LORD HOWE ISLAND ELECTRICITY SUPPLY SERVICE RULES

FOREWORD

These Service and Installation Rules have been compiled and issued for the guidance of Electrical Contractors, Consulting Engineers, Architects, and those persons directly concerned with the installation of electrical systems within the area of the Lord Howe Island Board Electricity Supply. They embrace the Board's requirements regarding metering and control equipment, underground consumer's mains and point of supply, and the consumer's installation. Except where otherwise provided, the Wiring Rules published by Standards Australia, which are known as the AS/NZS 3000-2018 Wiring Rules shall apply.

Where the words "Supply Authority" or "Board" are used in these rules they shall be deemed to be the Lord Howe Island Board. "Officer" shall be the Lord Howe Island Board's Electrical Supply Consultants, their Authorised Contractors and/or the Senior Electrical Officer.

Words defined in the AS/NZS 3000-2018 Wiring Rules are used in these rules in accordance with these definitions.

The Board reserves the right to add to, alter, or amend these rules as it thinks fit at any time, and any such amendment, deletion or addition to these Rules shall, when duly advertised, become an integral part of the Rules.

Chief Executive Officer
Lord Howe Island Board

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16/09/2004	
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28/09/2020	Formatting changes. References to AS3000 updated to reflect current revision. Connection conditions for air conditioners revised to include fresh foodstuffs and food preparation areas in part (iii).
13/05/2025	Formatting changes and content revisions for improved clarity. Connection conditions for air conditioners revised to include educational organisations.

SERVICE AND INSTALLATION RULES
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Lord Howe ISLAND BOARD

NSW GOVERNMENT

GENERAL ADVICE TO PROSPECTIVE CONSUMERS AND CONTRACTORS

AREA OF SUPPLY

The Board distributes supply within the confines of Lord Howe Island.

CONTACT INFORMATION

Lord Howe Island Board Administration Office	Telephone Email	02 6563 2066 administration@lhib.nsw.gov.au
Powerhouse	Telephone Email	02 6563 2080 administration@lhib.nsw.gov.au

APPLICATIONS

Immediately upon knowing that a new supply or an addition and/or alteration is required, the appropriate application form(s) should be obtained, filled in with all the required information, signed by the consumer responsible for the payment of the accounts, and lodged with the Board.

The 'Application for Supply' form must indicate the full extent of the entire proposed installation, where such information is known by the applicant at the time of the application.

ADDITIONAL INFORMATION

Any additional information on the matters covered by these rules, or on the supply of electricity generally, may be obtained by contacting the Lord Howe Island Board Administration Office via email at administration@lhib.nsw.gov.au.

WARNING AGAINST PREMATURE EXPENDITURE

No expense should be incurred by the prospective customer until an application form has been lodged with the Supply Authority, and advice has been received that supply will be provided, along with the conditions under which it will be supplied, including any provisions the consumer must make for the installation of the Board's equipment on the premises.

The Supply Authority will not provide supply to sub-standard premises unless such premises have been approved by a building inspector. When considering the connection of appliances

(Such as electrical welding apparatus, x-ray equipment, motors with rapidly fluctuating loads and the like), particular care should be taken to determine the conditions required to prevent their interference with the supply to other consumers. Where interference cannot be prevented, the Supply Authority reserves the right to refuse connection of such equipment.

Matters affecting the design of a building project, such as the position of service equipment, the point of entry for underground service cables, and the placement of any substation or distribution pillar on the site, should be settled through consultation at an early stage.

COMPLIANCE WITH AS/NZS 3000 – 2018 WIRING RULES

An electrical installation will not be approved for connection to the Supply Authority's mains if it does not comply with the AS/NZS 3000:2018 Wiring Rules. As inspections often occur after construction is complete, many parts of the installation may be concealed and inaccessible. Therefore, an inspection or approval for connection does not guarantee the overall quality or full compliance of the installation. To ensure full compliance, inspections should be arranged before wiring is concealed within the structure.

NECESSITY FOR EMPLOYING A LICENCED PERSON

The *Electricity Safety Act 1945*, as amended, requires that all electrical installation work, whether residential, industrial, or commercial, be carried out by a suitably licenced person. Any registered electrical apprentice must be appropriately supervised while undertaking all electrical work.

WORKER SAFETY

The *Electricity (Workers' Safety) Regulation 1992*, authorised under the *Electricity Safety Act 1945*, as amended, applies to work practices and procedures for all electrical work under the control of the Board.

NOTIFICATION OF ELECTRICAL WORK AND INSPECTION REQUIREMENTS

No new installation or addition to an existing installation may be connected without specific permission, and until it has been inspected, tested and a Certificate of Compliance form submitted. However, permission may be granted for the connection of an addition to an existing final sub-circuit, already connected and in use, pending the inspection, provided the additional

work is complete and complies with the AS/NZS 3000-2018 Wiring Rules and these Service Rules.

Similarly, permission may be granted for the connection of additional circuits to the switchboard of an existing installation, provided the new circuits are complete, comply with the AS/NZS 3000-2018 Wiring Rules and these Service Rules, and are isolated from the supply in the following ways:

(i) If the additional circuits are protected by fuses, the fuse carriers must be removed..
(ii) If the additional circuits are protected by overload circuit breakers, the circuit breakers must be left in the 'off' (open) position.

The *Gas and Electricity (Consumer Safety) Act 2017* and *Gas and Electricity (Consumer Safety) Regulation 2018*, as amended, require that the customer, the supply authority, and, where relevant, the Department of Fair Trading receive a copy of the Certificate of Compliance - Electrical Work form from the installing electrical contractor within 7 days of the work being completed. The Compliance form details the particulars of work carried out on the customer's installation.

A Compliance form is also required after:

- Remedying any notified defect in a customer's installation
- Reconnection of supply by an electrical contractor authorised by the Board

The Supply Authority and the contractor must retain the Compliance form for five years.

An installation will not be inspected until a Compliance form has been lodged with the Supply Authority.

