MANUAL

Evoenergy Service and Installation Rules

Key summary points

- This document is to ensure that the electrical installation of a customer can be connected to the distribution system.
- Evoenergy describes the requirements of the connection to its system as Service Rules.
- Evoenergy describes the compatible requirements of the electrical installation as Installation Rules.

Contents

Evoenergy – web links

Link	Use
http://www.evoenergy.com.au	For Network Connection/Disconnection/Network Alterations Application forms
https://www.evoenergy.com.au/residents/pricing-and-tariffs	For electricity and gas network prices, network charges policy and FAQ
https://www.evoenergy.com.au/business-and-government/electrical-safety-rules	For Electrical Safety Rules
https://www.evoenergy.com.au/workersafety	For Evoenergy Accreditation and Authorisation Training
https://www.evoenergy.com.au/about-us/about-our-network/electricity-five-year-plan	For industry consultation
https://www.evoenergy.com.au/about-us/contact-us	We welcome any feedback, improvement suggestions & requests for additional information
https://www.evoenergy.com.au/consumer-engagement-program	For Consumer engagement program details
https://www.evoenergy.com.au/business-and-government/service-and-installation-rules	For Evoenergy Service and Installation Rules
https://www.evoenergy.com.au/residents/connections-overview	For information about connecting to the Evoenergy network
https://www.evoenergy.com.au/Connection/2024-29-Connection-Policy	For Evoenergy's connection policy
https://www.evoenergy.com.au/key-documents	For Evoenergy Standards and Manuals

Before you dig Australia

“Before You Dig Australia” is the national referral service for information on the location of underground infrastructure. Australia’s major service providers have a single web-enabled information service for information on the location of underground communications, gas, water, electricity infrastructure.

The Before you Dig Australia online service is available 24 hours a day and enables users to have more control over their enquiry as you detail the dig site on the mapping software yourself.

Use the website to ensure that you ‘Before You Dig Australia’ before any excavation work. When calling the 1100 phone number the operator may require the following:

- Your name and address
- Name of company
- Contact telephone number
- Fax number for return information
- Contact name on site
- Site address and both nearest cross streets
- Start date of proposed work
- Type of work being carried out

Phone 1100 - free call (except from mobiles)

Fax 1300-652-077

Website: https://www.byda.com.au/

Foreword

The Evoenergy Service and Installation Rules for Connection to the Electricity Distribution Network have been compiled by the Strategy & Operations Group of Evoenergy in consultation with Customer Delivery, Network Services, Major Projects & Safety Group of Evoenergy.

Disclaimer

Whilst these Rules contain material relevant to the electricity industry legislation, codes of practice and standards, it is not intended to provide legal advice on how electrical contractors can meet their own statutory obligations or comply with legislation, codes of practice or industry standards such as AS/NZS 3000 (Wiring Rules).

Whilst care has been taken in the preparation of the Rules, Evoenergy does not guarantee that the information contained in the Rules is accurate, complete or up to date at time of publication. To the extent permitted by the relevant legislation Evoenergy will not be responsible for any loss, damage, cost or expense incurred as a result of any error, omission or misrepresentation in relation to the information contained in the Rules.

Note

Printed versions of the Rules are “uncontrolled copies” - the latest version is available on the Evoenergy website (Evoenergy – Web Links).

Copyright

Acknowledgements

Evoenergy wishes to thank the following organisations for their valuable assistance in the preparation of these rules:

- Service and Installation Rules of New South Wales Management Committee
- Queensland Electricity Connection and Metering Manual Committee
- Victorian Electricity Distributors Service and Installation Rules Management Committee

Technical regulatory approval

ACT Government
City and Environment

25/0439963

Mr John Knox
Chief Executive Officer
ActewAGL
GPO Box 366
CANBERRA ACT 2601
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Dear Mr Knox

Approval of – Revised Evoenergy Electricity Service and Installation Rules (version 12)

Thank you for providing Evoenergy's revised Electricity Service and Installation Rules (version 12) to the Utilities Technical Regulation (**UTR**) team on 25 September 2025, to fulfill the obligation outlined at section 4 of the *Utilities (Electricity Service and Installation Rules Code) Determination 2013*.

Following a detailed review of the changes incorporated in the revised document by UTR technical officers, I am advised that version 12 of Evoenergy's Electricity Service and Installation Rules introduces changes aimed at improving clarity and aligning with current standards for definitions, terminology and processes, without introducing new rules. UTR has confirmed its satisfaction with these changes and recommended approval. Based on this advice, I approve Evoenergy's Service and Installation Rules version 12 (Schedule 1).

The Electricity Service and Installation Rules includes a number of references to Evoenergy internal documents, manuals and drawings.

Any future changes to these reference documents that affect the intent or application of the Electricity Service and Installation Rules require Technical Regulator approval. Minor changes that do not significantly affect network connections may proceed without approval, provided Evoenergy consults with UTR in advance.

Should you have any questions, please contact Rudranil RC, Engineering Director, Utilities Technical Regulation on (02) 6207 7428 or via email at Techregulator.utilities@act.gov.au.

Yours sincerely

Josh Rynehart
Head of Access Canberra
City and Environment
26 November 2025

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1 General requirements

1.1 Scope and disclaimer

These Service and Installation Rules apply generally in respect of connection of premises in urban and rural areas to the Evoenergy electricity network. Where the premises are in isolated or undeveloped areas conditions may vary.

Despite the care taken in preparation of this document, Evoenergy does not warrant that it is free of inaccuracy.

Users must exercise their professional judgment to ensure safety and should obtain advice from Evoenergy about any entry in these Rules that they believe may be in error.

Advice can be obtained by telephoning 13 23 86 (Monday to Friday 07:30 – 17:00), however based on type of enquiry, on call person (being non-technical) may not be able to answer the query. It is therefore preferred to send us your queries by email on networkservicing@evoenergy.com.au or StandardsSpecification@evoenergy.com.au with subject titled as “S&I Enquiry”, so it can directed to appropriate areas.

1.2 Purpose of the service and installation rules

Evoenergy is obliged to connect customers to their distribution system under a customer connection contract. The contract stipulates terms and conditions that must be satisfied by Evoenergy and the customer.

To ensure that the electrical installation of a customer can be connected to the distribution system, Evoenergy can describe the requirements of the connection to its system (Service Rules) and compatible requirements of the electrical installation (Installation Rules). The legislative instrument for these rules in the ACT is the Utilities (Electricity Service and Installation Rules Code) Determination 2013.

These Rules provide uniform requirements for electricity distributors, metering providers, contractors and customers throughout the ACT. This has been achieved by:

1. Providing consistent requirements from Evoenergy.
2. Specifying electrical installation requirements as permitted by AS/NZS 3000.
3. Specifying service requirements to promote industry standardisation of systems and practices.
4. Specifying service requirements which comply with the provisions of the relevant ACT Acts, Codes and Regulations.
5. Including recommendations and advisory information which may indicate future requirements of AS/NZS 3000 and legislation.
6. Providing information to the electricity supply industry, metering providers accredited service providers and the electrical contracting industry which enables them to work together to promote standardisation of systems and practices.

1.3 Use of the service and installation rules

Evoenergy’s prime directives with respect to the application of this document are, in order of importance:

1. The safety of personnel who work on the electricity network and to the general public; and
2. To minimise asset loss-of-life, reduced performance, and to prevent damage to electricity network assets; and
3. To minimise disruption to all customers (quality of supply) inclusive of the applicant’s site; and
4. Environmental compliance
5. Evoenergy has adopted these Rules through customer connection contracts.

Where the words **"must or shall**" appear, it indicates that Evoenergy cannot negotiate with the customer on that particular matter.

Where other less definite terminology is used, a degree of flexibility is indicated, and it may be feasible for the customer to negotiate with Evoenergy. Where possible, the customer's preferences will be taken into account. These Rules are designed to achieve safe, reliable and efficient outcomes for both Evoenergy and the customer.

Consideration of safety to customers, electricity workers and the general public are paramount - as well as considerations of potential liability. Should a contravention of these Rules (without an accepted alternative method) occur, Evoenergy is entitled to refuse, suspend or disconnect supply, or require correction of the contravention subject to any resolution achieved by a dispute resolution process.

The Rules are presented in two parts:

1. Section 1 provides the fundamental legislative obligations, definitions, standards, policy conditions and informative statements.
2. Sections 2 to 8 and the Appendices contain detailed design, material and construction information for services, service equipment and protection of this equipment.

These serve to clarify the requirements of Evoenergy to authorised persons, contractors and installation designers.

For the avoidance of doubt, nothing in the Rules is intended to prevent or impede Evoenergy from exercising its rights under the legislation in the management of its distribution network and assets.

Evoenergy for example, may repair, maintain, augment or renew service mains without reference to the rules as it would be managing its network in accordance with jurisdictional regulatory requirements.

1.4 Compulsory requirements

ACT Legislation permits Evoenergy to state its requirements in relation to an electrical Installation of a Customer for connection to its network.

Evoenergy may:

1. Impose conditions on the installation and use of electrical appliances and equipment to prevent or minimise adverse effects on the supply to other customers.
2. Impose conditions on the loading, and the balancing of the load, over the phases of the customer's supply.
3. Require a minimum rupture rating or minimum breaking capacity of the customer's main protection devices.
4. Require the customer to install relays, current transformers and other protection equipment having characteristics to suit Evoenergy's protection system.
5. Require the customer to provide free of cost, for use by Evoenergy, suitable accommodation for transformers, switchgear and other equipment.
6. Make additional requirements, where allowed by AS/NZS 3000.

1.5 Failure to comply with the service and installation rules

In the event of a person failing to comply with the requirements of these Rules, Evoenergy may refuse to connect the installation to the network or may disconnect the installation.

A charge may be made for the reconnection of the installation to the network.

1.6 Definitions

Unless otherwise stated, the terms used in these Rules are as defined in AS/NZS 3000. The following definitions shall also apply.

Term	Definition
Evoenergy Office	For all enquiries and counter transactions: Evoenergy Corner Anketell and Oakden Streets Greenway ACT 2900 Business hours for Office staff are 7.30am to 5.00pm on weekdays.
ACT Government – Electrical Inspectorate	The ACT Government Electrical Inspectorate is the inspecting authority in the ACT and is responsible for inspecting and approving the customer's electrical installation. Contact number: (02) 6207 7775 Email: electrical.inspections@act.gov.au
Access Authority	Any form of authorisation which allows an authorised or instructed worker access to test or work on or near electrical apparatus. Access Authorities are specified in the electrical safety rules (*Evoenergy – Web Links*)
A (Amp)	A unit of electrical current
Authorisation	Permission granted to an individual in writing by an electricity distributor to work on or near an electricity distributor's distribution system
Authorised Worker /Person	A worker with technical knowledge or relevant trade experience who has been approved or has the delegated authority to act on behalf of Evoenergy, to perform the duty concerned. (Sign on, work and receive an Access Authority).
Australian Standard (AS) or Australian/New Zealand Standard (AS/NZS)	A standard published by Standards Australia as current at the time
Basic Connection Application (BCA)	This is an electrical works request for a new, or alterations to, an installation under 70kVA. Most Basic Connection Application works require the completion of a Basic Design Application prior to application. The Basic Connection Application process was previously referred to as a Request For Service (RFS)
Basic Design Application (BDA)	This is a request for Evoenergy to assess the Evoenergy Network and provide a quote for a new, or alteration to, a customer's electrical service where the required capacity is less than 70kVA and the number of premises is under Evoenergy's limit for this connection type. The Basic Design Application process was previously referred to as a Request for Service Marking (RSM).

Term	Definition
Energy Storage System (ESS)	A system consisting of one or more energy storage cells connected in a series, parallel or series-parallel arrangement that can be charged electrically to provide stored electrical charge when needed. The cells may consist of various chemicals – such as lead, nickel or lithium, and depending on the operating requirements, the installation may or may not include a storage system management device for monitoring, controlling and protecting the individual cells and complete system.
CES	Certificate of Electrical Safety
Common Multiple Earthed Neutral (CMEN)	Means an earthing system at distribution substations where the HV earthed system is bonded in a deliberate and permanent way to the local MEN via the local LV earthing system at the substation.
Connection Device	Means a device that forms the physical junction through which electricity is transmitted across a break in electrical conductors. Where the connection device forms part of the electrical installation as defined in Connection Point, it is owned and maintained by the Distributor for connection to the Distribution System (which could be service protection device (SPD) or non-protection device (NPD) depending upon the type of connection).
Connection Point	The definition of Connection Point in these Rules fulfils the requirements of defining the Connection Point in the National Electricity Rules (NER). Means the junction where the Distribution System is connected (by means of a Connection Device) to the Customers Installation. The following situations describe the different types of connections at the Connection Point and reference the relevant diagrams within these Rules: Where electricity is supplied from the distribution system i.e. that is from a substation on public land, the connection point is on the distribution system side of the connection device closest to the distribution system. Refer to Figure 1 and Figure 2. Where electricity is supplied from a distribution substation on relevant land, the connection point is at the electrical installation side of connection device situated at the substation. Refer to Figure 1 and Figure 2. The connection point for a HV customer, or a customer who has entered into a relevant agreement with Evoenergy concerned, is the Connection Point agreed in writing between the customer and Evoenergy.
Consumer's Mains	Consumer's mains are the conductors between the Connection Device and the main switchboard or energy meter and forms part of the customer's electrical installation.
Consumer's Terminals	These are the junction between the conductors of the service line or underground service cable and those of the consumer's mains.
Contractor	Means a licensed electrician who carries out installation work or electrical tests on an electrical installation.
CT	Current Transformer is an electrical device that produces a current in its secondary winding that is proportional to its primary current or load.

Term	Definition
Customer	Is an individual or entity that (either personally or through an agent) applies for, receives or makes use of a connection of an Electrical Installation to Evoenergy's distribution system.
Customer Connection Contract	Is a contract between the network operator and a customer that contains the terms and conditions under which an Electrical Installation of a customer is connected to Evoenergy's distribution system
Customer Installation	Means an electrical installation, owned and maintained by a customer.
Distribution Substation	An electrical installation with HV and LV.
Distribution System	Means Evoenergy electricity power lines, associated equipment and electricity structures that are used to convey and control the conveyance of electricity to or from the premises of customers A distribution system excludes the transmission network and the rail network electricity system.
"Easement in Gross"	Means, in relation to a business providing a public utility service, an easement registered in the name of a person or body for the purposes of that business.
Electrical Installation	As defined by the Electricity Safety Act 1971.
Electrically Un-Protected	Means where the conductors [Consumer's mains] from the connection point are not protected by customers protection and are only protected by the distribution protection equipment
Electricity Distributor (Distributor)	Means Evoenergy.
Energisation	Energisation is the act of the operation of switching equipment or a service protection device, which results in there being a non-zero voltage beyond a connection point (supply of energy to the end customer).
High Voltage (HV)	High Voltage nominally above 1000 Volts AC or 1500 Volts DC.
High Voltage Installation Responsible Person (HVI)	The owner, controller or operator of a high voltage (HV) installation i.e. taking supply at voltages higher than 1,000V AC or 1500V DC.
Inverter	A device that uses semiconductor devices to transfer power between a D.C. source or load and an A.C. source or load.
Islanding	Any situation where the electrical supply from the distribution network is disrupted and one or more inverters maintains any form of electrical supply, be it stable or not, to any section of that distribution network
kVA	kilo Volt Amp; the measure of Total Power.
kVAr	kilo Volt Amp Reactive; the measure of Reactive Power
kW	kilo Watt; the measure of Real Power.
kWh	kilo Watt Hour.

Term	Definition
Main Switchboard (MSB)	A switchboard from which the supply to the whole electrical installation can be controlled.
Metering Equipment	Equipment used to measure the electricity consumption at a metering installation as defined by the National Electricity rules. This does not include load control equipment.
Meter Protection Device (MPD)	A fuse which complies with Clause *5.8* or other protection and isolation device located on the un-metered side of the installation, intended for the isolation and protection of the meter and its associated customer installation. When MPD is separately installed to an SPD inside the network boundary, the MPD is owned and maintained (including the fuse cartridge and fuse holder) by the customer for connection to the energy meter.
Metering Provider	An entity registered by AEMO under the National Electricity Rules to install metering equipment.
'Must' and 'Shall'	For the purposes of these requirements, the words 'must' and 'shall' indicate a mandatory requirement.
National Electricity Rules (NER)	The Rules made under the National Electricity Law to control the operation of the National Electricity Market.
National Energy Customer Framework (NECF)	The National Energy Customer Framework (NECF) was introduced in the ACT on 1 July 2012.For more information refer to: *http://www.aemc.gov.au/Energy-Rules/Retail-energy*
Network	Evoenergy's electrical distribution system
Network Area	Where an installation (or Dual Tenancy) is supplied directly from a pit or pillar, the clearly defined area on a customers' main switchboard or POE where Evoenergy's Service Protection Devices and dedicated Neutral link are installed.
Network Boundary	The demarcation point, where Evoenergy's electrical network ends and the customer's electrical installation begins. For further details, refer to Appendix "C".
Network Charges	For the purpose of these requirements, 'Network Charges' shall refer to the costs invoked by Evoenergy for the use or augmentation of the distribution network
NMI	National Meter Identifier. A unique identifier for each meter in the National Electricity Market (NEM).
Non-Protection Device (NPD)	The nearest network side connection device to the customer's electrical installation which provides isolation (without protection) and complies with Clause *5.9*.

