isolated from the network, the MG should be shut down by operating the circuit breaker without first reducing the load.

9.0 RENTED MGS

The requirements for siting, installation, connection, operation etc of MGs, as described in this document, apply irrespective of whether a MG is owned by Ausgrid or rented from an external supplier.

However, for rented units, the allocation of responsibilities between the supplier of the MG (MG provider) and Ausgrid staff may differ according to various contractual arrangements with different MG providers.

Ausgrid Procurement staff shall ensure that all relevant staff of Ausgrid and the MG provider are made aware of their responsibilities in relation to both contractual arrangements and the requirements defined herein.

Responsibilities assigned to any external MG provider should go no further than the provision, and operation of the MG.

Responsibilities relating to interactions with customers (eg negotiating MG sites, power outages, etc), installation and connection and synchronisation to the network, and the investigation and

resolution of any issues relating to the network or customer installation to which the MG is connected, should be restricted to appropriately trained and competent Ausgrid staff only.

10.0 RECORDKEEPING

The table below identifies the types of records relating to the process, their storage location and retention period.

Table 3 – Recordkeeping

Type of Record	Storage Location	Retention Period*
Approved copy of the network standard	Document repository Network sub process Standard – Company	Unlimited
Draft Copies of the network standard during amendment/creation	Work Folder for Network Standards (HPRM ref. 2014/21250/203)	Unlimited
Working documents (emails, memos, impact assessment reports, etc.)	Records management system Work Folder for Network Standards (HPRM ref. 2014/21250/203)	Unlimited

* The following retention periods are subject to change eg if the records are required for legal matters or legislative changes. Before disposal, retention periods should be checked and authorised by the Records Manager.

11.0 AUTHORITIES AND RESPONSIBILITIES

The authorities and responsibilities of Ausgrid employees and managers are identified in relation to content, management and document control of this network standard can be obtained from the Company Procedure (Network) – Production / Review of Engineering Technical Documents within document repository. The responsibilities of persons for the design or construction work detailed in this network standard are identified throughout this standard in the context of the requirements to which they apply.

12.0 DOCUMENT CONTROL

Content Coordinator : Mains Engineering Manager

Distribution Coordinator : Manager Asset Standards