RE-INSPECTION FEE

If the initial inspection or test shows that the Installation is incomplete or does not comply with AS/NZS 3000-2018 Wiring Rules, or these Service Rules, a fee in accordance with the Schedule of Fees and Charges, may be charged by the Board for every subsequent inspection required. A fee may also be charged for other inspections.

DAMAGED TO SUPPLY AUTHORITY'S EQUIPMENT

If the initial inspection or test shows that the Installation is incomplete or does not comply with AS/NZS 3000-2018 Wiring Rules, or these Service Rules, a fee in accordance with the Schedule of Fees and Charges may be charged by the Board for every subsequent inspection required. A fee may also be charged for other inspections.

INTERFERENCE TO SUPPLY OF OTHER CONSUMERS

If the consumer deals with the electricity supplied to them in such a manner as to cause, in the opinion of the Supply Authority, undue interference with the supply to other consumers, the Supply Authority may require them to make such necessary adjustments or alterations, and to operate the offending equipment in a way that ensures the supply to other consumers is not interfered with. If they fail to do so, the Supply Authority may disconnect the supply of electricity to the premises. The fact that the Supply Authority has connected and approved that apparatus or equipment does not exempt the consumer from this rule.

Where it is established that, in the opinion of the Supply Authority, undue damage to equipment or interference with the supply has occurred due to the actions of the consumer, the Board reserves the right to recover costs involved in restoring supply.

INTERFERENCE WITH EQUIPMENT

No person, other than an Officer of the Supply Authority or person duly authorised, may interfere with, operate, remove, replace, connect or disconnect any conductor, service fuse, meter, seal, link, time switch, or other device that is the property of, or under control of, the Supply Authority.

SEPARATE OR ADDITIONAL SERVICES

In general, the Supply Authority will connect only one service for any building or for any group of buildings occupied by one consumer.

Additional points of supply may be given for the following reasons:

- Dual occupancy, where it is more convenient to give supply from another source
- Technical considerations

All costs involved in providing additional points of supply will be paid by the customer.

Where more than one point of supply is provided, each separately supplied installation must be clearly defined. No facilities for interconnection with any other installation or source of supply (either directly or by changeover switching) shall be provided unless agreed to by the Supply Authority.

The extent of each installation must be defined either in terms of plant or equipment connected to it, or by specified areas it serves.

SOURCES OF ALTERNATE SUPPLY

Where the customer installs an alternative source of electrical supply, such as a standby generator, facilities for connection to the electrical installation normally supplied by the Supply Authority's system must not be installed unless the proposed arrangements have been approved by the Supply Authority.

If approved, the facilities must be arranged, either directly or by suitable interlocking procedures, so that the Supply Authority's system and service equipment cannot be energised from the alternative source, except in the case of connections via inverters as described in Appendix B.

A notice must be fixed to the main switchboard indicating that such facilities exist, which sections of the installation they supply, their point of control, and the conditions under which they may be operated.

POINT OF SUPPLY

Before any work on an installation is commenced, the point of entry for the underground service cable and the position of the service equipment should be ascertained from the Supply Authority. This particularly applies to existing installations where new consumers mains and/or switchboards are being provided.

THE SUPPLY AUTHORITY'S RIGHTS AND POWERS

Nothing contained in these Service Rules shall prejudice the rights and powers of the Supply Authority under any Act, Regulation, or amendments thereto.

The Supply Authority reserves the right to add, alter or amend any of these service rules at its discretion. Any such changes shall be considered part of these conditions.

SYSTEM OF SUPPLY

PARTICULARS OF SUPPLY

The system of supply uses alternating current at 50 hertz originating from one of the following sources:

(i) Single phase, 2 wire 230 volts
(ii) Three phase, 4 wire 230/400 volts

All supply is provided through underground cables from substations or distribution pillars. All voltages are measured at the customer's distribution pillar/substation supply point.

Note: Voice frequency control signals may be superimposed on the supply voltage.

EARTHING OF SUPPLY

The neutral conductor is earthed at the source of supply using the Multiple Earthed Neutral (MEN) system of earthing, which applies to all installations connected to the Supply Authority's low and medium voltage mains.

LIMITATIONS OF THE LOADING OF APPARATUS AND BALANCING OF LOAD

GENERAL

Appliances and single phase switched socket outlets are generally limited to 10 amps per phase unless special approval is granted by the Board. For loads requiring more than 10 amps per phase, the Board will undertake a suitability assessment and may consult an independent expert to determine the system's capacity.

BALANCING OF INSTALLATION

For installations, or separately metered portions of an installation, supplied through a service with more than one active conductor, the total load must be balanced as evenly as practicable, across the active conductors.

BALANCING OF APPARATUS

Individual lighting installation or appliance, other than one of those specified in this Rule, may be required to balance its load over two actives of the system if its rated load exceeds 10 amps at 240 volts, and over three actives of the system if it exceeds 20 amps at 240 volts. However, two actives and a neutral , or three actives and a neutral, will not be provided solely for the connection of apparatus that may be connected to one active and neutral; or to two actives and neutral, in accordance with these Rules.

LARGE TWO WIRE APPARATUS (EXCEPTING WELDING APPARATUS)

The Supply Authority reserves the right to refuse connection of two-wire apparatus of, with rapidly fluctuating loads.

WELDING APPARATUS

The Supply Authority reserves the right to refuse the supply of electricity from the general supply mains to any electrical welder. Consumers or prospective consumers must not incur any expenses until confirmation has been received advising that supply will be provided, including the applicable terms and conditions.

COOKING RANGES, HOTPLATE UNITS, WASH BOILERS (240 VOLT PERMANENTLY CONNECTED TYPE)

Connection of single phase appliances with load exceeding 2000 watts will not be permitted.

DISHWASHERS AND CLOTHES DRYERS

The Supply Authority reserves the right to control the use of dishwashers and clothes dryers.