Term	Definition
Overhead Service	Means overhead or aerial conductors, installed by Evoenergy operating at not more than 600/1000V, between the electricity distribution system and the connection point/point of attachment on the customer's premises. Refer to Figure 1. The overhead service comes under the ownership, control and maintenance of Evoenergy as part of its network. The overhead service includes the strain clamp at the Point of Attachment but does not include the bracket or other form of anchor at which the overhead service is terminated or the connection device.
Point of Attachment (POA)	This is the point at which the aerial conductors of the service line are attached to a customer's building, post, pole, or structure. It is also the point or points, at which the mechanical loads of overhead conductors of an overhead service or overhead consumer's mains are terminated on a customer's building, pole or structure. The POA forms part of an electrical installation. Refer to Figure 1.
Point of Common Coupling (PCC)	The point on a distribution system, electrically nearest to a particular customer or installation, at which other customers or installations are, or could be, connected. The electrical assets on the installation side of the Point of Common Coupling are dedicated for the use of that electrical installation. (It is possible for the point of common coupling to be within a High Voltage system).
Point of Entry Cubicle (POE)	A cubicle serviced by Evoenergy service cables for non-domestic commercial, multi-residential or industrial installations.
Proponent	A person proposing to become a generator (the relevant owner, operator or controller of the generating unit or their agent)
PV	Photo Voltaic system
Relevant Land	Means land to which the customer concerned, or the electrical installation owner has a legal right of access for the purpose of constructing or maintaining the electrical installation.
Repair	Means restoration to an acceptable operating or usable condition, a broken, damaged, failed device or item of equipment. e.g. 'like for like' replacement.
Rules	Means Evoenergy Service and Installation Rules.
Secondary Residence	Means a dwelling in addition to the main residence. It can be attached or detached from the primary building
Service Equipment	The distributor's equipment associated with the supply, control and non-revenue metering of electricity to a customer. Includes associated equipment that may/may not be provided by the distributor to meter and control (meters, CT & VT transformers, communication equipment and wiring), to protect (service protection fuses), support (brackets), connect (neutral links, service connection boxes) and secure (security seals) the service, meters and control devices.

Term	Definition
Service Fuse	Safety / protective assembly in electrical installations, designed to interrupt fault currents between the main switchboard and the network. Generally, refers to a Service Protection Device (This definition is obsolete but is retained to allow references from external documents to exist without ambiguity). Refer to Figure 3.
Service Fuse: Base / Carrier	A serive fuse base is a device that securely holds a fuse holder in place within a circuit. It's designed to provide a reliable connection for the fuse and ensuring proper electrical contact. Fuse bases often incorporate features to enhance safety, such as insulation to prevent accidental contact with live components, and secure mounting methods to ensure the fuse is properly held in place. Refer to Figure 3.
Service Fuse: Fuse (Cartridge / Link)	A service fuse cartridge/link is a safety or protective device consisting of a strip of wire / link that melts and breaks an electric circuit if the current exceeds a safe level. They can be in different styles such as blade, bolt down, cartridge, link, rectangular, threaded, etc. Cartridge (ferrule) fuses have a cylindrical body terminated with metal end caps. Linked / bolted fuses for low voltage power circuits may have blade or tag terminals or NH type which may be secured to a fuse holder and base. Refer to Figure 3.
Service Fuse: Holder	A service fuse holder is a device that securely holds a service fuse cartridge in place, which needs to be mounted on the service fuse base or carrier within an electrical circuit. It's essentially a container that protects the fuse and provides a safe and reliable way to connect it to the circuit. Service fuse holders are typically made of non-conductive materials like plastic to prevent electrical shocks. Refer to Figure 3.
Service Protection Device (SPD)	The nearest network side connection device to the customer's electrical installation which provides protection and complies with Clause *5.8* and *5.9*.
Service Riser Bracket	A type of service bracket attached to a building or structure to provide a higher point of attachment for an overhead service cable than a standard service bracket. It does not include a strut or extension of a building. A service riser bracket attached to a building or structure inside the block boundary is owned and maintained by the customer.
Standard Service Bracket	A standard service bracket is a bracket attached to a building or structure to provide a point of attachment for an overhead service at the point where the bracket is fixed to the building or structure, e.g. house bracket, pole bracket and rafter bracket. A standard service bracket attached to a building or structure inside the block boundary is owned and maintained by the customer.
Transmission System	Means any electricity power lines and associated equipment and electricity structures that are a transmission system operating at 66kV, 132 kV and above.
Underground Service	Means underground cables, operating at a voltage not exceeding 600/1000 volts, between the electricity distribution system and the Connection Point. Refer to Figure 1.

Term	Definition
	The underground service comes under the ownership, control and maintenance of Evoenergy as part of its network. The underground service does not include the conduit, structure or enclosure protecting or enclosing the cable that is situated on relevant land.
Underground Supply from an Overhead System (UG/OH)	This is a term used where a customer is supplied by an underground service from an overhead distribution system.
Un-metered supply	An authorised supply which is un-metered. It can refer to supplies located in public places that are un-metered and of LV single-phase up to 10 Amps or otherwise agreed by Evoenergy, where an accurate assessment of energy usage can be made.
Urban Classification	Means areas where the majority of land is zoned for residential and / or commercial and / or industrial use within a town or city type of area which is contiguous with other similar town or city areas with an aggregated population of at least 5,000 people.
V or kV	Volt or kilovolt; the measure of Electrical Potential.
Voltage Transformer (VT)	Electrical device that produces a voltage in its secondary winding that is proportional to its primary voltage.
Zone Substation	An electrical installation transforming voltages from 132kV or 66kV to 22kV or 11kV.

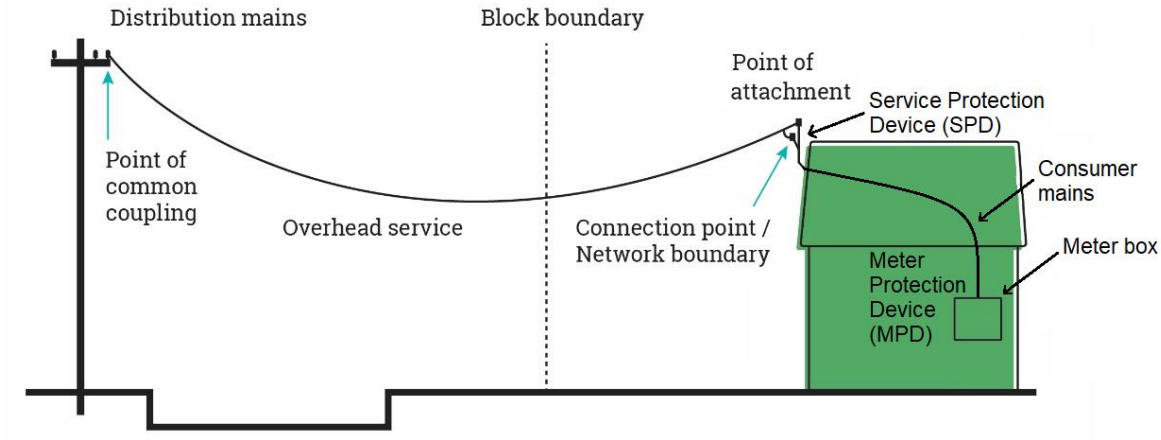

Figure 1. General Supply from Overhead Distribution Mains

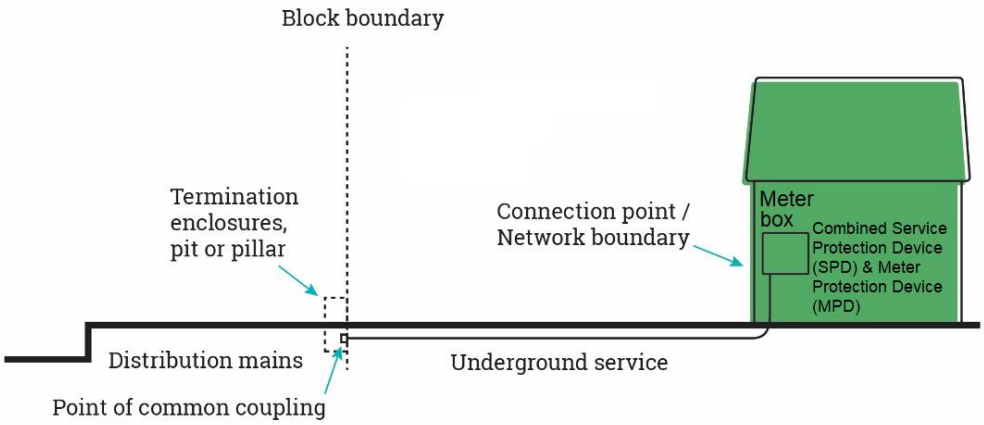

Figure 2. General Supply from Underground Distribution Mains

Figure 3. Service Fuse

1.7 Referenced Acts, ENA guidelines and standards

1.7.1 Acts and regulations

- Electrical Safety Act 1971
- Electrical Safety Regulation 2004
- Utilities Act 2000
- Utility Networks (Public Safety) Regulations 2001
- Utilities (Technical Regulation) Act 2014
- Electricity Service and Installation Rules Code Determination 2013
- Electricity Network Boundary Code Determination 2013
- Electricity Distribution Supply Standards Code Determination 2013
- Work Health and Safety Act 2011
- Work Health and Safety Regulation

- National Electricity Rules (Chapter 5)

1.7.2 Industry guidelines

- ACT building and construction industry safety handbook
- Evoenergy Electrical Safety Rules

1.7.3 Energy networks association guidelines

ENA guide to electricity	
ENA Doc 2016	ENA EMF Management handbook
ENA Doc 017-2008	ENA industry guideline for the inspection, assessment and maintenance of overhead power lines
ENA Doc 031-2011	ENA national guideline for mobile plant earthing
ENA Doc 016-2006	Guideline for the management of risks when working alone
ENA Doc 005-2006	Joint use of power poles – model agreement
ENA Doc 001-2019	National electricity network safety code
ENA NENS 05-2006	National fall protection guidelines for the electricity industry
ENA Doc 024-2010	National guideline for management of tools and equipment used in the electricity supply industry
ENA NENS 08-2006	National guidelines for aerial surveillance of overhead electricity networks
ENA NENS 10-2005	National guidelines for contractor occupational health and safety management
ENA NENS 07-2006	National guidelines for manual reclosing of high voltage electrical apparatus following a fault operation (manual reclose guidelines)
ENA Doc 015-2006	National guidelines for prevention of unauthorised access to electricity infrastructure
ENA NENS 03-2006	National guidelines for safe access to electrical and mechanical apparatus
ENA NENS 04-2006	National guidelines for safe approach distances to electrical and mechanical apparatus
ENA NENS 09-2014	National guidelines for the selection, use and maintenance of personal protective equipment for electrical hazards
ENA Doc 008-2006	National guidelines on electrical safety for emergency service personnel
ENA Doc 014-2006	National low voltage electricity network electrical protection guideline
ENA Doc 011-2006	Pole supply and performance specification
ENA EG1-2006	Substation earthing guide

1.7.4 Industry standards

Industry standards	
AS HB100	Coordination of power and communications
AS/NZS 1026	Impregnated paper insulated cables for electricity supply at working voltages up to and including 19/33kV

Industry standards	
AS 1055.1	Acoustic – Description and measurement of environmental noise – General procedures
AS/NZS 1158	Lighting for roads and public spaces
AS 1243	Voltage transformers for measurement and protection
AS/NZS 1269.1	Occupational noise management-Measurement and assessment of noise emission and exposure
AS 1284.4	Electricity metering - Socket mounting system
AS 1397	Steel sheet and strip - hot dip zinc-coated or aluminium/zinc-coated
AS/NZS 1429.1	Electric cables – polymeric insulated
AS 1657	Fixed platforms, walkways, stairways and ladders - Design construction and installation
AS 1767	Insulating oil for transformers and switchgear
AS/NZS 1891.1	Industrial fall-arrest systems and devices
AS 1940	Storage and handling of flammable and combustible liquids
AS/NZS 2053	Conduits and fittings for electrical installations
AS 2067	Substations and high voltage installations exceeding 1kV ac
AS 2279	Disturbance in mains supply networks
AS 2374	Power Transformers
AS 2467	Maintenance of Electrical Switchgear
AS/NZS 2648.1	Underground marking tape- Part 1 Non-detectable tape
AS 2865	Confined spaces
AS/NZS 3000	Wiring Rules
AS/NZS 3012	Electrical installations - Construction and demolition sites
AS/NZS 3439	Low Voltage switchgear and control gear assemblies
AS/NZS 3760	In-service safety inspection and testing of electrical equipment
AS/NZS 3820	Essential Safety Requirements for low voltage electrical equipment
ISO 45001	Occupational health and safety management systems – Requirements with guidance for use
AS/NZS 4836	Safe working on or near low-voltage electrical installations and equipment
AS/NZS 4777.1	Grid connection of energy systems via inverters - Installation requirements
AS/NZS 4777.2	Grid connection of energy systems via inverters – Inverter requirements
AS 5804	High voltage energised working
AS/NZS 7000	Overhead Line Design- Detailed Procedures
AS 60038	Standard Voltages – Alternating (50Hz)
AS 60044.1	Instrument transformers - Current transformers
AS/NZS 60079.0	Explosive atmospheres – Equipment – General requirements

Industry standards	
AS/NZS 60079.1	Explosive atmospheres – Equipment protection by flameproof enclosures ‘d’
AS 60422	Mineral insulating oils in electrical equipment - supervision and maintenance guidance
AS 60269.1	Low-voltage fuses – General requirements
AS 60529	Degrees of protection provided by enclosures (IP Code)
AS/NZS 60947	Low-voltage switchgear and control gear
AS 60974.1	Arc welding equipment - Welding power sources (IEC 60974-1:2000, MOD)
AS/NZS 61000	Electromagnetic Compatibility limits (EMC)
AS 61000.3.100	Electromagnetic Compatibility limits (EMC)-Steady state voltage limits in public electricity systems
AS 61000.3.2	Electromagnetic Compatibility (EMC) - Limits - Limits for Harmonic Current Emissions (equipment Input Current =16 A Per Phase)
AS 61000.3.4	Electromagnetic Compatibility (EMC) – Limits - Limitation of Emission of Harmonic Currents in Low-voltage Power Supply Systems for Equipment with Rated Current Greater Than 75 A
AS 61000.3.5	Electromagnetic Compatibility (EMC) – Limits - Limitation of Voltage Fluctuations and Flicker in Low-voltage Power Supply Systems for Equipment with Rated Current Greater Than 75 A
AS 61000.3.11	Electromagnetic Compatibility (EMC) – Limits - Limitation of Voltage Changes, Voltage Fluctuations and Flicker in Public Low-voltage Supply Systems - Equipment with Rated Current Less Than or Equal To 75 A
AS 61000.3.12	Electromagnetic Compatibility (EMC) - Limits - Limits for Harmonic Currents Produced by Equipment Connected to Public Low-voltage Systems with Input Current >16 A And ≤75 A Per Phase
AS/NZS 61439	Low-voltage switchgear and control gear assemblies
IEC 60867	Insulating liquids – Specifications for unused liquids based on synthetic aromatic hydrocarbons
IEC 61230 Ed2.0	Live Working – Portable equipment for earthing or earthing and short-circuiting
AS 62271.200	High-voltage switchgear and control gear - A.C. metal-enclosed switchgear and control gear for rated voltages above 1 kV and up to and including 52 kV
AS/NZS 61386	Conduit systems for cable management

1.7.5 Evoenergy standards

Evoenergy standards	
PO0843	Evoenergy HV EG Technical Requirements
PO0844	Evoenergy LV EG Technical Requirements
PO0845	Evoenergy Micro EG Technical Requirements
PO0842	Evoenergy EG Connection Requirements

PO07174	Evoenergy LV Point of Entry Cubicle Requirements
PO07127	Evoenergy Distribution Earthing Design Manual
PO07420	Evoenergy Underground Distribution Design Manual
PO07132	Evoenergy Overhead Line Distribution Design Manual
PO07218	Evoenergy Standard for Integration of non-Evo Assets on the Evo Network
PO0793	Evoenergy Civil Works Manual Volume 2

Note: The referenced Evoenergy technical standards in these rules are available upon request.

1.7.6 Energy market administrators contact details

- Australian Energy Market Commission www.aemc.gov.au
- Australian Energy Regulator www.aer.gov.au
- Australian Energy Market Operator www.aemo.com.au

1.8 Area of Evoenergy network

The Evoenergy electricity distribution network covers customers within the area known as the Australian Capital Territory and small adjacent areas in New South Wales. For more details refer to Evoenergy annual reports on the Evoenergy website.

1.9 Safety and environmental risk management

In all activities undertaken, the safety of our employees, contractors, customers and the community are paramount. Safety is our number one value and there is a commitment to ensuring that "safety must come first" to achieve a no injuries workplace.

In accordance with safety and environmental legislative requirements Evoenergy has developed Policies, Standards and Work Practices that its workers are required to follow to assess the safety and environmental risks associated with the carrying out of work for themselves, other workers, customers and the community. Appropriate action is then taken to mitigate these risks.

We trust that electrical contractors and persons in control of sites will appreciate that our workers will not undertake any work in a situation where there are uncontrolled risks inconsistent with our safe systems of work

1.9.1 Safety when dealing with Asbestos

Asbestos was commonly used in the building industry prior to 1988 and if a premise was built before this time, then the electrical meter board and conduit supplying the service cable may contain asbestos. If meter board has been identified as possibly containing asbestos a caution sticker may have been placed on the board or inside your meter box.

Authorised personnel and electrical contractors must not carry out work that disturbs the integrity (e.g. drilling, cutting) of existing meter or switchboard panels and conduits that may contain asbestos, within electrical installations, without taking suitable precautions. Information in this regard is available from the WorkSafe ACT website which lists relevant industry safety guidelines and model procedure.

The developer, electrician, homeowner or retailer requesting Evoenergy, for any type of work on these premises that may contain asbestos must identify the presence of the Asbestos on Request for service form as “Additional comment from Contractor (if any)”.

Evoenergy adheres to strict safety procedures to manage the risk of any potential exposure to our employees. If Evoenergy detects any (minor / major) disturbance on asbestos containing panels / conduits, works will not be undertaken by Evoenergy until all asbestos has been removed or dealt with appropriately according to WorkSafe ACT and documentation from a licensed asbestos removalist / assessor is provided stating the asbestos has been removed from the site or has been appropriately dealt.

1.10 Standard customer contracts

These Rules are to be read in conjunction with the relevant customer contracts covering connection to the Evoenergy electricity network and the on-going provision of electricity through that connection. These contracts apply to all customers connected to (or intending to be connected to) the network and do not relieve customers of any obligations outlined in these Rules.

The details of the contract(s) that apply can be found on the Evoenergy website at www.evoenergy.com.au.

1.11 Guidelines for builders

Evoenergy has developed guidelines to assist builders and other contractors in the building industry understand how Evoenergy will electrically service new, extended or redeveloped residential properties.

Specifically, the guidelines indicate where Evoenergy will nominate an underground service to be installed in areas that are reticulated with overhead mains. In some circumstances there may be exceptions. Therefore, in accordance with the Rules, before any building activity commences any change to existing electrical services due to extensions, or any new electrical service connection required due to a redevelopment must be specified by Evoenergy.

1.12 Agreement to pay charges

Where the customer is required to pay for any charge in accordance with these Rules, the customer shall, if requested, sign an acceptable written agreement to Evoenergy before the work is commenced.

1.13 Charges for supply of electricity

Customers must contact their nominated electricity retailer and enter into a contract for the supply of electricity. Final energisation of the site shall not take place until the retailer notifies Evoenergy that they have a contractual arrangement with the customer in place.

1.14 Network charges

The Australian Energy Regulator is responsible for the economic regulation of distribution services provided by Evoenergy. For further information, please refer to:
https://www.evoenergy.com.au/residents/pricing-and-tariffs

1.15 Warning against premature expenditure

No expense should be incurred by the prospective customer until formal application has been made and advice received as to the conditions under which Evoenergy would agree to the connection of the load to the network and the provisions to be made by the customer for the installation of Evoenergy's equipment on the premises.

Adequate notice of the customer's requirements should be given, particularly where the load is relatively large or the supply is required in a remote location, as considerable time may be necessary for negotiations and construction.

Matters which may affect the design of a building project, such as the determination of the position of service equipment, the point of attachment for the service line or the point of entry of the underground service cable, and the position of a substation on the premises, should be settled at an early stage.

When contemplating the connection of equipment, particular care should be taken to ascertain Evoenergy's requirements relating to the prevention of interference with the supply to other customers.

1.16 Application for connection to the electricity network

Formal written application for connection of a new installation, or for an addition or alteration, should be lodged as soon as the decision to proceed is made, together with payment of any charges before the connection will be made.

Evoenergy requires written notification for all alterations to service arrangement, point of attachment, point of entry locations, uninterruptible power supply installations, motor generator installations or embedded generators including PV installations.

All application forms must be lodged online through https://www.evoenergy.com.au/connections.

1.16.1 Basic Design Application (BDA) and Basic Connection Application (BCA)

A basic design application (previously knowns as request for service marking (RSM)) form should be lodged with Evoenergy where:

- Additional load requires an existing service to be upgraded from single-phase to three-phase 16mm^2 service; or where premises requires a new Connection Point or relocation of an existing 16mm^2 service.
- A relocation of existing domestic overhead service to underground 16mm^2 service is required.
- A new 16mm^2 service connection from existing network assets to non-domestic, unmetered load and other utility service connection points is required, subject to supply voltage compliance at connection point
- An alteration of existing 16mm^2 or similar service to non-domestic & unmetered loads is required.

A basic connection application (previously known as request for service application (RFS)) form must be submitted prior to completion of building work to give Evoenergy time to install the underground service cable and associated equipment. A typical timeframe for completion of a BCA by Evoenergy is up to 25 business days from the time of a complete application (including invoice payment).

1.16.2 Provision to be made for service equipment

Reference should be made to Section 5 as appropriate, for details of the facilities which must be provided by the customer.

These facilities, in the case of new installations, will include provision by the customer of a panel, with all wiring for the connection of meters and all associated equipment and control equipment.

The provision of the service equipment and the installation of the consumer's mains should be carried out as soon as the building work is sufficiently advanced. Evoenergy must be notified by the submission of basic connection application (BCA) to enable the scheduling of the installation of the service equipment.

1.17 Necessity for employing a licensed person

Legislation requires that all electrical wiring work be carried out by a person licensed as prescribed and, in addition, prohibits persons other than licensed electricians from undertaking such work.

Therefore, where the customer is responsible for electrical wiring work required under these Rules, a licensed electrician shall act as the agent of the customer. The holder of an appropriate grade of electrician's license may carry out the installation of wiring in a premise of which the holder is the owner or bona fide occupier.

1.18 Industry training and accreditation

The ability of new businesses to install, maintain and read electricity meters will provide opportunities for electricians to undertake work on the new smart meters. To ensure these electricians have the appropriate skills new training and accreditation requirements will exist in the ACT.

In addition to the appropriate ACT Government issued licence, Evoenergy will also require all electricians wishing to install or maintain smart meters to have appropriate network authorisation.

The Rules allow trained persons to install consumer's mains subject to 2.10.6.

This network authorisation is to ensure that electricians have the necessary information and skills to interact safely with the electricity network and to maintain accountability and consistency across the network.

This training and associated accreditation are be incorporated into Evoenergy Electrical Safety Rules training and involve a focus on network access and the revised Evoenergy Service and Installation Rules. Electricians are required to have their authorisation card issued by Evoenergy available all times while working on Evoenergy's network.

Evoenergy requires electricians to complete an annual refresher course to maintain their authorisation

1.19 Compliance with the wiring rules

Legislation requires work carried out on a customer's installation to comply with AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules).

The Wiring Rules set down the essential requirements for ensuring safety from fire and shock and apply to all electrical installations on customers' premises.

Persons carrying out such work are required to be licensed with the ACT Government as electricians and to provide the ACT Government with a Certificate of Electrical Safety within 14 days of the completion of this work.

1.20 Connection of installations following completion of wiring work

Evoenergy or a network authorised worker must not energise an installation to the electricity network until that work has been approved for energisation. In the ACT, evidence of this approval is normally provided by the issue of a Certificate of Electrical Safety by Electrical Inspectorate for less than 1MW installations. For installations from 1MW to 30MW, provision of service operating certificate must be granted by the Technical Regulator prior to energisation of the installation. Utilities Technical Regulation is responsible for assessing operating certificates.

For installations in areas outside ACT Government jurisdiction Evoenergy require a certificate of electrical safety or equivalent prior to any connection. Refer to 1.24.

Energisation of the customers' new electrical installation to the electricity distribution network via the metering provider's meter shall not occur until evidence that there is a relevant retail supply agreement, and a completed and approved ACT Government inspection is confirmed. The request for energisation comes from the retailer.

Confirmation must be sought by evidence of the Authority's self-adhesive label signed off and dated at the customer's metering enclosure, POE or at the combined meter apparatus and installation equipment at the main switchboard.

If no such label is present the installation must remain disconnected from the electricity distribution network.

The only exception to this requirement is residential (NCC Building Class 1 and 10) PV systems and Battery Energy Storage Systems charged directly by a PV system.

Note:

1. The licensed electrician must gain prior approval from Evoenergy to connect a grid connected inverter to their network.
2. Connection of an installation shall not be regarded as implying compliance with any specification or legislation, nor in any way as giving an assurance of quality.

1.20.1 Servicing appointments

In certain circumstances it may be necessary for the licensed electrician to arrange in advance for servicing work to be conducted at an appointed time. Work requiring appointments include re-positioning or replacement of metering enclosures and service mains.

In such cases, an appointment must be made in advance at Evoenergy's offices in Greenway.

It is essential that any such appointment be made only when it is known that all the necessary preliminary matters have been arranged: that is, the service equipment is satisfactory, any charge has been paid and the installation will be completed before the time of the inspection. An application (BCA)

form shall be submitted at the time of making the appointment, and a Certificate of Electrical Safety must also be submitted to ACT Government.

1.20.2 Work outside normal working hours

In some circumstances, Evoenergy may agree to a customer's and/or electrical contractor's request to carry out certain work outside normal working hours. Written confirmation by the customer and/or the electrical contractor to pay the cost involved is required in addition to a letter stating that all customers affected are aware of and have agreed to outage times if required. This confirmation must be received by Evoenergy at least three working days prior to the commencement of works.

1.20.3 Separation of supply

When a contractor divides an existing installation into separate installations, serving two or more occupancies, the contractor must make an appointment for this work to be carried out. Such change must be in accordance with Section 6 of this document.

1.20.4 Installation defect fee

An Installation Defect fee applies when Evoenergy has to revisit a site, necessitated by obstructed access or non-compliance with the Service and Installation Rules, or a failure to have the installation inspected by the Electrical Inspectorate prior to the appointment. This fee is approved by the Australian Energy Regulator (AER) and is published on the Evoenergy website (Evoenergy – Web Links).

1.21 Connection of alterations and additions

Legislation requires that, except with the permission of the ACT Government, a person shall not connect to the electricity network any consumer's installation or any addition or alteration thereto, prior to its inspection by ACT Government Electrical Inspectorate.

Alterations can be energised provided the CES for the installation is received by Evoenergy within fourteen (14) days of completing the work.

1.22 Reconnection of idle installations

Legislation requires that a person shall not connect to the electricity network any customers installation that has been disconnected from the network for a period greater than six months, prior to inspection and authorisation of that installation by ACT Government Electrical Inspectorate.

Disconnection may have been performed by the following methods:

1. Physically, for example isolation at main switch, meter, or service protection device.
2. Remotely, for example isolation by smart meter.

Installations disconnected from the electricity network can be energized provided the CES for the installation is received by Evoenergy within fourteen (14) days from the inspection.

1.23 Interference and damage to Evoenergy's equipment

ACT Legislation prescribes penalties for interfering with, or obstructing access to, Evoenergy's equipment. A customer may be held liable for damage to Evoenergy's equipment installed on the premises.

1.24 Alternative connection arrangements

These Rules establish the requirements for connection to the electricity network. Customers can propose alternative arrangements for connection to the network outside the scope of these Service and Installation Rules. Any alternative arrangements proposed must be submitted, in writing, to the Group Manager – Strategy & Operations, at the address shown below in 1.26.

The Group Manager - Strategy and Operations will determine the acceptability of the proposed alternative connection arrangement within 15 business days of receipt of the written proposal.

1.25 ACT ombudsman - ACAT

Any customer dissatisfied with a decision made by the Group Manager – Strategy & Operations concerning an alternative connection arrangement should, in the first instance, refer the matter to the General Manager – Energy Networks. If the matter remains unresolved, the customer may have the right to request the ACT Civil and Administrative Tribunal (ACAT) involvement for a resolution.

1.26 Correspondence

Any correspondence with Evoenergy in connection with these Service and Installation Rules should be addressed to:

Group Manager – Strategy and Operations

Evoenergy

GPO Box 366 Canberra ACT 2601

1.27 Publication and revision

The revision, development and publication of these Rules are administered by the Evoenergy. The Utilities Technical Regulator approves all rule changes.

Although changes to regulations are usually the catalyst for revisions, users and interested parties are invited to provide comment and suggestions to assist further development of the Rules at any time.

2 Supply arrangements

2.1 System of supply

The electricity supplied by Evoenergy at the point of supply is in the form of alternating current of approximately sinusoidal waveform at a frequency of 50 Hertz.

The nominal supply voltage is 400/230 volts from three-phase 4 wire systems. Steady state phase-neutral low voltage at the customer's point of supply is maintained at single-phase 230V +10%/-6% in accordance with Australian standards AS 60038-2012 – Supply voltages and AS 61000.3.100-2011 – Steady state voltage limits in public electricity systems. Supply is also available at high voltage, which is normally 11,000 volts.

Evoenergy may superimpose control voltages on the normal supply voltage.

2.2 System earthing

The neutral conductors of the supply system are solidly earthed. For the purposes of the AS/NZS 3000 - Wiring Rules, it shall be regarded as the Multiple Earthed Neutral (MEN) System. For further details refer to 6.2.4.

Electricians are required to take note of presence of rail network in Canberra region. In order to mitigate the risks associated with the transfer of DC negative return current into the nearby MEN network, earthing system of normal electricity supply system must be separate from the rail network earthing. For further information and or advice please contact Evoenergy.

2.3 Prospective fault current and service protection devices

The installation must be designed to withstand, without damage, the maximum currents, which may occur under fault conditions such as a short circuit.

Unless otherwise advised in writing by Evoenergy, the maximum (three-phase symmetrical) prospective short circuit current for one (1) second, at the customers terminals where supply is at 400/230 volts from street mains, may be taken as:

1. Suburban residential areas

   a. 10,000 Amps (10kA – for Three phase installation)

   b. 6000 Amps (6kA – for Single phase installation)

2. Multi- residential (four or more units), commercial and industrial areas - 30,000 Amps (30kA).

Lower values of prospective short circuit current will apply in installations, which are remote from a substation or supplied from a substation of small capacity.

Higher values of prospective short circuit current (40kA or greater) may apply where supply is direct from a substation of large capacity. Customers shall confirm prospective fault current values with Evoenergy on case-by-case basis including two and three transformer chamber substations.

In the case of supply at high voltage, customers will be advised of the values following receipt of an application. It is the customer's responsibility to ensure that there is low voltage switchgear with sufficient protection to ensure that a fault within the customer's facility or installation does not interfere with other customers connected to the network. This may require the installation with a Service Protection Device (SPD) with appropriate protection settings.

Note: Consumer's mains in directly metered installations are protected by a service fuse of up to 100 Amps rating. The ACT Government requires that consumer's mains be a minimum size of 6mm^2 to avoid damage to the insulation under fault conditions.

2.3.1 Types of service protection devices

Evoenergy shall provide a service protection device at the Point of Supply or elsewhere. If provided, the protection device will generally be one of the following:

Service Capacity Required	Protection Device
Not exceeding 80 Amps per phase	80 Amp HRC fuse
80 up to 100 Amps per phase	100 Amp HRC fuse
Above 100 Amps per phase	Refer to Evoenergy

Table 1. Service protective device

Note: Evoenergy may vary the service protection device or rating. The customer may be required to contribute to the cost of alternative protection devices.

2.3.2 I²t characteristics of LV fuses

Characteristics of LV fuses used by Evoenergy as service protection devices are given in AS 60269.1 "Low Voltage Fuses – Part 1: General requirements". Pre-arcing I^2t characteristics of fuses conforming to AS 60269.1 are as follows:

Fuse Rating (I_n for "gG" & I_{ch} for "gM")	Range of Operation	
	Min	Max
	I^2t_{min} 10^3 x (A^2s)	I^2t_{max} 10^3 x (A^2s)
80 Amp	16	46
100 Amp	27	86

Table 2. Pre-arching I^2t values at 0.01 seconds for "gg" and "gm" fuse links

Note: Although at times an Evoenergy service fuse may provide protection on the consumer's mains from overload and short circuit, the primary purpose of the service protective device is to prevent detrimental effects on the distribution system.