WATER HEATERS - INSTANTANEOUS HEATING TYPE

The Supply Authority reserves the right to refuse to connect water heaters of the instantaneous heating type.

WATER HEATERS - ELECTRIC BOOSTED SOLAR TYPE

The Supply Authority reserves the right to control the supply of electric boosted solar hot water heaters. Such booster elements must not exceed a capacity of 2.4 kW, or 2.4 kW per phase per unit.

Note: This rating must be specified when ordering a new Electric Boosted Solar Hot Water unit or replacement element through the supplier or their agent.

AIR CONDITIONERS

The Supply Authority reserves the right to refuse to connect air conditioners. However, approval may be given in the following situations:

(i) For medical reasons.
(ii) To protect technical equipment i.e., IT equipment rooms or other communications enclosures.
(iii) To protect fresh foodstuffs and food preparations areas in an enclosed commercial premises with maximum enclosed area of 81 square metres.

(iv) To ensure suitable educational environmental conditions within enclosed premises operated by established registered educational organisations.

In all cases Supply Authority reserves the right to control the supply by way of time switch. In all cases the air conditioner must be appropriately sized according to the dimensions of the premises to which it is installed.

MOTORS AND STARTERS

(i) The Supply Authority reserves the right to refuse connection of any motor if it is considered that the supply to other consumers may be adversely affected.

(ii) Motors with nameplate HP ratings up to 2 HP at 240 volts may be connected to a single-phase supply.
Written permission may be granted, subject to location and usage, for the installation of single-phase 240-volt motors exceeding 2 HP.

(iii) Motors withthe maximum nameplate HP ratings not exceeding those specified in the following table may be controlled by the corresponding typeof starter:

Type of Starter		
1.	Direct-on-line	0-2 HP Single Phase
		0-5 HP 3 Phase
2.	Star-delta	0-7.5 HP 3 Phase
3.	AUTO-Transformer	0-15 HP

The Supply Authority reserves the right to nominate the tapping of auto-transformer type starters.

(iv) Motors with nameplate ratings exceeding 15 HP will not be connected without special permission and subject to certain conditions.

(v) The above table specifying the types of starters for various motor horsepower ratings must be adhered to, except where exceptions are granted in special cases after investigation by the Supply Authority's technical staff upon request from Contractors.

MOTOR STARTING CURRENT

Notwithstanding the above requirements, the Supply Authority may require the starting current of any motor installation to be limited.

SERVICE CABLES

GENERAL

The Supply Authority will generally connect only one service to supply a single building, or any group of buildings occupied by one consumer.

The customer is responsible for the supply of materials and installation of materials for the service . A connection fee will be charged to cover metering, service equipment and connection to the supply system.

POINT OF ENTRY

(i) The Supply Authority will determine the route of the underground service cable and the location of the point of entry.

Electrical contractors should consult Supply Authority officers for directions before commencing installation work.

(ii) The Supply Authority will indicate the point of entry and main switchboard position. Consultation during the planning stage, before submitting development applications, may be advantageous.

(iii) If the consumer requests the meter box to be recessed into the wall, the supply conduit may have to pass through the building's structural footing and rise within an external wall cavity. If the conduit is to rise on the outside of the wall, the standard meter box should be surface mounted.

Note: It is standard practice for the SEO to pre-drill, fit and wire the Supply Authority-supplied equipment on the meter panel provided by the customer.

UNDERGROUND SERVICES

For the purpose of these rules and connection to the Lord Howe Island Distribution System, the Consumer mains are considered to run from the point of supply (distribution pillar or substation) to the customer meter board. These consumer mains will remain the responsibility of the connected customer.

(i) Consumer mains shall be installed in heavy-duty rigid PVC conduit compliant with Australian Standard Specification 2053 – "Non-Metallic Conduits and Fittings". The minimum nominal size shall be 32mm with a minimum bend radius of 300mm. (Refer to drawing Appendix A.)

Note: The above-ground section may consist of appropriate light duty conduit with adequate mechanical protection for approximately 450mm above ground level. AS/NZS 3000-2018 Wiring Rules require conduits exposed to direct sunlight be treated or painted.

(ii) The conduit should be laid in a generally straight line from the service connection to the meter box position. It generally extends into the meter box, though alternative arrangements may apply. The conduit must be laid at a depth which provides 500mm cover from finished ground level.

EARTHING

MEN SYSTEM

The Multiple Earthed Neutral (MEN) system of earthing shall apply to all installations connected to the Supply Authority's low or medium voltage mains.

MAIN EARTHING CONDUCTOR

The main earthing conductor must be connected directly and continuously from the neutral busbar on the main switchboard, to the electrodes, in accordance with the requirements of the AS/NZS 3000-2018 Wiring Rules.

EXISTING INSTALLATIONS

If alterations to plumbing in existing installations result in a substantial portion of the plumbing being non metallic, all power circuits must be protected by a Residual Current Device (Safety Switch) as described in AS/NZS 3000-2018 Wiring Rules.

METERING EQUIPMENT

GENERAL

The consumer must provide a suitable space for the Supply Authority's metering equipment. This space must be readily accessible to Officers for fixing, reading, testing, adjustment and removal of equipment without obstruction. Generally, the metering point should be located where Officers can access them without needing a key. However, meters may be enclosed within business premises that are open during business hours.

Adequate space must be available on the main switchboard to accommodate the the Supply Authority's metering equipment.; The space required will be dependent on the supply type, tariff rates, and the number of meters, fuses, or other equipment required..

While the Supply Authority may install metering equipment remotely from the consumer's premises, Electrical Contractors must not assume this will be the case and should contact the Supply Authority for confirmation. Where metering boxes are mounted on poles, the top of the meter panel must be fitted 2000mm above ground level.

The consumer must ensure unrestricted access to the metering equipment. If access is restricted, the consumer will be required to pay all costs associated with relocating the meters to an accessible position. Consumer are also required to provide adequate protection for the meters where, in the opinion of the Officer, it may be exposed to mechanical damage, weather or corrosion.