2.3.3 Co-ordination of protective devices

The protective devices forming part of an electrical installation should operate in such a manner that a fault in the installation is unlikely to activate protective devices installed in the distribution system. In order to achieve this, Evoenergy will require all protective devices to be coordinated or graded with its service protection device(s).

2.4 Number of services

In general, Evoenergy does not approve a supply confirguation which results in more than one source of supply into a single block. Exceptions may apply to:

- Temporary supply arrangements for construction, where the construction supply is to be removed at the completion of works on site, or
- Commercial EV charging installations, or
- Large blocks where Evoenergy network configuration results in benefits from more than one source of supply.

Customers shall request these arrangements which may be either temporary or permanent and only where segregation between supplies can be established and maintained. Refer to 2.6 for further details.

Evoenergy shall not approve dual supply for a standard non multi-premises residential block. If capacity is required for EV at a single residential block, then upgrade of the supply cable through a project shall be required. Where a premises is in a unit/townhouse complex and each is fed via individual service cables, these shall

be treated as a single residential block in regards to dual supply. Any load increases for individual units or the house power shall follow the projects process and supply cable capacity increased if/as required.

2.5 Dual supply application process

Customers requesting a temporary dual supply during construction or requesting permanent dual supply for electrical vehicle charging must complete the relevant form and submit all required attachments at time of application:

- Application for Dual Supplies at Construction Sites form
- Application for Dual Supplies for EV Connection form

Customers shall also note that prior to energisation of the additional supply they are required to provide:

- Photos of the “Dual Supply” sign on site
- Supply of notice sent to all staff advising of the dual supply configuration

2.5.1 Technical review

Evoenergy shall review the documentation provided. This review is focused on the proposed arrangement of the dual supply points and how risks are mitigated on site.

Specific attention shall be made to:

- Segregation of supplies, ensuring that no paralleling can occur on site.
- Impacts of a dual supply arrangement on any previously approved, under design, or under construction works Evoenergy are undertaking on site.

Assessment of applications shall be made in line with Safety in Design. Once satisfied that the technical requirements are met and it is safe to have dual supply, Evoenergy shall sign off the application sending a copy to the customer.

If the risks cannot be mitigated (such as segregation of existing and additional supplies is not enough and there is no protection on existing and additional supplies being paralleled), then Evoenergy shall advise the risks to the customer and may not proceed with the additional supply project.

2.5.2 On site works

Once the application is approved and the site is ready for connection of the additional supply, an Evoenergy field worker shall be engaged to undertake on site energisation works. Prior to energisation of the additional supply the field worker shall:

- Confirm, to the best of their ability, that the site is in the physical state approved for the dual supply
- Witness, and document if required, the “Dual Supply” sign on site
- The notice sent to all staff advising of the dual supplies.

Once satisfied the field worker shall energise the additional supply through normal commissioning processes.

2.5.3 Small scale development with supply ≤ 100 Amps

In a small-scale development, the developer may request for permanent supply, even though the temporary supply has not yet been removed. Evoenergy may proceed with permanent supply (new underground supply) if the site meets both of following conditions:

- Temporary supply has been disconnected (and the only remaining work is for its removal)
- Supply Abolishment form has been lodged for removal of the temporary supply and that works are scheduled.

2.6 Segregation of supplies

Where more than one service is provided, each shall supply clearly defined premises without intermixture or electrical interconnection of the portions, (either directly or by changeover facilities) unless otherwise agreed to by Evoenergy.

Unless the additional service is provided to supply specific equipment, the whole of the installation in any the premises shall be supplied from the same service.

The customer shall affix labels at each main switchboard to define the area or equipment it supplies and to indicate the presence and location of other supplies. A label shall further be affixed to each distribution board to indicate the main switchboard from which it is supplied.

Where more than one service is supplied to a customer's main switchboard no bus-section switches shall be installed between sections of the board supplied from the separate services without approval of Evoenergy.

2.7 Unmetered supplies

Unmetered installations, or Type 7 unmetered supplies to the customer are currently agreed sites for street lighting, traffic signals, traffic control/monitoring devices, pedestrian crossing lights, flood warning systems, telephone booth illumination, electronic parking meters and electronic voucher machines, telemetry stations, cathode protection units and bus shelter route indication devices or similar. To service these installations the customer is required to provide the consumers terminals and suitable facilities above ground as per Evoenergy Drawings 8913-212-01 and 8913-212-02. For more details refer to 6.12 of these Rules.

In the case of street lighting, more details are provided in 6.13 of these rules.

2.8 Temporary installation

Where permanent network supply is available and subject to the payment of relevant charges, Evoenergy will provide a service to a temporary connection point in situations where supply is required for a limited period. 'Appendix A' contains further details on temporary supplies.

2.9 Sources of alternative supply

Where the customer proposes to install an alternative source of electrical supply (see Clause 7.2) for connection to the electrical installation normally supplied from Evoenergy's system, such equipment shall not be installed or connected until notification has been submitted to Evoenergy by way of an BCA (Basic connection application) form. A drawing shall be supplied showing clearly the connections to be made and methods of operation of the alternative supply. BCA form can be lodged online through https://www.evoenergy.com.au/connections.

The approval of Evoenergy shall be obtained before any connections are made. Reference needs to be made to Section 6 regarding minimum requirements applicable to the customer's installation.

2.10 Evoenergy substations on customers premises

2.10.1 Method of supply

The method of supply to large or isolated installations shall be determined by negotiation between Evoenergy and the customer.

It is sometimes necessary for Evoenergy to install a transformer substation within a customer's premises. Where this occurs Evoenergy retains sole access to the asset.

Where the maximum demand of the installation may exceed 250kVA or the installation is at an isolated location, inquiries shall be made to Evoenergy to determine whether a substation will be required on the premises.

It is the customer's responsibility to obtain all relevant design and siting approvals. The substation location showing clear vehicular access facility must be included in applicable development application information.

2.10.2 Accommodation

Sometimes it is necessary for Evoenergy to increase the capacity of its networks in order to connect a building or premises to the network. If in the opinion of Evoenergy the connection can best be given by installing transformers, switchgear, and other apparatus on the premises which are to be supplied, Evoenergy shall not be required or compelled to connect that building or premises to the network unless the customer provides, free of cost to Evoenergy, a suitable space and enclosure, approved by Evoenergy, within the building or premises to accommodate the mains, transformers, switchgear, and other equipment which, in the opinion of Evoenergy, are necessary to connect the building or premises to the network.

The space or enclosure provided by the customer shall be for the exclusive use of Evoenergy and no other non-associated services or customer owned equipment shall pass through, or be installed in, the space or enclosure. The customer is responsible for the maintenance of the space and or enclosure and the provision of appropriate continuous access to that space or enclosure.

2.10.3 Installation/extension of high voltage mains

Evoenergy will supply, install and maintain the high voltage mains determined by Evoenergy to supply Evoenergy's substations on customer's premises. Charges may be made for any such extension or maintenance of such mains. The customer shall provide satisfactory access to the high voltage mains and provide, install and maintain a conduit or set of conduits, cable pits and any associated facilities required by Evoenergy.

Depending on the location of high voltage cable and/or low voltage cable mains relative to buildings and structures, Evoenergy may require provision of an "*Easement in Gross*" to ensure access is available to the cable routes for installations and maintenance purposes. Evoenergy will advise the customer when this requirement is necessary.

2.10.4 Location of main switchboard

The main switchboard should be installed as close as possible to the substation. In any case the maximum size consumers' mains shall be 2 by 300mm² Cu cables per phase. Permission shall be sought from Evoenergy if larger size cables or 3 or more cables per phase are proposed. Please refer to *6.6.2* for further requirements for consumer's mains.

2.10.5 Use of equipment

Evoenergy may use its equipment installed on the premises to connect to the network any other premises or customer, subject to the requirements of the customer on whose property the substation is located first being met.

2.10.6 Access to Evoenergy's substation and other assets

Where consumer mains are directly run into an Evoenergy asset, such as a padmount or chamber substation, then any physical access to this substation must be organised through the coordination and permission of Evoenergy.

This situation currently exists where a padmount substation is located on the same block and section of site and thus helps reduce the installation costs to the end customer.

Although the network boundary is now located inside the padmount substation, network access and personnel safety remains paramount and Evoenergy will not allow free access to these assets.

2.11 Determination of number of phases of low voltage supply

Except where otherwise advised by Evoenergy the number of phases of low voltage supply which will be provided to an installation or separately metered portion of an installation, without incurring a charge in accordance with *1.12*, shall be as set out in Table 3.

Evoenergy may not provide additional phases to supply instantaneous water heaters, 400-volt single-phase equipment such as welders, X-ray machines, three-phase motors rated at 2.0kW or less, or other polyphase equipment if, in the opinion of Evoenergy, 230-volt single-phase equipment can satisfactorily perform the required function.

Load Category	Number of Phases
Nominal load not exceeding 100 Amps	1 phase and neutral (2 wire)
Nominal load exceeding 100 Amps	three-phases and neutral (4 wire)
Rating of largest motor exceeds 2.0 kW	

Table 3. Number of phases of low voltage supply

The "nominal load" for the purpose of Table 3 shall be calculated on the assumption that all loads will be connected line-to-neutral at 230 volts and shall exclude polyphase instantaneous water heaters. The calculation shall otherwise be in accordance with the method set down in the AS/NZS 3000 Wiring Rules for the calculation of maximum demand in mains and sub-mains, except in the case of multiple domestic installations. In this case, the nominal load of the whole installation shall be taken as the sum of the nominal loads for each domestic unit calculated separately.

2.12 Balancing of the installation

In any installation or separately metered section supplied by multiple phases, the load must be balanced so that, at peak demand, the current in any active conductor does not exceed that in another active conductor by more than 25 Amps.

However, in a single-phase 230 Volt system, a single appliance not exceeding 40 Amps may be connected to a single phase, provided it belongs to one of the following categories:

- Electric vehicle (EV) charger
- Instantaneous water heaters
- Electrical cooktop / oven
- In-slab floor heaters

Whereas, in three-phase 400 Volt system, the maximum demand in any active conductor is not more than 25 Amps above the current in another active conductor. Also the total current in the neutral conductor of three-phase 400 Volt system shall not exceed the highest simultaneous current in any active conductor, including the effects of power quality.

For detailed information on each of the above appliance categories, please refer to clauses 2.12.1 through 2.12.4. Additionally, all equipment shall also meet requirements for voltage disturbance limits as described in *6.1.1*.

2.12.1 EV chargers

EV chargers are classified as continuous loads, meaning they operate for extended periods and must be properly sized to ensure safe and efficient performance.

- Level 1: These plug directly into a standard single-phase household outlet and require no special installation. While convenient, they offer slow charging speeds and are generally unsuitable for daily full charges.
- Level 2: The most common choice for residential use, Level 2 chargers provide significantly faster charging. They are typically wall-mounted and require a dedicated electrical circuit. Depending on the vehicle’s battery capacity and the charger’s power output, a full charge can be achieved in just a few hours. Level 2 chargers are available in both single-phase and three-phase configurations, delivering power between 3.6 kW and 22 kW.
- Level 3: DC fast charging is primarily for public charging stations due to its high cost and power requirements. They deliver DC power directly to the battery, bypassing the EV's onboard charger.

2.12.2 Water heaters (instantaneous type)

The instantaneous water heaters are high demand appliance with variable treatment in load calculations. The appliance are typical rated from 4.5 kW to 28 kW in single and three phase

configurations, however the actual draw current will depend upon the flow rate, pressure, ambient temperature and settings.

2.12.3 Cooking ranges

Electrical cooktops are considered high-demand appliances and typically represent a significant load in residential electrical systems. Most of them are classified as resistive loads, meaning they convert electrical energy directly into heat without inductive or capacitive components therefore high power factor. But some of them are based on induction, means utilizing an electromagnetic field to heat cookware directly, therefore they have a lower power factor because the magnetic field generation requires reactive power.

The current draw of an electric cooktop depends on its size and number of heating elements, but standard units usually range from 6.5 kW to 11 kW in single phase configuration, three phase cooking ranges are for industrial use. In terms of demand and diversity, electrical cooktops are often included in load calculations using demand factors which account for the likelihood that not all elements will be used simultaneously.

2.12.4 In-slab floor heaters

In-slab heating systems are electrically powered and typically represent a substantial load in residential and commercial buildings due to their extended operating periods and large coverage areas. The electrical demand varies depending on the area being heated and the insulation quality, but typical installations range from 150 to 200 watts per square meter, which can translate to 20–40 amps or more for larger zones on a single-phase supply. Because in-slab heating operates over long durations, often during off-peak hours, it is considered a continuous load. However, diversity factors may be applied in load calculations, especially in multi-zone systems, to account for staggered operation or thermostatic control that prevents all zones from running simultaneously.

2.12.5 Single phase service cable connection & phase balancing

All single-phase service connections must be connected to the appropriate phase to avoid substantive unbalanced loads on the LV network. The appropriate phase will be determined by the identifying the block and section details of the service location and the following phase selection methodology must be used.

Where the Evoenergy has established three phase connection to network boundary, it is the responsibility of an authorised electrician/metering service provider to ensure that a single-phase connection is established as per rule stated here.

Block No	Phase Designation
Block 1	**Red** phase
Block 2	**White** phase
Block 3	**Blue** phase
Block 4	**Red** phase
Block 5	**White** phase
Block 6	**Blue** phase
Block 7	**Red** phase
Block 8	**White** phase
Block 9	**Blue** phase

From Block 10 onwards it is a simple addition to bring the double digit back to a single digit to align with the phase allocation above. For example:

Block 10 = 1+0 = 1. One is Red phase in the above table.

Block 12 = 1+2 = 3 Three is Blue Phase.

When you reach a value that sums to more than 9 you repeat the process. For example:

Block 19 = 1+9 =10 which = 1+0 = 1. Block 19 goes on Red phase.

Block 77 = 7+7 = 14 which = 1+4 = 5. Block 77 goes on White phase and so on.

Block and section data is readily available in the field through various mobile applications such as ACTmapi and some issued for construction drawings.

2.13 Quality of supply issues

Modern electronic equipment is sensitive to variations and disturbances in electricity supply. Issues include logic errors, loss of data, and unscheduled shutdowns to actual component damage. Customer loads can generate unwanted harmonic currents, flicker, voltage sags and high levels of voltage regulation in the supplying network. These effects via the network can, in turn, cause severe disturbance to other electricity customers. Also refer to *6.1* for further information

In extreme circumstances, Evoenergy after measuring and analysing the disturbances may disconnect the non-compliant installation from its network.

Customers generating excessive disturbance to the network can have adverse impacts on:

1. The operation of other equipment in the customer's own installation.
2. The operation of equipment in other customers' installations.
3. The operation of the electricity supply network.

Factors which affect quality of supply include:

- Steady state voltage
- Supply frequency
- Voltage sags
- Voltage swells
- Voltage transients
- Harmonic distortions
- Radio frequency inference

Many of these factors are difficult to identify and observe, and their measurement usually requires the use of special test equipment with the analysis being carried out by experienced technicians or engineers.

Where PV or other sustainable generation options are involved, the operation of the embedded generation unit shall not cause undue interference with the supply to other customers. Refer to Section 7 for more details.

Note: A useful reference document is the ENA Customer Guide to Electricity Supply -2008 which refers to various standards, guidelines, calculations, legal requirements, technical details and other information.

2.14 Clearances from Evoenergy's electricity assets

Clearances from Evoenergy's electricity assets in accordance with the Utility Networks (Public Safety) Regulations 2001 and Evoenergy Drawings 3811-004 and 3832-018 shall be maintained at all times.

No unauthorised equipment shall be placed on or near (within minimum clearances) Evoenergy's assets.

Care shall be exercised by customers including obtaining clearances when excavating in the vicinity of buried cables. Cable clearances must be obtained by contacting Before You Dig Australia.

A minimum of two full working days' notice is required.

3 Underground Services

3.1 Introduction

In general, it is Evoenergy's preference that all new developments are serviced by underground cabling. This Section outlines the requirements for the installation of an underground service to all installations. Reference should be made to PO07420 Underground Distribution Design Manual

3.2 Guidelines for builders

Evoenergy has developed guidelines to assist builders and other contractors in the building industry understand how Evoenergy will electrically service new, extended or redeveloped residential properties.

Evoenergy have a process, which is initiated when the Development or Building Application is received. The Customer will receive a copy of the completed Request for Service Marking Form specifying the method of supply when approved customer plans are returned.

Alternatively, if the Customer has not received this form with plans any change required to an electrical service can be requested by the builder, contractor or homeowner by submitting a completed Request for Service Marking Form. Once again this should be initiated before any building activity commences.

Evoenergy will not allow aerial service lines in bushfire prone areas (all rural and Bushfire Abatement Zones are nominated by the Emergency Services Agency) or where underground mains are available.

In low bushfire risk areas (Urban) or where overhead mains are available, Evoenergy's preference is to provide underground service cables.

Underground services will also be required where;

1. An intermediate service pole would otherwise be required
2. The aerial service would be greater than 30 metres in length
3. The service connection is any building comprising two or more levels above ground
4. Adequate ground clearance cannot be obtained by installing an overhead service with the use of a standard riser
5. Regulatory clearances to structures cannot be met or maintained
6. Existing vegetation prevents the installation of an overhead service or where such vegetation has the potential to encroach minimum clearances from the overhead line
7. Where the change of service would further encumber a neighbouring property
8. The overhead line would traverse any part of a swimming pool
9. The site has been redeveloped
10. A standard Evoenergy bracket or riser is unable to be installed at the point of attachment to accommodate an overhead service (i.e.: flat roof residences)

3.3 General requirements for underground service

Where Evoenergy determines that connection to the network will be made available by means of underground cable or where the customer's request is granted by Evoenergy for provision of underground supply, the customer is required to provide, install and maintain the conduit/s and associated facilities and the consumers mains where required.

Evoenergy installs and maintains the service cable. A charge is made in certain circumstances in accordance with 1.12 of the Service and Installation Rules.

Upon receipt by Evoenergy of the proposed plan/s of the premises, an officer will indicate Evoenergy's requirements, so that conduit can be laid before concrete foundations and the like are installed

A completed basic connection application (BCA) form must be submitted fifteen (15) working days prior to completion of necessary building work to give Evoenergy time to install the underground service.

The underground service extends between Evoenergy's PCC and the connection point on the customer's premises.

The connection point is established at either a POE on the customer's premises, or at the customer's main switchboard. Refer to Figure 2.

3.4 Underground service cable for installations with demands less than 100 Amps per phase.

All new service cables within the customer's property must be installed in conduit suitable for the drawing in and drawing out of the cable.

3.4.1 Underground service cables for single domestic and small installations installed in conduit

Underground service cables must be installed in conduit throughout their entire length within the property boundary. Evoenergy may allow direct buried cable for 240mm^2 or above.

Furthermore, underground services installed in conduits must meet the following requirements:

1. The conduit shall be heavy duty rigid UPVC to AS/NZS 2053 or AS/NZS 61386.
2. The diameter shall be 50mm minimum, except in special circumstances where a conduit of larger diameter is required by Evoenergy's officer.

3.4.2 Laying of conduit

The conduit shall be laid in accordance with the approved plan, in a generally straight line from a position on the boundary alignment to the POE or metering enclosure. The conduit shall be laid at a depth which provides 600mm of cover to finished ground level for 50mm conduits and 850mm of cover for larger conduits. The conduit is not to pass under the building.

Installation of conduit in rock shall be in accordance with AS/NZS 3000 Wiring Rules. The underground conduit must be maintained a minimum 600mm depth throughout the entire length.

Note:

1. Generally the metering enclosure is housed in a recess in the wall, as shown in Evoenergy Drawing 8912-02. With this arrangement, the conduit may have to pass through a structural footing of the building and rise within the cavity of an external wall.
2. Evoenergy cables in the nature strip should be treated as "energised" and care must be exercised during excavation. (Clearances must be obtained from "Before Your Dig Australia BYDA" a minimum of two (2) full working days before excavations begin)
3. Where the ground or obstructions prevent maintaining the 600mm depth, the underground wiring requirements of AS/NZS 3000 will prevail. Evoenergy must be notified by the licensed electrician of the method used.
4. Orange marker tape must be installed 300mm above the underground conduit for its entire length. Marker tape is not required when under boring techniques are used to install an underground service. The marker tape must meet the requirements of AS/NZS 2648 'Underground marking tape - Part 1 Non- detectable tape'.

3.5 Underground service cables for installations with demands exceeding 100 Amps per phase

The conduit shall be heavy duty rigid UPVC to AS/NZS 2053 or AS/NZS 61386.

The nominal size of conduits and minimum radius of bends shall be generally in accordance with Table 5. A larger size or a second conduit may be specified by Evoenergy's Officer.

Nominal conduit size (mm)	Minimum radius of bend UPVC (mm)
50	310
100 – 150	1200

Table 4. Minimum radius for conduit bends

3.6 Installation of a service cable to a Point of Entry (PoE) cubicle

Where Evoenergy determines that supply will be made available by means of an underground cable to a Point of Entry (PoE) Cubicle. An approved Point of Entry cubicle/enclosure must be provided by the customer to terminate the service cable and connect the consumer's mains. The type of POE cubicle must be specified by relevant Evoenergy project engineer under an application for electricity network connection or alteration.

The enclosure shall be installed in a location which has been agreed to by Evoenergy Project/Connection Engineer as being suitable and to which a conduit (or conduits) for the installation of the service cable can be laid.

The conduit shall terminate flush with the top of the base of PoE cubicle. The location must be such that a minimum of 1.5m of unrestricted machinery access is provided to the PoE and service cable/s.

Consumer's mains cables must be installed by the customer's electrical contractor into the POE cubicle with sufficient enough length to allow termination and connection to the service equipment by Evoenergy. The customer shall provide suitable lugs for Evoenergy to terminate the consumer's mains into PoE cubicle.

For PoE cubicle requirements please refer to Evoenergy low voltage (LV) Point of Entry (PoE) cubicle requirements (PO07174). Evoenergy will not issue any network connection equipment to switchboard manufacturers. The Point of Entry (POE) cubicle/switchboard must have pre-drilled base plate/s as per Evoenergy Drawing for Evoenergy to install any network connection equipment under the network connection work.

Evoenergy will continue issuing the 2000A isolator to switchboard manufacturers, however, this will be only issued under the relevant customer-initiated project with approval of the relevant project engineer. Switchboard manufacturer will need to seek the project engineer's contact details from their customer/Electrical Contractor and contact the relevant project engineer to coordinate the equipment pick up from the Evoenergy supply centre at Greenway.

Please refer to 6.8 for switchboard inspection and approval process. For further understanding on PoE cubicle requirements please refer to Evoenergy low voltage (LV) Point of Entry (PoE) cubicle requirements (PO07174).

3.7 Provision for other utility services on customers premises

Other services may be located in the same trench as Evoenergy's service cable provided that, with the exception of necessary crossings, they are separated as far as practicable in the trench as per Evoenergy Drawing 3832-018 and not laid over the service cable provided they also comply with the requirements of the AS/NZS 3000. Other utilities may have additional requirements.

3.8 Position of underground service/consumers mains on the premises

A sketch of the underground service/consumer's mains route must be clearly marked on the inside of the meter enclosure or on the meter panel. Alternatively, a suitable sketch placed in a clear plastic envelope must be permanently attached either within the main switchboard enclosure or on the meter panel.

3.9 Conduit requirements

Refer to PO0793 –Evoenergy's Civil Works Manual Volume 2 for specific information.

3.9.1 Sizes

The minimum conduit size used to enclose an underground service cable is 50mm diameter heavy duty orange conduit compliant with AS 2053.2 or AS/NZS 61386.21.

3.9.2 Installing service conduits

Only one bend of 90 degrees or less, having a radius as per Table 5 is permitted where the conduit rises to the metering enclosure or other terminating position such as meter box, POE, substation and / or switching station. No additional bends shall be installed but a minor deviation of the straight line run of the conduit is permissible, i.e. within the flexibility of the conduit without distortion of the walls. If it is found to be impracticable to install the conduit in accordance with these requirements, Evoenergy's advice should be sought.

Do not use heat on the conduit to aid bending. Where the underground service cable terminates, in the meter enclosure, the conduit must enter the enclosure without flexing.

3.9.3 Joints

Joining of the conduit shall be by means of sockets or fittings so that the bore of the system is continuous and smooth and presents no obstruction to pulling in the cable. Joints shall be watertight and bonded using an appropriate jointing method.

3.9.4 Draw rope

All 50mm conduits shall be provided with a general-purpose synthetic polypropylene filament rope of minimum 6mm diameter, protruding at least 600mm at each end of the conduit. Refer to *Evoenergy* PO0793 Civil Works Manual Volume 2 for further details.

3.9.5 Draining

A Drain shall be installed in a conduit when the ground level at the street end of the conduit is above the floor level of a building in which the conduit terminates.

The drain shall be positioned approximately 300mm above ground level.

It should include:

1. A 10mm diameter hole facing the wall if the conduit rises on the outside of a building, or
2. Where the conduit is not on the outside of the building, a 15mm diameter PVC pipe shall be solvent welded into the conduit without protruding into the bore. It shall be arranged to discharge to the exterior of the building.

3.9.6 Sealing

Care shall be taken to prevent material from entering the conduit. The conduit shall be sealed at the street end with a plug or cap and soft mastic compound, which can be removed easily.

The conduit end shall be identified by the installation of an appropriate marker peg.

3.9.7 Trench inspections

The trench may be backfilled before the installation is inspected.

3.10 Underground supply from an overhead distribution system (UG/OH)

A Customer may request supply by way of an underground service from the overhead distribution system. This will be provided by an underground to overhead connection (UG/OH) at the nearest electricity distributor pole. The following conditions apply:

1. The arrangement must not require any additional street pole.
2. Evoenergy may inspect the site before agreeing to the proposal.

3.11 Applicable Evoenergy drawings

The following Evoenergy drawings form part of this section:

Drawing Number	Drawing title
8912-02	Underground Service Conduit Requirements
8912-03	Typical Underground UG & OH Service Cable Conduit-Requirements for a Single Domestic or Commercial Installation
8912-04	Typical Underground Service Cable Conduit Requirements for Installation exceeding 100amps per phase
8912-05	Typical UG service arrangement for POE/Meter box in boundary fence/wall
3832-018	Separation & Cover Requirements
8913-22-02	P.O.E. / Fuse Box for Domestic & Small Commercial Customers (16mm² Underground Service)
8911-313	Non domestic – Small installations POE/Meter box for installation with underground service cables up to 50mm^2 Cu
8911-324	Typical service cubical multi-installation for radial and looping or paralleling of Evoenergy cables
8913-213-06	Point of Entry (POE) Service Cubicle 400A to 600A Free Standing or Wall Mounted with Modular Feeder Units
8913-213-08	Point of Entry (POE) Radial Service Cubicle 800A to 2000A Free Standing or Wall Mounted
8913-22-04	Concrete plinth details for Point of Entry cubicle
390-002	Conduit Installation, Roadways & Driveways
393-007	Cable trench details for Cable Installations not covered by Shared Trench
393-011	Underground Services in a Shared Trench – URD with gas
393-012	Underground Services in a Shared Trench – URD without gas

Table 5. Applicable Evoenergy underground service drawings

4 Overhead services

4.1 Introduction

This Section outlines installation requirements for an overhead service Reference should be made to PO07132 Overhead Line Distribution Design Manual which is based on AS/NZS 7000.

4.2 Approval for an overhead aerial service

Evoenergy may determine whether premises will be supplied by an overhead service. Evoenergy must approve the:

1. Point of Common Coupling
2. Type of Construction
3. Point of Attachment, and
4. Route of Service

If an aerial service line is to be provided Evoenergy will determine the route of the service line and the position of the point of attachment to any building or structure.

The customer shall provide, install and maintain any support on private land for the service line and shall carry out any work and provide and install any equipment required by Evoenergy on such support, point of attachment or point of connection.

Details of construction requirements are available on request.

The specification and location of any bracket, or similar device used to raise the point of attachment, shall be as determined by Evoenergy at the time of marking the service.

Evoenergy will not accept responsibility for damage to the customer's premises resulting from normal tension in the service line or causes beyond Evoenergy's control.

4.3 Existing service

This clause outlines in tabular form, the requirements for alteration and addition by or for the customer of any of the following:

1. Overhead Service
2. Point of Attachment
3. Consumers Mains (including aerial consumer’s mains)

Table 7 summarises these requirements for the most common alterations and additions and the customer is required to fund the work unless otherwise stated.

The requirements should be confirmed with Evoenergy (before commencing work).

Nature of Alterations or Additions	Service Cable Requirements	Consumers Mains Requirements
Uprating the consumers mains (cable being replaced)	Install as new if cable rating exceeded. If rating satisfactory apply 4.4 to determine need for replacement.	Install as new
Repairing the consumers mains	N/A	Repair as existing
Altering/relocating the Point of Attachment	Install as new if service needs to be extended	Install as new if cable rating exceeded or consumer mains to be extended

Increasing the number of phases (additional service cable required)	This service must now comply with these Rules	Install as new if cable rating exceeded
Increasing the number of phases (no additional service cable required)	Refer to 4.4	Install as new if cable rating exceeded
Uprating the service (cable being replaced)	Install as new	Install as new if cable rating exceeded
Re-routing a cross-property service line	Install as new	Install as new if cable rating exceeded

Table 6. Requirements for existing overhead services and consumers mains

Note:

1. Unless otherwise stated the customer must fund this work.
2. Reference to ‘as new’ means the final installation must comply with the current requirements of these Rules and AS/NZS 3000 as applicable.
3. 100 Amp service cables must not be paralleled to form 200 Amp supplies or greater.

4.4 Retaining an existing service

Where work is being carried out, and it is proposed to retain the existing overhead service cables (see Table 6), all of the following provisions must apply:

1. The service cable and its associated fittings must be in good condition.
2. The service cable must be PVC or XLPE insulated.
3. All other aspects of the installation must comply with the Service and Installation Rules, e.g. access to and height of the POA, service clearances, neutral bonding where applicable, etc.

Note:

- In certain instances (refer to Table 6) Evoenergy as part of its maintenance responsibility may fund the replacement of the service line where conditions 1 and 2 above are not satisfied.
- The customer must fund any work required to satisfy condition 3 above.
- The customer should make arrangements with Evoenergy to replace the service cable (where Evoenergy has agreed to fund the new service) in conjunction with the alterations or additions.
- Where Evoenergy carries out this work the customer will be required to pay for the cost of the disconnection and reconnection (of the new service cable) at the connection point.

4.5 Connection to private overhead electric lines

If connection is made to a private pole of a private overhead electric line, the customer shall ensure the installation is designed in accordance with AS/NZS 3000 and AS/NZS 7000.

Non-distributor poles such as communications poles must not be used without prior consultation with the pole owner.

4.6 Service route and Point of Attachment (POA)

4.6.1 Overhead considerations

The clearance of service lines above ground, to structures, and to trees and other vegetation is required to conform with the Utility Networks (Public Safety) Regulations, Evoenergy Drawings 3811-004 and 3832-018 and to AS/NZS 7000. Evoenergy will nominate the point of attachment and any other requirements to ensure that these clearances are achieved.

Such clearances shall not be reduced by any subsequent works on the premises.

The following factors should be taken into consideration:

1. The location of Evoenergy's poles in the street supplying adjacent properties.
2. A transformer located on the pole selected for the connection of a service.
3. The position, including its height above ground of the POA.
4. The existence of trees and large shrubs.
5. Required clearances.
6. The location of any additional pole.
7. The selection of the POA to ensure that the route of the service is clear of swimming pools, vegetation and other relevant building features such as doors, windows, balconies and entrances.
8. The location of other utility services,
9. Mitigation of bush fire risks in accordance with Evoenergy's Bush Fire Risk Management Plan and Procedures.

Note: Connections are generally not permitted at pole substations in urban areas unless no practical alternative exists. Evoenergy must approve the proposed connection in advance.

4.6.2 Crossing of adjoining property

A route crossing an adjoining property is only acceptable provided a suitable easement is obtained over the property.

Evoenergy will not consider the installation of a distribution pole unless there is no other practical alternative.

Note: If a customer is required to relocate an existing cross property overhead service that is not installed with an easement, the customer is responsible for the associated cost.

4.6.3 Requirements for swimming pool and spa zones

Swimming pool and spas to powerline/service cable clearance requirements are based on AS/NZS 3000 and the Utility Networks (Public Safety) Regulation 2001, which requires clearance measurements to include line sag and swing. This minimum clearance is a guide only and each site is reviewed on a case-by-case basis. Refer to Evoenergy Drawing 3832-020, which details to the clearance for a swimming pool or spa from electrical infrastructure.

4.7 Access to service and Point of Attachment (POA)

The overhead service and POA must be erected with readily available access. The location is determined by an officer of Evoenergy who also indicates the provisions, which must be prepared by the customer to enable Evoenergy to securely anchor the insulators, which it installs to terminate the service line. The position selected for the point of attachment will depend on such factors as the profile of the terrain, the presence of obstructions and the relative positions of the building and distribution mains. Typical locations selected by Evoenergy's officer for the point of attachment include the house fascia or gable.

The area below the POA should provide a firm, level base with sufficient space to safely erect a standard extension ladder.

In some cases, it may be necessary to install a service riser bracket at the point of attachment to raise the line sufficiently to maintain minimum safe clearances above the ground or driveway and other structures. Service riser brackets (when required) are to be supplied by the customer and must be one of a number of approved types available from trade suppliers. Standard cable bracket and fascia bracket are provided by Evoenergy.