Note: It is standard practice for the Senior Electrical Officer to pre drill, fit and wire the Supply Authority's equipment onto the meter panel supplied by the customer.

DOMESTIC PREMISES

The consumer's electrical contractor must supply and wire an approved weatherproof meter box.

NON-DOMESTIC PREMISES

For installations with a maximum demand not exceeding 100 amps per phase, an approved weatherproof meter box will be required. Where the maximum demand exceeds 100 amps per phase, the size and type of metering equipment will be specified by the Supply Authority upon receipt of a "Certificate of Compliance – Electrical Work" form.

METERING EQUIPMENT

Metering equipment includes meters and instruments, metering links and terminal blocks; instrument transformers, and any other equipment installed solely for metering purposes.

ADDITIONAL METERING EQUIPMENT

(i) Sub-metering installations will not be provided by the Supply Authority, nor will sub- meters (if installed by the consumer) be read by officers of the Supply Authority.
(ii) Additional meters beyond those required by the Supply Authority's purposes, may be supplied, and installed by the Supply Authority upon application, and at the consumer's cost.. These additional meters will not be read or maintained by the Supply Authority.

ALLIED EQUIPMENT

Allied equipment such items as time switches, relays, and contactors, used to control supply during restricted hours must be of a type and make approved by the Supply Authority. All equipment must allow for effective sealing by the Supply Authority.

METERS – GENERAL

(i) Direct-reading meters (energy) will generally be used. A single-phase meter must not be installed on three phase installations, such as a three phase motor.

(ii) Common meter types include

- Single-phase two wire 240 volts 10/100 amp
- Three-phase 4 wire 3 x 240 volts 10/100 amp

CONNECTIONS OF METERING EQUIPMENT

Metering cables for direct connected meters must be no smaller than 4mm² nor larger than 35mm² and should be of suitable ratings.

Note: It is standard practice for the Senior Electrical Officer to pre-drill, fit and wire the Supply Authority's equipment onto the meter panel provided by the customer.

(i) All connections to the metering equipment will be carried out by the Supply Authority.

(ii) Where it is necessary to connect more than one part of an installation to a meter, the contractor shall arrange, by means of links or by paralleling the different parts of the installation, that no more than two 4mm² cables are connected to any one terminal of a meter.

(iii) Cables of the same colour as those of the consumer's mains shall be used for the wiring of directly connected metering equipment.

GROUPING OF METERING EQUIPMENT

All metering equipment connected to an installation should be grouped at a single location, approved by the Supply Authority.

CONSUMER INSTALLATION POWER FACTOR

GENERAL

The power factor at maximum demand should not be less than 0.9 lagging. Notwithstanding this requirement, the power factor of certain classes of apparatus must comply with the following conditions:

LUMINOUS DISCHARGE TUBES (FLUORESCENT LAMPS AND THE LIKE)

In any installation (other than a single domestic installation) where the total installed capacity of electrical discharge lighting systems exceeds 300 watts, the power factor of such lighting shall not be less than .85 lagging.

No condition of operation involving a capacitor or variation of an inductive load that result in a 'leading' power factor shall be introduced into any installation, except with prior arrangement with the Supply Authority.

TEMPORARY SUPPLY

BUILDING IN COURSE OF ERECTION

Generally, temporary service will not be provided to buildings in the course of erection. However, the Supply Authority may permit supply prior to building completion, provided that the progress allows for the permanent installation of service and metering equipment, and that the installation complies with the AS/NZS 3000-2018 Wiring Rules and these Service Rules.

BUILDER'S SERVICE

Once service cables have been installed, builders may apply for a "Builder's Service", which may be either single, two or three phase as required, subject to availability. This service must be connected to an independent structure adjacent to the building, erected by the builder.

The temporary switchboard and the Supply Authority metering equipment must be erected on the structure and protected by an approved weatherproof box. The installation must comply with the AS/NZS 3000-2018 Wiring Rules and these Service Rules. However, in this instance, flexible conduit may be used to protect the consumer's mains.

It is advisable to locate the Builder's Service adjacent to the planned point of entry and leave enough length of underground service cable to redirect it to the point of supply when the building is ready for connection to supply, and the Builder's Service is no longer required.

The provision of a Builder's Service remains the responsibility of the customer and must be installed by a suitably licenced person.

HOUSEHOLDERS

Temporary services will be provided to temporary dwellings, such as garage or part house, where it is not expected that it will become necessary to alter the position of the service and metering equipment when the permanent dwelling is completed. The cost of any subsequent alterations will be charged to the consumer.

TARIFFS

GENERAL

Electricity is supplied by the Board at various tariffs. Presently the tariff structure is broken into four types:

1. Domestic
2. Commercial
3. Pensioner
4. Electric Vehicle (re-charging point)

Tariff types are defined according to Lord Howe Island Board guidelines and included in the Schedule of Fees and Charges.

SCHEDULE OF FEES AND CHARGES

The schedule is not included in these rules due to the frequency of review and amendment. The effective charges are available at the Board's Administration Office.

All electricity supplied by the Board to the customer's premises shall be paid for by the consumer in accordance with the rates adopted by the Board from time to time, as set out in the "Schedule of Fees and Charges" (generally guided by State Government decree).

The Board reserves the right at any time to increase or decrease rates of charges and to alter the form of tariff as it may deem fit or as directed by other relevant Government Authorities or departments. Customers affected will be notified of any changes, either directly or in writing, and such changes shall apply to the consumption of electricity recorded by all meters read on and after the date specified in the notification.

DETERMINATION OF TARIFFS

The Board reserves the right to decide which tariff type any customer should be charged. The tariff cannot be altered unless approved by the CEO. Where a dispute exists, the Board may approach an independent arbitrator for determination of the appropriate tariff. The actual tariff may be set, varied and any increase limited by Government edict.

MINIMUM CHARGE

A minimum charge shall apply to all metered points of a supply.

ISSUE AND PAYMENT OF ACCOUNTS

All accounts shall be rendered quarterly, or as otherwise determined by the Board, and are payable at the Board's Administration Office.

Should any employee or contractor of the Board misread a meter or make an error when rendering the account, the Board reserves the right to cancel such account and submit an amended statement in lieu thereof.

An account shall not be deemed to be paid until it has been received by the Board's office, or in the case of payment by cheque, until the cheque has been cleared by the bank.

No receipt will be recognised unless it is made on the official receipt form of the Board.

RE-CONNECTION FEE

If payment of any electricity accounts is not made within the stated period, the Board may discontinue electricity supply until accounts have been paid. In such case, a re-connection fee will apply to restore supply.

Where supply of electricity has been disconnected by request to allow work of any nature to be carried out, lodgment of a Notice of Electrical Work form requesting re-connection shall attract a charge for effecting the re-connection.

FEED-IN TARIFF

The Lord Howe Island Board does not have a feed-in tariff.

APPENDIX A

Figure 1 - Typical Underground Service Conduit Installation

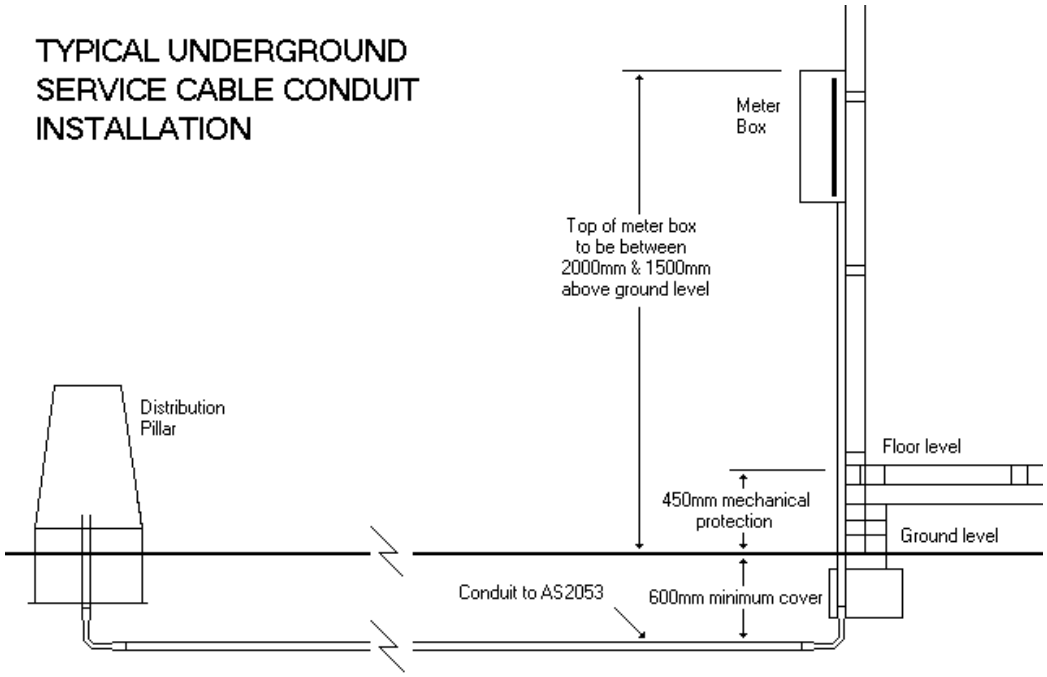
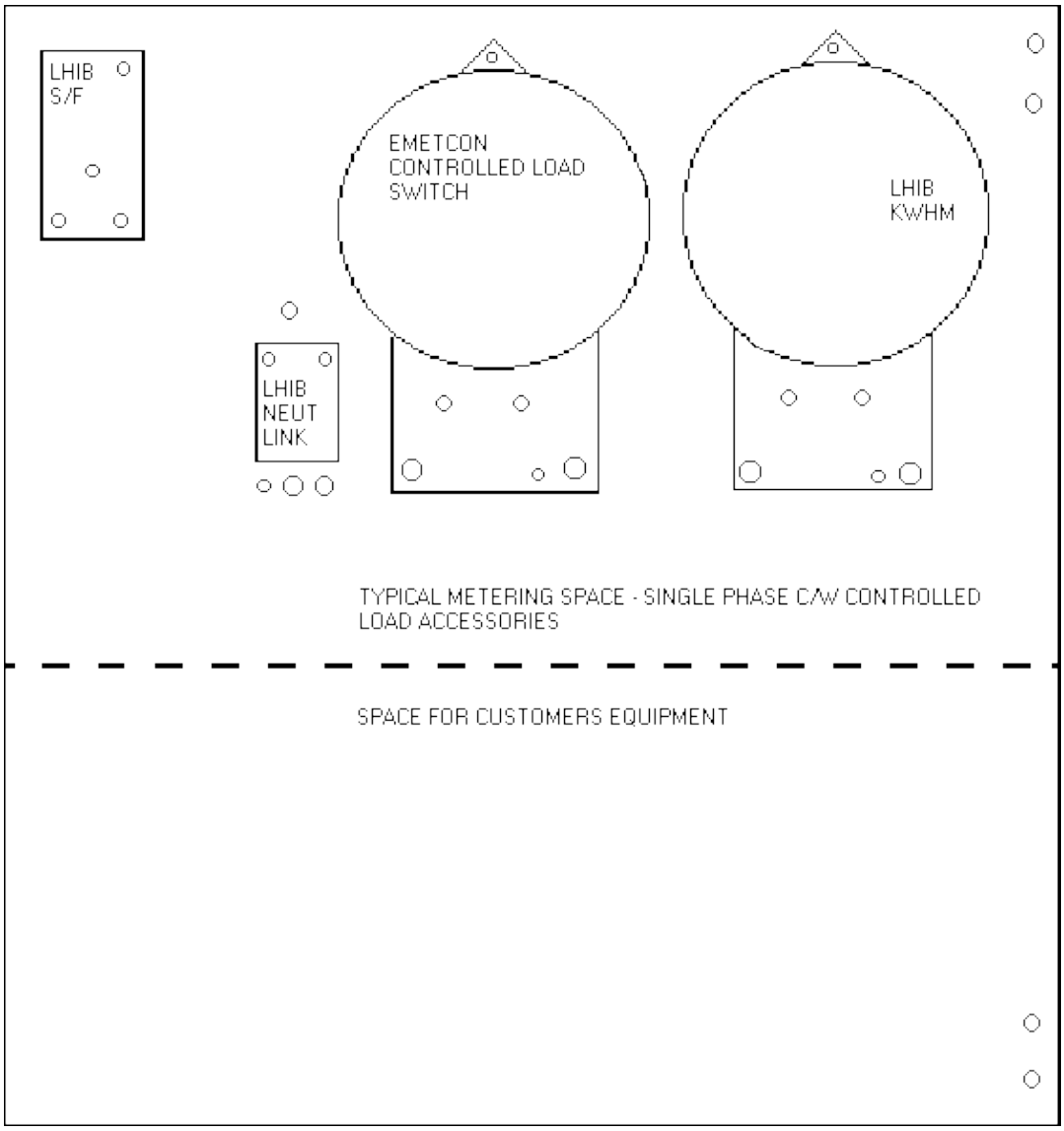