The overhead service neutral conductor must be bonded the service riser bracket, and the fascia bracket must be bonded where a conductive (metal) fascia is installed. The bond must be by a separate fastener with a minimum size of M6 and must be outside of the roof space. If there is an existing earth connection to a riser or fascia bracket, this connection must be removed prior to

installing a neutral bond. See Evoenergy drawing 8913-12-05 Overhead Service and Point of Attachment (POA) Arrangement.

It is important for the customer's electrical contractor to ensure when installing the service bracket that the structure supporting the anchor bolts or service riser bracket is adequate in strength to withstand the tension of the service line.

The POA must not be accessible without the use of a ladder or other device to assist climbing. If necessary, install a protective guard to prevent unauthorised access. When access is from an awning or balcony, its construction should allow safe working practices to be followed in attaching an overhead service to the building.

Unrestricted access must be provided to the point of attachment for aerial service cables and associated equipment and fuses. Structures such as carports and pergolas shall not be erected immediately below the pole end or the point of attachment. For safety reasons, Evoenergy will not allow exemptions to this requirement. For details refer to Evoenergy Drawing 3811-004 Minimum Clearances for Insulated and Bare Overhead Conductors.

4.8 Underground supply from overhead distribution system (UG/OH)

Refer to Section 3 – Underground Services

4.9 Evoenergy owned poles and third party equipment

Evoenergy has installed non-conductive and conductive poles (steel and steel reinforced concrete) in its electricity distribution systems.

Third party equipment including communications associated equipment must not be located on Evoenergy poles without explicit written permission from Evoenergy for each pole. The third party provider shall assess each pole separately

Hazardous voltages can be present on all types of poles during abnormal system conditions including, but not limited to, equipment failure, earth faults, weather conditions, etc.

Where communication equipment is required to be installed on these poles the insulation requirements of Evoenergy Standard PO07218 – Standard for Integration of non-Evoenergy Assets on the Evoenergy Overhead Distribution Network must be met.

4.10 Applicable Evoenergy drawings

The following Evoenergy drawings form part of this section:

Drawing Number	Drawing title
3811-004	Minimum Clearances Insulated and Bare Overhead Conductors
3832-018	Separation and Cover Requirements for Cables and Plant
3832-020	Clearance Requirement for Swimming Pool from Electrical Infrastructure
8913-12-03	Galvanised steel service pole
8914-201	Temporary Installation Residential Blocks O/H Supply
8913-12-05	Overhead Service and Point of Attachment Arrangement

Table 7. Applicable Evoenergy overhead service drawings

5 Provisions for service equipment

5.1 Introduction

In December 2017, the Australian Energy Market Commission (AEMC) National Electricity Amendment (Expanding competition in metering and related services) Rule No 12 2015, implements changes that will conclude the installation of types 5 & 6 (basic) metering. From that point onwards, no more basic meters will be installed, and any meter changes of those types will be replaced with an advanced meter (types 1 to 4).

In accordance with national metrology processes, meters can only be installed by a Metering Provider. In the ACT, basic meters are generally only handled by Evoenergy.

Advanced meters will predominately become part of the consumer's installation and remain the property of the Metering Providers.

When a customer chooses, or is required, to have advanced meters installed, they will contact their electricity retailer, who will arrange for the installation. Retailers will engage metering providers, who in turn will engage a qualified electrician to perform the required work. The retailer shall remain the primary contact for the customer.

This framework means that the metering provider and the retailers are responsible for the installation, maintenance and replacement of the new electricity meters. Suitably qualified electricians can only carry out advanced metering work after being engaged by a Metering Provider, the electrician must comply with the Metering Provider's safety management systems while carrying out that work.

It will be required that any person engaged to install advanced metering must have undertaken appropriate training, including having the appropriate and current level of Evoenergy authorisation for a worker/person to de-energise and re-energise of electrical installations.

This means a meter installer engaged by a metering provider can remove a type 5 or type 6 meter when it is being replaced by an advanced meter if the metering installation can be de-energised via a Service Protection Device or Meter Protection Device.

If the installation supply needs to be disconnected at the point of common coupling (PCC), Evoenergy shall perform the required disconnection.

5.2 General information

The customer or its metering provider must arrange to provide and install:

1. Meter Protection Device(s), unless the device is also a Service Protection Device
2. Service and Metering Neutral Links
3. Metering and load control devices.
4. The meter/switchgear enclosure.
5. Associated wiring and connections in accordance with AS/NZS 3000.
6. Any other service or metering equipment required.

The enclosure must be in a location and in conditions acceptable to Evoenergy and metering provider.

Responsibility for installed devices dedicated for network management purposes will be transferred to Evoenergy upon connection of supply.

The nominated metering provider will maintain the metering equipment accordingly.

The nominated metering provider will assess the maximum demand for service and metering equipment. Where it exceeds 100A per phase or the current rating of a meter for separately metered parts of an installation, the Metering Provider at their discretion may require Current Transformer (CT) metering to be installed. In all other cases whole current metering will be installed.

5.2.1 Existing installations

The customer may install additional service equipment on an existing board if the additions can be accommodated without relocating existing metering equipment.

If it is necessary to install additional panels, these panels may be either:

1. In the standard arrangements which are outlined in this document, or
2. Matched to the existing style.

5.2.2 Location and accessibility of service equipment

The nominated metering provider will provide and install meters appropriate for the number of separately metered occupants in the premises and for the tariffs required (including allowances for PV and Off-Peak).

Where there are multiple metered premises at the same location, it is preferred for all the meters, the service protection devices and the metering protection devices to be located at the one metering position.

Service and metering equipment must be in a readily accessible area on common property.

The customer must ensure that access to any enclosure for the services equipment is never restricted or made unsafe. The location must always be kept clear. If access is obstructed the customer must remove the obstruction or relocate the service equipment.

An exclusion zone of 1000mm shall be maintained between the service equipment installation and any structure or block boundary.

Rooms dedicated to house service equipment must be well lit, clean, unobstructed and not used for storage of materials or equipment. The door(s) of rooms and enclosures housing the service equipment must be labelled accordingly

Non-revenue metering and dedicated load control equipment is to be easily accessible to Evoenergy within normal working hours. Where the metering equipment is not located adjacent to the service protection device, its location must be labelled on the main switchboard.

5.2.3 Switchboard panels containing asbestos

Refer to 1.9.1.

5.3 Domestic premises

5.3.1 Installation of main switchboards having a nominal load of up to 100 Amps per phase

For single domestic and other nominated installations having a nominal load of up to 100 amperes per phase, Evoenergy generally requires the use of a standard hinged pre-drilled panel, to cater for Evoenergy's service equipment.

The customer shall provide and install a standard hinged pre-drilled panel complying with Evoenergy Drawing 8911-2211-101. The panel shall be complete with wiring for the mounting of Evoenergy's service and control equipment. The panel shall be mounted either:

1. In a standard metering enclosure complying with Evoenergy Drawing 8911-312; or
2. On a suitable surround of steel not less than 1.2mm thick providing at least 75mm of space behind the panel, erected in a location which is suitably protected.

Except where otherwise nominated by Evoenergy, the panel shall be located so its top edge is not more than 2000mm or the bottom edge is not lower than 900mm above the floor or ground beneath it. A clearance of 200mm shall be maintained from the front face of the hinged panel to any fixed object with the panel open 90˚ on its hinges. If the panel is enclosed, other than in the standard metering enclosure, a clearance of 175mm shall be provided from the front face of the panel to the door. For overhead service, the service protection device and neutral link is installed at Point of Attachment.

Customers are advised to use a panel that complies with Evoenergy's published standard. These panels and associated metering enclosures and surrounds are available from trade suppliers.

The panel is required to be protected from the weather and is generally enclosed in a weatherproof metering enclosure rated at IP23. It is preferred that this be made of a standard metering enclosure which complies with Evoenergy Drawing *8911-312*. However, other forms of construction are acceptable if they are equivalent to the standard box in all relevant respects.

Evoenergy installs its service equipment and other associated equipment on this panel. This consists of the service protection devices' installation and the network side cables' terminations including the neutral cable termination to the service neutral link.

Adequate space is generally also available for the customer's switchboard equipment necessary to control and protect the sub mains and final sub circuits.

5.3.2 Installation of main switchboards having a nominal load rated above 100 Amps per phase

If the residence has a very large electrical installation, typically above 100amps per phase the standard panel may not be adequate and a larger panel and separate facilities for the mounting of the service equipment may be required.

Low voltage customer switchboards with ratings of more than 100 Amps per phase may be subject to additional Evoenergy requirements. The customer must not proceed with work until they know:

1. The requirements for service equipment.
2. Evoenergy's planning requirements.

5.3.3 Location of service equipment

The service equipment must be located where ready pedestrian access is maintained, in one of the following locations:

1. On the face of the residence facing the front boundary.
2. On the adjacent side wall within 3m of that face or associated corner window or verandah and not behind a locked gate.
3. Within the front boundary fence so that meter reading and maintenance of service and metering equipment may be carried out without introducing a safety hazard.

Where the main entrance is on the side of a residence the service and metering equipment may be installed on that side not further than 3m beyond the main entrance subject to access being available.

The service equipment position must not be located behind fences.

5.3.4 Connections at the Service Equipment

Connection to Evoenergy's Service Protection Devices (SPD) must be completed by Evoenergy personnel or Evoenergy authorised workers. Evoenergy personnel will connect cables on the network side of the SPD and Evoenergy authorised workers will connect the customers cabling to the installation side of the SPD.

Existing overhead Point of Attachments (POA) are the only exception. POA fuse holders are a single use device and once connected must be replaced by Evoenergy personnel should replacement of consumers mains be required

Where service protection devices are located on the switchboard, one additional cable connection is permitted to be terminated on the load side at each service protection device to enable supply to be provided to a separately metered portion of the installation such as an off-peak water heater. In addition, a service neutral link shall be installed so that a connection can be made from it to the customer neutral link.

The customer shall arrange for the installation of the wiring on the load side of Evoenergy's service equipment and for the ends to be prepared for insertion and connection by an Evoenergy authorised worker. Separate full-sized PVC or elastomer-insulated stranded copper metering neutral cables are required for each meter or control device.

5.3.5 Dual occupancy and secondary residence

Dual occupancy/subdivision shall mean, "Two dwellings constructed on the one residential block, or one residential block proposed for subdivision into two residential blocks".

Consideration has been given to two different methods of servicing and metering of dual occupancy dwellings:

1. A single service to each lease, or
2. Separate services to each dwelling on the one lease.

A **secondary residence** is a form of residential development replacing the current ‘relocatable unit’ and ‘habitable suite’. This is a dwelling in addition to the main residence. It can be attached or detached from the primary building, and it can be permanent or temporary.

A single service will be provided to the primary residence only. The customer is responsible for arranging electricity supply from their electrical installation to the secondary residence.

Where a single service is provided to a residential lease with more than one dwelling it shall generally be connected to the front or original dwelling.

Separate services for dual occupancy/subdivision will be provided. However, where a separate service is installed to an additional premise, the cost of the second service is to be borne by the customer including any other network modification required. Evoenergy will determine the appropriate point for the connection of the service to each premise.

Evoenergy will install an underground service as determined by the basic design application (BDA). This service may terminate in a POE box which may be located on the back wall of the premise or at a metering enclosure in an approved location. Refer to Evoenergy Drawings 8911-321, 8911-326 and 8913-22-02.

For underground services a conduit is to be installed in accordance with Section 3, from a point determined by Evoenergy. Refer to Evoenergy Drawings 8912-02, 8912-03 and 8912-04.

5.4 Single business premises

Unless otherwise approved by Evoenergy, the service equipment must be located as close as practicable to the network boundary of the premises and must be readily accessible (in an area normally open to the public).

The service equipment for single business premises within multiple occupancy must be grouped at the associated common distribution board, external to the tenancies.

Access must be available during Evoenergy’s normal business hours.

5.5 Multiple occupancy premises

The customer is required to provide mounting and installation facilities for Evoenergy's service equipment in the positions selected by Evoenergy. "Service Equipment" shall mean all equipment installed in a premise by Evoenergy, including service lines, cables and busbar’s, service fuses, circuit breakers, links and auxiliary control equipment.

Requirements for the location and mounting of the service equipment will be notified by Evoenergy following the receipt of plans prepared by a switchboard manufacturer for approval.

If Evoenergy decides the proposed work is complex in nature it may be necessary for an onsite appointment with an Evoenergy officer who will set out provisions to be made for the mounting and connecting of service equipment.

In addition to complying with the requirements for accessibility and protection of Evoenergy's equipment from weather, the service fuses and service neutral link must be located externally at the street access level of the building, and thus accessible to Evoenergy's officers. This is to ensure continuity of supply to individual customers. Consideration will be given to other locations only in exceptional circumstances.

5.6 Access conditions

Immediate access shall be provided to Evoenergy for all service equipment on the customer's premises. This is required to comply with Evoenergy’s safety and technical obligations.

This requirement is considered to be complied with where:

1. In a single domestic premises access is not restricted by a locked door or gate.

2. In multiple domestic premises the equipment is accessible by means of direct external 24-hour access, unless otherwise approved by Evoenergy.
3. In business premises the equipment is located in a lockable portion of such premises which are always open or attended.

Any elevated floor or platform used to provide access shall be substantial and permanent and, where necessary, shall be fitted with a railing. Access to such elevated positions shall be provided by an approved fixed stairway equipped with a handrail.

The design of the platform, railings and handrails shall comply with AS 1657 – 'Fixed platforms, walkways, stairways and ladders - Design, construction and installation'

Service equipment must not be installed behind locked gates or doors unless the obstructions are fitted with acceptable access arrangements.

In addition, the following locations are considered unsuitable for mounting service and metering equipment:

1. Over stairways or ramps, in narrow passageways, or in confined spaces.
2. In vehicle docks, driveways, factory passageways where the equipment or a person working on it would not be effectively protected.
3. In close proximity to, or over, machinery or open type switchgear.
4. Locations which are liable to be affected by fumes, vibration, dampness, or dust, which may cause deterioration of equipment or unsatisfactory working conditions.
5. In hazardous or prohibited switchboard locations as defined in the AS/NZS 3000, including the customer switch room and MSB.
6. Where the normal ambient temperature exceeds 50˚C.
7. Where there is insufficient light.
8. Where projections at head height are a hazard.
9. In pool or spa zones as defined in AS/NZS 3000.
10. In carports, unless with the prior permission of Evoenergy.
11. On enclosed verandahs.
12. In areas enclosing animals.
13. In areas to which access is normally restricted - for security, health or other reasons. (This would include areas in which animals are kept for security reasons).
14. Behind a fence without a gate.
15. Within gas emitting devices exclusion zone, refer to AS/NZS 5601.
16. Within LPG cylinder minimum clearance to ignition sources refer to AS/NZS 5601.
17. In fire isolated stairways, passageways or corridors.
18. Where access is restricted by vegetation.
19. On Evoenergy's asset.

5.7 Facilities for the installation of service equipment

5.7.1 Physical protection of service equipment

Service equipment must be protected from:

- The weather
- Mechanical damage
- Salt or dust laden air or corrosive atmospheres
- Vandalism

An enclosure must be fitted with a door and a catch.

5.7.2 Service equipment panel

For all new installations the supplied panel must:

- Not use materials containing asbestos.
- Provide sufficient space for the installation of service equipment as per Evoenergy Drawing 8911-2211-101.
- Separate the service equipment from the customer's equipment. Separation may be shown by marking.
- Be of an appropriate fire rated material as per AS/NZS 3000 – Clause 1.5.

5.7.3 Service equipment protective enclosure

The form of protective enclosure shall, where practicable, be a surface run rigid PVC conduit without inspection fittings. The conduit shall be adequately supported and in the case of switchboard mounted service equipment (including non-revenue metering equipment), shall continue into the switchboard enclosure to a position adjacent to the base of each current transformer and to the potential fuses.

Where surface run wiring is not practicable, the wiring shall be in heavy duty UPVC conduit laid at a depth of 600mm except where the conduit is encased in concrete.

Where a service equipment enclosure is required, it shall comply with the AS/NZS 3000.

5.7.4 Top hinged switchboard doors

If the door is hinged at the top, provide a stay fastened to the enclosure to hold the door open greater than 90^0.

5.7.5 Fixing of service equipment enclosure

Ensure the facilities for mounting service equipment and associated surrounds and enclosures, are securely fixed to a wall or rigid supporting structure.

5.7.6 Fixing of the service equipment

All service equipment is to be secured using all available fixing points.

For panels with a thickness of less than 20mm, bolts and nuts must be used to secure the equipment.

Bolts must not protrude more than 5mm past the fixing nut, nor be capable of damaging any conductor insulation.

Where screws are used, they must not protrude past the rear of the panel. Screws must utilise at least 75% of the panel thickness to secure any equipment.

Where the head of any fixing device is exposed on the front of the panel, it must be suitably insulated.

5.7.7 Spacing between metering equipment and high current conductors

External magnetic fields may damage metering equipment. A minimum spacing between metering equipment and current carrying conductors must be provided and maintained as per the metering provider's instructions.

5.7.8 Labelling

Warning labels on a customer's main switchboard shall be installed in accordance with AS/NZS 3000 and other appropriate standards. Evoenergy may outline additional requirements where needed.

5.7.9 Locking and access restriction

Locking and restricting access to an enclosure for service equipment is acceptable if the lock or access is approved by the metering provider and Evoenergy.

The following access arrangements are acceptable provided an officer of Evoenergy and or metering provider is not required to reset security alarms:

1. Where electrically operated security locking is used, a key switch is to be provided and fitted with Evoenergy's standard cylinder.

2. Where access is given by means of a security card, either a key switch as above or a card left in a locked box provided by the customer and mounted adjacent to the entrance door which can be opened by Evoenergy's key is to be provided. The lock box must be mounted no lower than 0.6 m or no more than 2.0m above the ground, floor or platform.

Note:

- Evoenergy's locking system is a restricted key system not a high security system.
- Evoenergy's locking system must not be installed on doors which give access to any rooms or areas in which portable articles and equipment of any value, personal goods and the like are located.

5.7.10 Isolated and unattended locations

Where service equipment is installed in an enclosure externally on a building or a private pole in an isolated and unattended location, the enclosure must be constructed using galvanised steel or equivalent material of sufficient strength to achieve protection against vandalism, weather or other external factors. Such enclosures must always be kept locked using an acceptable locking system.

This requirement does not apply to a Temporary Installation.

5.8 Service protection and metering protection devices

Evoenergy will provide, install and maintain the service protection device (up to 100 Amps) and the metering provider must provide, install and maintain an approved meter protection device in accordance with the following sub clauses.

5.8.1 Selection of fuse carrier and base ratings for fuses

The maximum current rating of any fuse carrier and fuse base combination (the fuse assembly) used for the purposes of a service protection device or a meter protection device shall always be equal to or greater than the fuse element rating, but in no case more than 100 Amps for a single domestic installation.

The fuse assembly must have a sealable escutcheon, known as an anti-intrusion assembly, which prevents access to the terminals. The fuse carrier does not have to be sealed to the fuse base.

5.8.2 Selection of rating for meter protection devices

The rating of the fuse element is to be in accordance with *Table 9*. Alternative fuse element ratings or alternative protective devices may be used but in no case can the time-current protection rating exceed that of an 80 Amp HRC fuse. Circuit breakers rated above 80 Amps can only be installed with the approval of the Metering Provider.

5.8.3 Service protection device and meter protection device combined

For single customer or dual occupancy installations that meet the requirements of a service type 100 Amp single domestic in Table 9, the functions of a service protection device and a meter protection device can be fulfilled by the one physical device provided *5.8* is complied with.

5.8.4 Location of service protection devices and meter protection devices

For special situations check with Evoenergy, however the following shall be followed:

1. Meter protection devices must always be on the installation side of service protection devices.
2. For installations with a consumer maximum demand determined by the metering provider (in accordance with AS/NZS 3000) to be less than 100 Amps per phase unless otherwise approved by Evoenergy, the service protection device and any meter protection devices must be located at the meter position where practicable and on the distribution network side of the meters. Please refer to section 4 for details regarding overhead service connection.
3. For installations with a consumer maximum demand determined by the metering provider (in accordance with AS/NZS 3000) to be more than 100 Amps per phase or where metered with the use of current transformers, the service protective device must be located adjacent to or incorporated in the main switchboard on the network side of the current transformers.

4. The requirements of this sub-clause apply to alterations and additions to existing installations except where the relocation of the service protection device would require upgrading of the service, consumers mains or main switchboard, then the existing service protection device location may be maintained.

Service Type	Service Protection Device (SPD) Element Rating	Meter Protection Device (MPD) Element Rating	Further Information
60 Amp Three-phase Domestic	3x 60 Amps	3x 60 Amps	Suggested MPD requirements
100 Amp Single Domestic	1 x 100 Amps (see note 6)	1 x 80 Amps (see note 7)	For single domestic installations the SPD and the MPD can be one device but must be rated at the lower current carrying capacity (80 Amps).
100 Amp Multiple Domestic	1 x 100 Amps	Multiple x 80 Amps	For multiple domestic installations, there must be one SPD to provide overload protection to the service supplying the installation. A separate MPD must protect each separately metered installation, see note 4.
200 Amp	1 x 200 Amps	Multiple x 80 Amps	See Note 4
300 Amp	1 x 300 or 315 Amps	Multiple x 80 Amps	This may cause some grading problems with substation distributor fuses, which if blown are not able to be replaced by the customer. See Note 4 if there are grading constraints, 50 Amp fuse(s) may be used for the MPD See Note 4
400 Amp	1 x 400 Amps	Multiple x 80 Amps	This may cause some grading problems with substation distributor fuses, which if blown are not able to be replaced by the customer. The customer may be requested to install bars or have a combination of fuse ratings. See Note 4

Table 8. Examples of suitable service and meter protection fuses combinations

Note:

1. These examples are dependent on the load of the various metered sections of an installation.
2. When using service protection devices of the larger sizes you must ensure that grading is achieved below those fuses. The grading prevents unnecessary loss of supply as the Meter Protection device then protects a smaller portion of the installation by ensuring that the fault is seen by the device which is closest to the fault (between the fault and the supply).
3. With supplies direct from a substation, grading must be maintained.

4. Multiple 100 Amp service protection fuses per phase are allowed, when there is a single service protective device protecting the whole installation – contact Evoenergy for more information with each individual case.
5. Number of customers per 100 Amp service protection device / fuses is determined by the requirements of *5.15*.
6. For existing installations this rating may be reduced to reflect the current rating of existing consumers or sub mains and to accommodate load limiting in accordance with AS/NZS 3000 requirements.
7. This is a maximum rating for an MPD HRC fuse and may be reduced for installations with a lower maximum demand. In accordance with *5.8.2*, and
8. MPD can be a Circuit Breaker but in any case, must have time current characteristics that do not exceed that of an 80 Amp HRC fuse. The 80 Amp HRC fuse is to protect an Advanced Meter from damage due to through fault or substantial overload.

Advanced Meters can tolerate cyclical loading up to 100 Amp, short term overloads up to 128 Amps for two hours and through fault currents of 3kA for half a cycle before being damaged. The 80 Amp HRC fuse matches this protection requirement but can still carry 100 Amps without operating. A circuit breaker MPD can be used as a load limiting device as per AS/NZS 3000.

5.8.5 100 Amp fuses as service protection devices and/or meter protection devices

The 100 Amp service protection fuses and meter protection fuses must comply with the following requirements:

1. The service protection fuse assembly must accept a Type 11b 100 Amp current limiting (HRC) fusible link. The fusible link must be manufactured in accordance with AS/NZS 60269.
2. The meter protection fuse assembly must accept a Type 11b 80 Amp current limiting (HRC) fusible link. The fusible link must be manufactured in accordance with AS/NZS 60269.
3. The equipment must be supplied complete with the fusible link, fuse carrier, base and sealed escutcheon.
4. The fuse base may be either front or rear connected.
5. The fuse base must have two separate load terminals, or a sealable active link shall be provided for the connection of more than one tariff or customer.
6. Connect one conductor only to each separate terminal. Protect unused terminals from accidental contact.
7. Where the service and or meter protection device consist of a base, insulating cover (turret) and fuse carrier, the insulating cover (turret) must be installed and secured before the fuse carrier is inserted.
8. Where insulating barriers are provided on one terminal only, that side of the fuse base must be used for the network side connection. (Do not remove barriers).
9. Fuse manufacturer’s instructions must be followed if specialised insulated tools are used to make connections into the fuse base.
10. All fuse types must be identified by labelling with their respective designations. Labelling must be legible and durable. E.g. SPD, MPD or SPD/MPD as close as practicable to the fuse carrier usually directly above or below the fuse carrier.

Refer below figure 4 for single and three phase direct connected meter configuration.

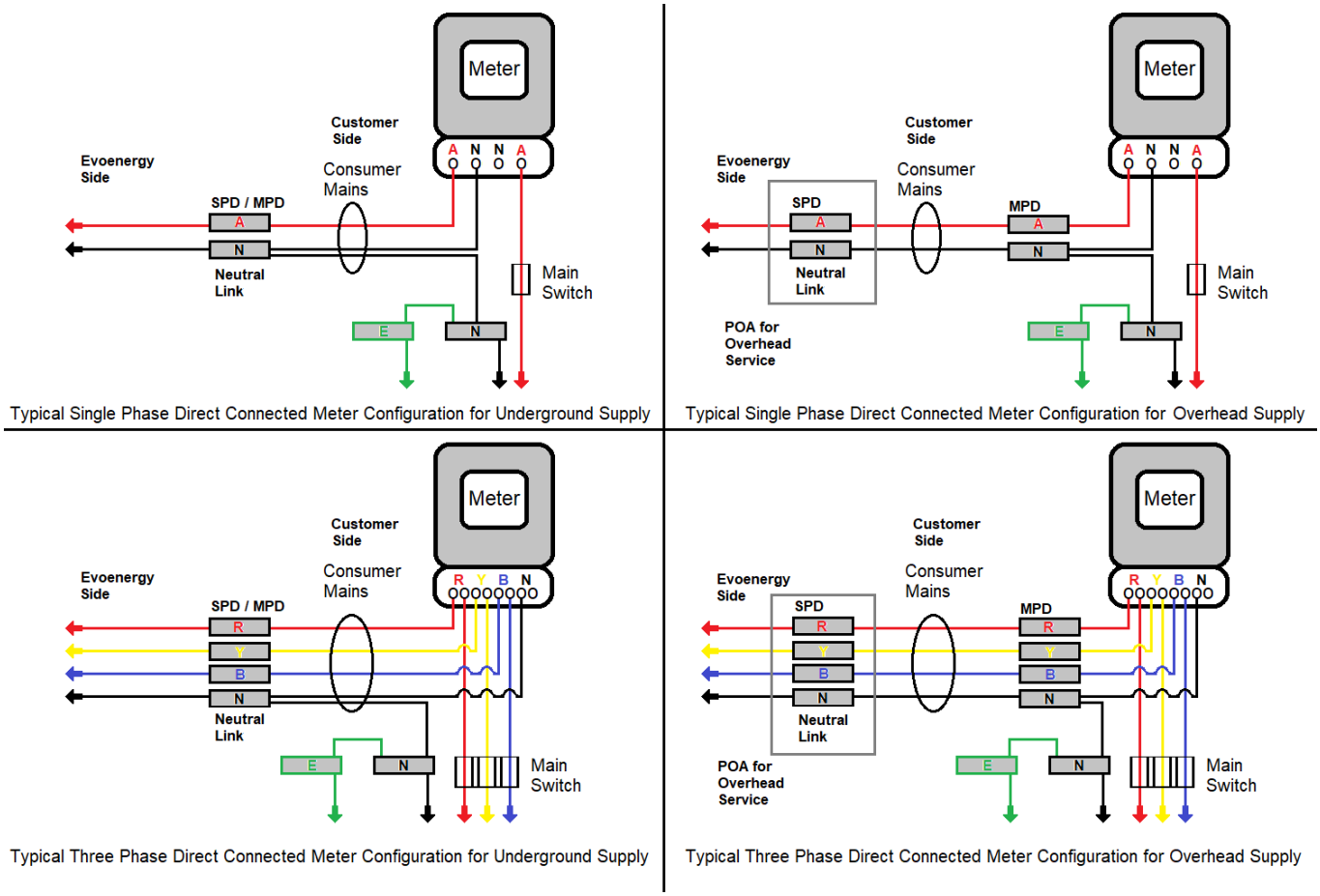

Figure 4. Typical direct connection spd and mpd arrangements for single customer

Note:

1. All Service Protection and Meter Protection HRC fuse links have potential to contain friable asbestos materials. Exposure to the asbestos inside may occur through accidental or mechanical damage.
2. As such, when fuse links are replaced, they must be removed and disposed of as asbestos waste.
3. The fuse carrier and fuse link at the Network Boundary are owned by Evoenergy (SPD or SPD/MPD). The MPD fuse carrier and fuse link are owned by the customer.

5.8.6 Service protection devices and meter protection devices on multi unit installation

Where there is a requirement to measure and record multiple loads such as residential/commercial units on a single lot, separate MPDs are required for each meter for each unit/premises over the single SPD. Meters are usually grouped and can be either multiple direct connected loads or CT metered systems. Refer to below figure 5 for single and three phase direct connected meter configuration for multi-unit installation.

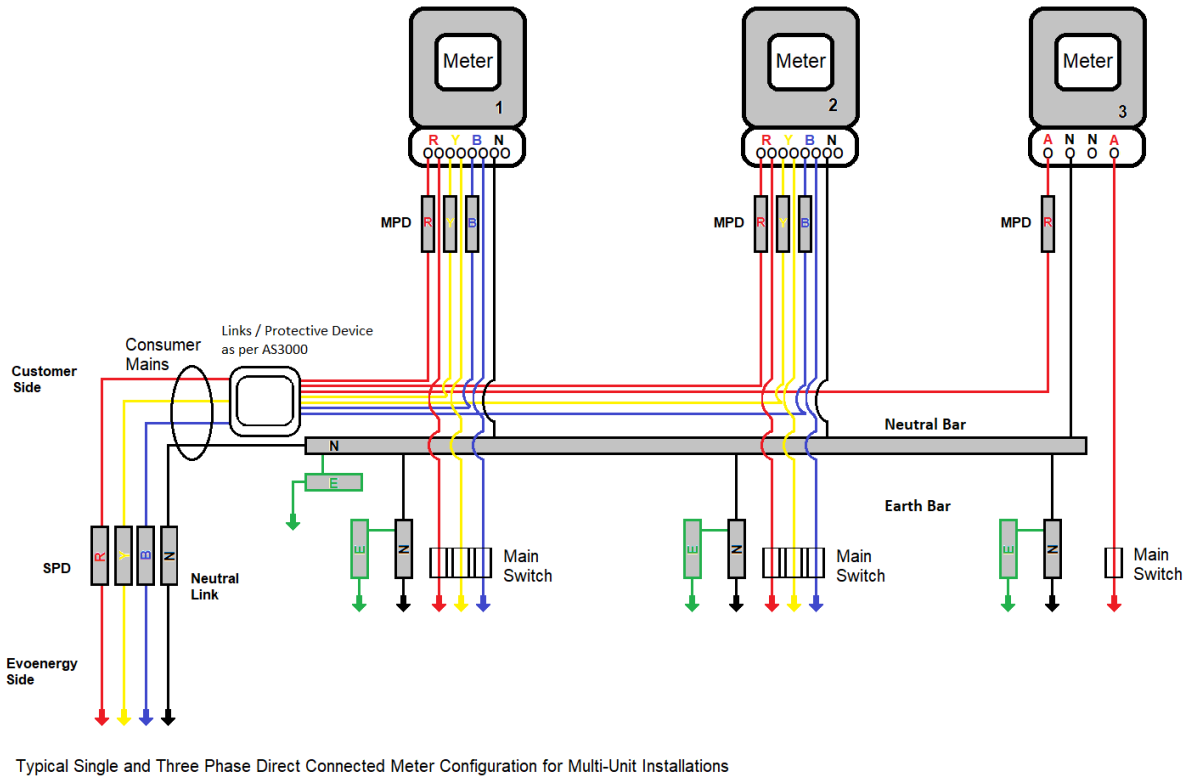

Figure 5. Typical Direct Connection SPD and MPD Arrangements for Multiple customers

5.9 Connection device greater than 100 Amps (protective or non-protective)

Service protection devices exceeding 100 Amps rating and non-protection device must be designed and installed in accordance with AS/NZS 61439.

5.9.1 General Requirements greater than 100 Amp Service Protection Device

Service protection devices exceeding 100 Amps must comply with:

1. AS/NZS 60269 ‘Low Voltage Fuses’
2. IEC 269 Part 2-1 ‘Low Voltage Fuses’
3. AS 60529 ‘Degrees of protection provided by enclosures (IP Code)’

The service protection device must also comply with the following requirements:

4. The assembly must be suitable for the installation of current limiting (HRC) fuses with a current rating from 200 Amps to 400 Amps.
5. A rated voltage not less than 500V.
6. Rated breaking capacity not less than 80kA.
7. The equipment must be supplied with the requested current rated fusible links. Where requested by the distributor, solid links must be fitted in lieu of fuses.
8. Have phase segregation dividers fitted to prevent phase to phase faults or use separately enclosed phase fittings. Where practical the fixed contacts should be shrouded to reduce the risk of contact with live parts.
9. The fuse assembly must be contained by an insulated enclosure. If within a metal switchboard the sides of the enclosure must be insulated.
10. The fuse assembly cover must be able to be adequately sealed, with or without the fuse link fitted. No live parts must be exposed during the sealing operation.
11. The fuse assembly may be either front or back connected.