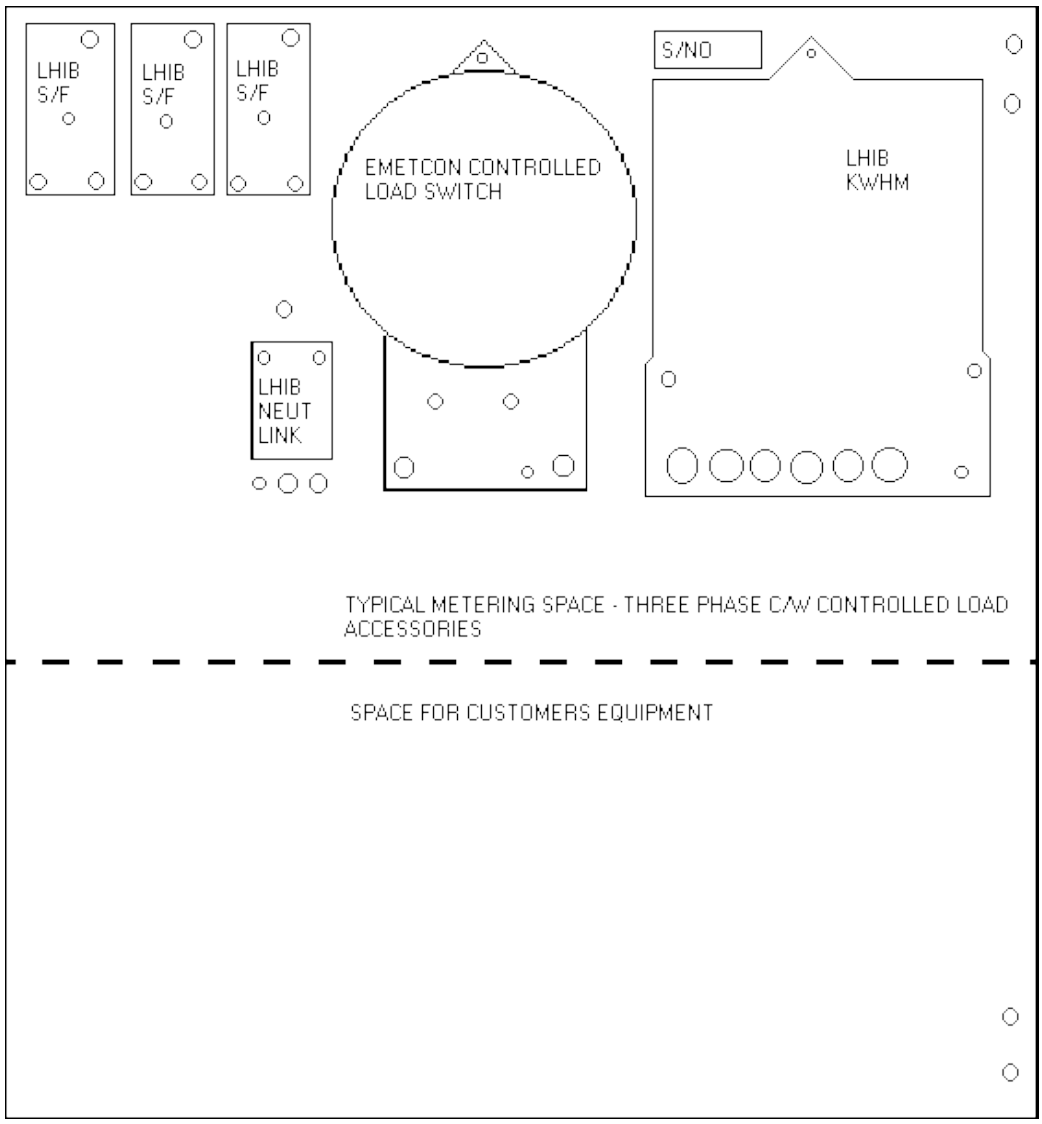
FIGURE 1

Figure 2 - Typical Single Phase Meter Panel Layout



Note: Drawings and drilling templates for this and other variations of metering arrangements such as multiple services on the one meter panel, are held by the Senior Electrical Officer.

Figure 3 - Typical Three Phase Meter Panel Layout



Note: Drawings and drilling templates for this and other variations of metering arrangements such as multiple services on the one meter panel, are held by the Senior Electrical Officer.

APPENDIX B

AUSTRALIAN GUIDELINES FOR GRID CONNECTION OF ENERGY SYSTEMS VIA INVERTERS

1. SCOPE

These guidelines apply to any **inverter energy system** as described in Energy Sources, connected to the Lord Howe Island Board low voltage distribution network. These inverter energy systems must satisfy the requirements of these guidelines and incorporate an accepted inverter. These guidelines address technical matters only. Commercial matters are outside the scope of these guidelines.

2. DEFINITIONS

(i) ***Energy Sources***
Grid connected inverter energy systems (excluding motor drive inverters). Single phase systems from 0 to 10kVA, three phase systems from 0 to 30kVA, connected at the nominal interconnection voltage and frequency. Herein referred to as **inverter energy system(s)**.

(ii) ***Nominal Interconnection voltage***
Low voltage i.e., 230 volts single phase / 400 volts three phase.

(iii) ***Nominal Interconnection frequency***
50Hz

(iv) ***Accepted inverter***
An accepted inverter is one approved by the relevant electricity distributor for grid connection.

(v) ***Lockable switch***
Lockable switch means that the switch or circuit breaker must as a minimum have provision for insertion of a wire seal to prevent the switch being closed.

(vi) ***Electricity Distributor***
The Lord Howe Island Board.

(vii) ***Islanding***
Islanding of inverter systems in the context of these guidelines means any situation where the grid fails or is tripped, and one or more inverters maintains a supply of any description (be it stable or not) to any section of the distribution network outside the consumer's installation (i.e., on the distribution network side of the point of the connection).

3. CONNECTION REQUIREMENTS

(i) GENERAL

Inverter energy systems must satisfy the requirements listed in the subsections below to satisfy these guidelines. The inverter must also be an accepted inverter.

(ii) POWER FLOW DIRECTION

Both directions of power flow allowed i.e., from inverter to grid and from grid to inverter.

(iii) POWER FACTOR

Allowable range is from:

0.8 lagging to 0.95 leading for outputs from 20% to 100% of rated VA
0.6 lagging to 0.9 leading from outputs from 5% to 20% of rated VA

Unless the device is approved by the relevant electricity distributor to control power factor beyond the above range for the purpose of providing voltage support at the point of connection. (Lagging power factor is to be interpreted with the inverter as a generator i.e. the inverter is supplying to the grid as if the grid was a load with lagging power factor, similarly for leading power factor.) Alternatively, under special circumstances the relevant electricity distributor may require a specific power factor.

(iv) HARMONICS

a) GENERAL

In order to maintain fairness to manufacturers of both current and voltage source inverters two test methods have been specified below. The method appropriate to the inverter type should be used.

b) TEST SUPPLY SPECIFICATION

In order to carry out inverter tests a minimum requirement on the supply that the inverters are required to work into is as below:

V3rd	0.9%
V5th	0.4%
V7th	0.3%
V9th	0.2%
Vevens order 2-10	0.2%
V11-40	0.1%

Individual supply harmonics should not be greater than these figures.

c) TEST METHOD FOR VOLTAGE SOURCE INVERTERS

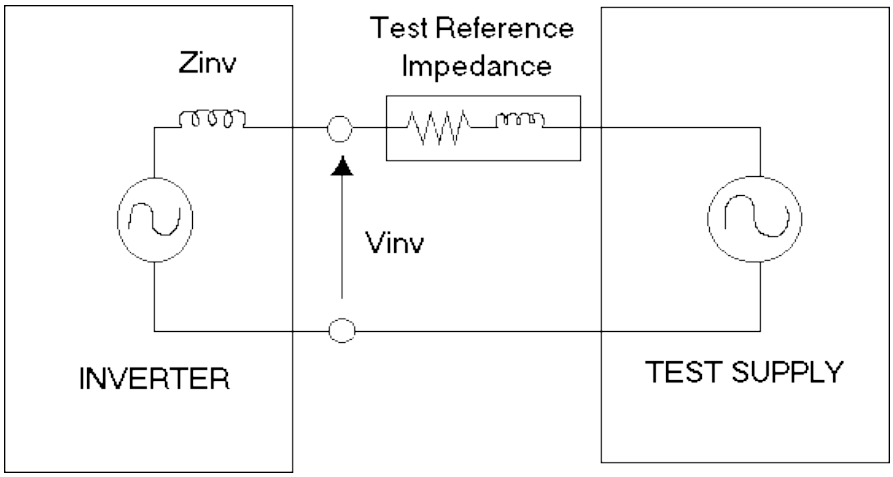


Figure 1 Harmonic Voltage Measurement Circuit

Test reference impedance should be 0.4 + j0.025 per unit using the inverter continuous rating as the per unit base.

Voltage Total Harmonic Distortion (THD) measured at the inverter terminals should not exceed 3%.

Individual voltage harmonics should not exceed values in table 1 at full load. The values in the table are shown as a percentage of the fundamental.

V3rd	2.7%
V5th	1.2%
V7th	0.9%
V9th	0.6%
Vevens order 2 – 10	0.6%
V11 – 40	0.3%

Table 1 Voltage harmonic ratio limits for voltage source inverters.

d) TEST METHOD FOR CURRENT SOURCE INVERTERS

Current source inverters should be directly connected to the test supply and current harmonic ratios measured.

Current Total Harmonic Distortion (THD) measured at the inverter terminals should not exceed 4%.

Individual current harmonics should not exceed values in table 2 at full load. The values in the table are shown as a percentage of the fundamental.

I3rd	3.6%
I5th	1.6%
I7th	1.2%
I9th	0.8%
Ievens order 2 – 10	0.8%
I11 – 40	0.4%

Table 2 Current harmonic ratio limits for current source inverters.

(v) HIGH FREQUENCY NOISE

Equipment must conform to AS1044 "Electromagnetic interference – Household electrical appliances, portable tools and similar electrical equipment – Limits and Methods of Measurement".

(vi) VOLTAGE FLICKER

Equipment must conform to limits as per AS2279 part 4 section 6.

(vii) PROTECTION

A minimum requirement to facilitate the prevention of islanding is that the inverter energy system protection operates and isolates the inverter energy system from the grid if:

- operating voltage is greater than 250V phase to neutral
- operating voltage is less than 210V phase to neutral
- operating frequency is greater than FreqMAX
- operating frequency is less than FreqMIN

FreqMAX will be in the range 50 to 52 Hz.
FreqMIN will be in the range 48 to 50 Hz.

Both these limits may be either factory set or site programmable. The values of these limits will be stipulated by the relevant electricity distributor. The protection voltage operating points may be set in a narrower band eg. 215V to 250V if required.

(If the inverter energy system does not have the above frequency features the manufacturer must demonstrate an alternate anti-islanding protection feature

that is acceptable to the relevant electricity distributor.)

The maximum time allowed for operation of the protection is 2 seconds.

If the protection function above is to be incorporated in the inverter it must be type tested for compliance with these requirements and accepted by the relevant electricity distributor. Otherwise, other forms of external protection relaying are required which have been tested for compliance with these requirements and approved by the relevant electricity distributor.

In addition to the passive protection detailed above, and to prevent the situation where islanding may occur because multiple inverters provide a frequency reference for one another, inverters must have an accepted method of islanding prevention e.g. frequency drift. This protection must operate and isolate the inverter energy system from the grid a maximum of 2 seconds after grid failure under all local conditions. (See compliance test requirements.) The inverter energy system must remain disconnected from the grid until the reconnection conditions are met (see section (xii)

(viii) DC INJECTION PREVENTION

A transformer shall be installed to prevent DC from entering the grid. The transformer can be omitted when a DC detection device is installed at the point of connection on the AC side. This detection device may be incorporated in the inverter provided that its performance has been type tested and approved for compliance with these guidelines. The limit on DC current injection will be such that the injected DC current will not exceed 5 milliamps (mA). Guidance can be obtained from AS3300 on DC current limitations for continuously operated devices.

(ix) CONNECTION POINT

It is preferable that the inverter energy system(s) be connected directly to the main switchboard. In installations where this is not possible/desirable the nearest distribution board shall be used and all switchboards between the inverter energy system and the main switchboard shall be labelled. See section on labelling.

The inverter energy system must be connected to a dedicated circuit. The rating of the inverter circuit cables and all the cables between any distribution boards and the main switchboard, which carry inverter output must be rated for at least the full output of the inverter. See AS3000:2018

(x) EXTERNAL DISCONNECT SWITCH

The main issue here is one of personnel safety when working on electrical systems both within a customer's installation which contains an inverter energy system(s) and on the grid adjacent to a customer that has an inverter energy system. To address these issues, it is required that there be a visible and accessible method of ensuring that the inverter energy system is disconnected from the grid and disconnected from the customer's installation.

Where the inverter energy system is connected directly to the main switchboard these requirements may be met by a single lockable switch appropriately labelled.

In installations where the inverter energy system is connected at a distribution board other than the main switchboard then two lockable switches must be provided.

1) The switch located on the main switchboard which controls the sub circuit of the distribution board to which the inverter energy system connects must be lockable to be used as isolation for utility staff working on the grid.

2) The other lockable switch must be located at the distribution board from where the inverter energy system sub-circuit emanates to provide isolation for electrical contractors working on the customer's installation.

Irrespective of where the inverter energy system circuit emanates from, the controlling device will be installed to the requirements governing main switches in AS/NZ3000:2018

(xi) LABELLING / SIGNAGE

The inverter energy system installation must include warning signage. Signage should as a minimum be placed:

- On the switchboard or distribution board that has the inverter energy system connected to it.

- On all switchboards including main switchboard and distribution board(s) between the main switchboard and the board that has the inverter energy system connected to it.

Signage should describe the actual type of generation source installed because particular generation sources, such as photovoltaic or wind, have varied electrical characteristics.

The owner of the inverter energy system shall make arrangements to supply and install appropriate signage on the installation, in accordance with requirements outlined in appendix AA.

The materials for the labelling / signage must comply with AS/NZ3100.

(xii) RECONNECTION PROCEDURE

Automatic reconnection of inverter energy system(s) onto the grid will only occur if the voltage is within the range of 200V to 270V phase to neutral and the frequency is within the range FreqMIN o FreqMAX, (as per section (vii)) and these conditions have been maintained for a minimum of 1 minute.

(xiii) CABLES AND WIRES

The installation must comply with all appropriate local and Australian Standards.

(xiv) METERING

Metering is the responsibility of the relevant electricity distributor.

4. SAMPLE SIGNAGE

This is only a sample of appropriate signage. It is indicative of the type of appropriate signage required at the various locations specified.

Note: Word in italic would change to describe the type of generation (e.g. Photovoltaic, induction generator, synchronous generator, alternative, renewable, etc.)

Size specifications are a minimum size.

Main switchboard and distribution board(s) upstream of distribution board where the inverter energy system is connected:

Qty: 1
Lettering: 4mm, 8mm "WARNING"
Colour: Red, white letters
Size: **120*60mm**

WARNING

SOLAR GENERATION PLANT
CONNECTED

ISOLATE *SOLAR* GENERATION PLANT
AT (appropriate distribution board)

Main switchboard or distribution board where the inverter energy system is connected:

Qty: 1
Lettering: 4mm, 8mm “WARNING”
Colour: Red, white letters
Size: **120*60mm**

WARNING

DUAL SUPPLY

ISOLATE BOTH NORMAL AND *SOLAR* SUPPLIES BEFORE WORKING ON THIS SWITCHBOARD

Main switchboard or distribution board where inverter energy system is connected:

NORMAL SUPPLY MAIN SWITCH

Qty: 1
Lettering: 5mm
Colour: White, black letters
Size: **75*30mm**

NORMAL SUPPLY MAIN SWITCH

SOLAR GENERATOR MAIN SWITCH

Qty: 1
Lettering: Title 5mm, words 4mm
Colour: White, black letters
Size: **75*30mm**

SOLAR SUPPLY MAIN SWITCH

SOLAR GENERATOR LOCATED IN
(location of *solar* generator)