12. A combined fuse-switch unit with segregation is satisfactory
13. Grade (discriminate) with Evoenergy's protection starting at 100ms and above and up to the arcing fault level deemed to be at 30% of the prospective short circuit current.

Where the service protective device consists of a base, insulating cover (turret) and fuse carrier, the insulating cover (turret) must be installed and secured before inserting the fuse carrier.

Where specialised insulated tools are necessary to make connections into the fuse base then the fuse manufacturer's instructions must be followed.

Service protective devices using fuses greater than 100 Amps must be vertically orientated with fuse withdrawal towards the operator. They must comply with *5.8* of this document. Please contact Evoenergy for installation above 400Amps.

5.9.2 Circuit breakers in lieu of 100 Amp service protection device

In special circumstances and on application to Evoenergy approval may be given to allow circuit breakers in lieu of a 100 Amp service protection device/fuse.

Where approved, the circuit breaker must comply with the requirements of *5.9.3*.

5.9.3 Circuit breakers in lieu of service protective devices greater than 100 Amps

Circuit breakers may be used as an alternative to service protective devices in accordance with the following requirements.

Circuit breakers to be installed must:

1. Be of the fault current limiting type, without considering the effects of cascading (if used).
2. Have a rated short circuit current capacity suitable for the installation and its prospective fault current.
3. Grade (discriminate) with Evoenergy's protection.
4. Have the facility for locking and sealing in the 'off' position.
5. Comply with AS/NZS IEC 60947.2 Low voltage switchgear and control gear - Circuit breakers and the emergency systems provisions of AS/NZS 3000.
6. Have any adjustable settings sealable such that only authorised persons have access. A sealed escutcheon does not satisfy this requirement.
7. Have unmetered active/live connections enclosed and have facilities for sealing to prevent unauthorised access.
8. Be maintained by the customer in accordance with the manufacturer's specifications.
9. Have a label describing the circuit breaker load current settings attached adjacent to the circuit breaker.

5.9.4 Non-protection devices

Any non-protection device such as isolator, load break switch, links, etc used as connection device at network boundary must comply with:

1. AS/NZS 61439 Low voltage switchgear and control gear assemblies
2. IEC 60947.2 Low voltage switchgear and control gear

5.9.5 Assembly to connection device ≥ 100 Amps (protective or non-protective)

The line network connection of service protection devices must:

1. Be at the top where mounted vertically, or
2. Have the network side labelled.

5.9.6 Identification

The Service protection device, and meter protection devices are to be clearly identified.

Every fuse that is used for service or meter protection devices shall have the fuse link element rating clearly marked below the device.

Where the service and or meter protection devices are not fitted in accordance with these rules or are not clearly visible, a notation on the metering panel must describe the location of the devices. All labelling shall be in a legible and durable manner in accordance with the AS/NZS 3000.

5.10 Rewireable fuses

When altering the service or consumers mains terminated at existing rewireable service protection fuses or carrying out any work on existing rewireable service protection fuses, the rewireable service protection fuse assembly must be replaced with a service protection device complying with *5.8*.

5.11 Service active link

The service active link must:

1. Be all insulated type.
2. Be fitted with a cover suitable for sealing.
3. Have a separate terminal for each conductor.
4. Have a current rating not less than the capacity of the incoming conductor.
5. Be located so that it is easily accessible and safe to work on.
6. Be identified to indicate they are “service active links” in a legible and durable manner in accordance with AS/NZS 3000.

Hinged panel construction may enable the link to be located on the rear of the panel, see AS/NZS 3000.

5.12 Neutral links

5.12.1 Service neutral link

The service neutral link shall be provided by the customer and must:

1. Be all insulated type.
2. Be fitted with a cover suitable for sealing.
3. Have a separate tunnel terminal for each conductor which is clamped by not less than two screws.
4. Have a current rating not less than the current carrying capacity of the associated incoming conductor.
5. Be located so that they are not higher than 2.0m and not lower than 0.5m above the ground floor or platform. For special situations check with Evoenergy.
6. Be identified to indicate that it is a ‘Service neutral link’. Labelling must be legible and durable in accord with AS/NZS 3000.

Evoenergy prefers to have service / meter neutral link to be located on the front of panel. However Evoenergy allows service or meter neutral link to be located on the rear of the panel only in hinged panel construction.

The service neutral link must accommodate:

1. The incoming main neutral conductor.
2. The neutral connection to the customer's neutral link.

The meter neutral link connection must be made using an appropriately sized conductor.

5.12.2 Meter neutral link

The meter neutral link must accommodate:

1. Be all insulated type.

2. Be fitted with a cover suitable for sealing.
3. Have a separate tunnel terminal for each conductor which is clamped by not less than two screws.
4. Have a current rating not less than the current carrying capacity of the associated incoming conductor.
5. Earthed in compliance with AS/NZS 3000 requirements
6. The incoming main neutral conductor.
7. A separate neutral conductor for each meter or load control device being installed.
8. Be identified to indicate that it is a 'Meter Neutral Link'. Labelling must be legible and durable in accord with AS/NZS 3000.

5.12.3 Service neutral link and meter neutral link combined

For single customer and dual occupancy installations, the functions of a service neutral link and a meter neutral link can be fulfilled by the one physical link provided.

5.13 Connection to the service equipment

If cables other than thermoplastic or elastomer- insulated stranded copper-conductor cable are used then these must be joined, or connected in an approved manner, to a cable of the required type and size for connection to this equipment.

A single cable only is to be connected to any one terminal of service and meter equipment.

For installations containing twin element off- peak water heaters, or a contactor as per *5.17.8* two cables may be connected into the meter load terminal.

The two cables must be twisted together.

Where there is the need to connect more than one meter to one phase of an unmetered supply or sub main, links must be used to arrange the circuits connected to the meters.

The wiring must be suitable for the maximum demand that it will carry.

If two load terminals are provided in the service protection fuse, you may connect an additional cable to supply a separately metered portion of the installation. Where more than two portions of the installation have to be supplied from one service protection fuse, a suitable, sealable service active link must be provided and installed.

5.13.1 Cable preparation and termination

Manufacturer's guidelines are to be adhered to with regard to the preparation and termination of cables into service and metering equipment.

All cables connecting to service and metering equipment must be prepared and terminated in the following manner:

1. Only a single conductor per terminal is permitted
2. Single cables with a cross sectional area of less than 10mm^2 must be twisted and doubled over
3. Soldering is not acceptable Cables must be adequately secured under all available termination screws.
4. There must be no more than 1mm of exposed conductor protruding from any termination, where located under a sealed enclosure.

5.13.2 Free length of consumers mains

The free length of consumer's mains to be installed, measured from where it passes through the hole in the panel, must be as follows:

1. Above fuse (line side) 75mm
2. Below fuse (load side) 150mm.

A similar length is required for the neutral conductor. All cables must be connected to the Service Protection Device and the neutral link by an Evoenergy authorised worker.

5.13.3 Maximum conductor sizes for services rated to 100 Amps

The maximum total conductor cross-sectional area which is permitted to be terminated directly at meters and 100 Amps service or metering protection fuses shall not exceed the design of the terminal.

5.13.4 Flexible switchboard and panel wiring

Flexible switchboard and panel wiring may be used to connect service and metering equipment, provided it is installed in accordance with the manufacturer's specifications.

5.14 Sealing of service equipment

All service equipment and unmetered links must be sealed in an approved manner. Nylon/plastic sealing wire will generally be used.

Seals on a service equipment and links that are found broken will be re-sealed by an Evoenergy authorised worker. Charges may apply for this work.

For service fuses, the applied seal shall restrict access to the installed fuse and its cartridge unless broken

This clause is not intended to prevent Metering Providers from removing and replacing seals in accordance with national metrology requirements and procedures.

The customer’s qualified representative is able to replace ruptured unmetered fuses, without Evoenergy staff attending to remove seals and reseal equipment. Sealable escutcheon panels may be used with either front or back connected fuses or circuit breakers to allow this.

Individual items of equipment such as unmetered links must be sealed. In some cases, it may be better to provide a sealable cover or panel over equipment which the customer does not need to access for maintenance.

5.15 Multiple installations

Examples of multiple installations are:

1. Multiple residential installations which include: a number of single domestic installations. Single domestic installations include a flat, unit or duplex unit
2. Groups of small shops and/or offices
3. Shopping malls
4. Factory units
5. Combinations of the above.

For large multiple installation developments, Evoenergy must be contacted as early as possible to prevent delays for connection of electricity.

The customer must provide for supply to each separately metered portion of an installation that is supplied from a single point of common coupling (PCC).

If the main switches have to be installed on the line side of the service protective device (before or after the upstream active links) the main switches must be rated to withstand the nominal short circuit currents.

For multiple installations, meter panels must be clearly and permanently labelled to indicate occupancy identification in accordance with *5.7.8* for all equipment to be mounted on the panel.

The customer shall refer to Evoenergy and the metering provider for space, service equipment and metering equipment requirements.

5.16 Supply for national electricity rule compliant communications equipment

Please refer to the metering providers requirements.

5.17 Off-peak supply and load control equipment

5.17.1 Storage water heater

"Storage Water Heater" shall mean a device in which water is heated and stored in a container and drawn off for use. (The term shall include a water heater incorporating a heat exchanger for transferring heat from the stored water to the water that is drawn off. The water within the exchanger cannot be used). Storage Water Heaters are eligible for connection to Off-Peak.

5.17.2 Thermal storage space heater

"Thermal Storage Space Heater" is a device by means of which energy in the form of heat may be stored in concrete, masonry, metal, liquid or other suitable material for a lengthy period and subsequently liberated to surrounding air. The device may be in the form of an independent unit, or it may be incorporated in the building structure, e.g. heating units embedded in a concrete floor. Thermal storage space heaters are eligible for connection to Off-Peak

5.17.3 Control of Off-Peak installations

Any installations that vary from these rules shall be discussed with Evoenergy prior to installation.

5.17.4 Other heating sources

Off-Peak is not available to electrically boosted water heaters where gas, kerosene or other types of fuel are used as the primary source of heating. However, electrically boosted solar storage water heaters will be supplied at Off-Peak under similar conditions to other types of electric storage water heaters. The rated hot water delivery will include the electrically heated and solar sections

5.17.5 Swimming pools and spa pools

An electrically heated swimming pool or spa pool is classified as a storage water heater and is eligible for connection to Off-Peak subject to minimum volume limitations as defined in AS/NZS3000.

The nominal capacity of the pool shall be taken as the rated hot water delivery in determining eligibility for supply at Off-Peak.

Note: Spa and turbo tubs that do not have self-contained heating elements are not storage water heaters and therefore do not qualify for Off-Peak tariffs.

5.17.6 Replacement of water heaters

Water heaters supplied by Off-Peak shall be replaced by water heaters of similar or increased volume.

5.17.7 Change over switching

The Electricity Network Schedule of Charges requires that single element water heaters and thermal storage heaters supplied at Off-Peak may be given supply only within prescribed hours. A changeover switch or meter function which would enable the water heater load, normally supplied at the Off-Peak Charge, be transferred by the customer to the Principal Charge is permissible. A changeover switch is to have an "off" position.

5.17.8 Requirements for installation of a contactor and minimum size of conductor

Where electricity is to be supplied only during certain hours in accordance with the provisions of a published tariff, Evoenergy may require the customer to directly control the load supplied under that tariff. The customer shall provide and install load control device/function acceptable to Evoenergy and the metering provider

Unless approved by Evoenergy, controlled load must not exceed 30 Amp single-phase. Where the load exceeds 50 Amp single-phase or is inductive, the customer must provide, install and wire a contactor so that it is operated by the load control device. The contactor must be a non-latching type with provision for sealing and be installed at the metering position. The customer shall also install the necessary wiring and ensure that the contactor is satisfactorily maintained.

All conductors associated with the Off-Peak supplies shall be a minimum 6mm2 or as approved by the metering provider in compliance to AS/NZS 3000.

The contactor control circuit must be controlled and protected by a 10A circuit breaker which must be sealable. The neutral conductor for the contactor coil must be terminated in the customer neutral link.

5.17.9 Calculation of maximum demand for Off-Peak charges in a domestic installation

When calculating the maximum demand for consumer's mains the demand of the off-peak elements shall be taken to be the full load current:

1. When the calculated maximum load is less than 100 Amps including the off-peak elements, the consumer's mains shall consist of a one phase two wire system.
2. When the calculated maximum load including the off- peak elements exceeds 100 Amps the consumer's mains may consist of a two phase three wire system

6 Customer installations

6.1 Limitations on connection and operation of equipment

6.1.1 Interference with supply to other customers

The customer's equipment shall be arranged and operated to prevent undue interference with the supply to other customers. See 2.13 for additional information.

The effects may be considered under the following categories:

1. Excessive fluctuations - equipment which would cause excessive voltage disturbances on the distribution system as a result of large or fluctuating load demands, e.g. arc furnaces, welding machines, x-ray units, frequently started motors including air conditioning equipment. Must comply with AS/NZS 61000.3.3 or SA/SNZ TS IEC 61000.3.5 and AS/NZS 61000.3.11.
2. Excessive distortion - equipment which would cause excessive distortion of the supply wave shape, e.g. rectifiers, frequency converters, electronic load control devices, saturable reactors.
3. The customer must ensure that harmonic distortion caused by the electrical installation or by any appliances is not in excess of the limits prescribed in AS/NZS 61000 part 3.2, 3.4 & 3.12 for low voltage.
4. Interference with frequency load control system - equipment which would adversely affect Evoenergy's load control equipment: e.g. shunt capacitors used in power factor correction of fluorescent lighting.
5. Generating systems which may have adverse effects on the network or the customer's installation.
6. The customer should take particular care to check that equipment in these categories complies with the limits and conditions imposed by Evoenergy.

6.1.2 Corrective action

If, in the opinion of Evoenergy, the customer should use or deal with the electricity supplied in such a way as to cause undue interference to the supply to other customers, the customer causing the interference shall take corrective action. The fact that Evoenergy has connected a premise that has equipment causing the interference shall not exempt the customer from the operation of this clause.

In this situation, and others where there may be doubt as to the effects of particular equipment connected, or intended to be connected, to supply, the customer should seek professional assistance.

The customer's low voltage equipment or groupings of equipment will generally be considered acceptable for connection if:

- Manufacturer declaration stating that this equipment complies with AS/NZS 61000.3.2 or AS/NZS 61000.3.12 (for harmonic currents) is available and either
- Manufacturer declaration stating that this equipment complies with AS/NZS 61000.3.3 (for voltage changes, fluctuation and flicker) is available or
- The network impedance at the connection point is less than the maximum permissible system impedance declared by the manufacturer in accordance with SA/SNZ TS IEC 61000.3.5 or AS/NZS 61000.3.11 (for voltage changes, fluctuation and flicker).

Connections at high voltage will be assessed for compliance using the recommendations of the applicable standard – TR IEC 61000.3.6 for harmonic emission limits and TR IEC 61000.3.7 for voltage fluctuation limits.

6.1.3 General equipment

Equipment, other than motors, having load changes not more than those specified in Table 10 for the frequency of load change indicated is acceptable for connection.

Where a piece of equipment includes a motor which is switched simultaneously with another load component, then the equipment is acceptable if the steady state load changes are within those specified in Table 10 and the motor starting current complies with 6.1.4.

6.1.4 Motors

The starting current of motors, which is significantly higher than running current, can cause a significant fluctuation of the supply voltage. Motor installations with associated starting/control devices must be designed to ensure that the starting current will not cause the reduction in voltage measured at the connection point.

Motors having starting currents not more than those specified in Table 11 for the starting frequency indicated are acceptable for connection.

6.1.5 Equipment requiring special consideration

Evoenergy may refuse to permit the connection of equipment in the following categories if they consider that by such connection, the supply to other customers would be adversely affected:

Equipment which would cause excessive fluctuation of voltage on Evoenergy's system as a result of its large or fluctuating demand, e.g.

Arc furnaces, welding machines, X-ray units and frequently started large motors. In such cases the customer shall provide any information requested by Evoenergy to determine whether the equipment complies with AS/NZS 61000.3.3 or AS 61000.3.5.

Equipment which would cause excessive distortion of the wave shape of Evoenergy's system voltage, e.g., rectifiers, frequency converters, load control devices using thyristors or saturable reactors.

In such cases the customer shall provide any information requested by Evoenergy to determine whether the equipment complies with AS/NZS 61000.3.2.

6.1.6 Conditional approval

Evoenergy may approve the connection of equipment having a fluctuating load characteristic and/or which causes waveform distortion subject to specified conditions of operation of the equipment.

Such conditions may include restrictions on frequency or cycle of operation, time-of-day restrictions, provision of harmonic filters or other auxiliary equipment, or a specified method of connection to the power supply.

Costs incurred shall be the responsibility of the customer.

Where such approval is granted, the customer shall not cause any change to the specified conditions without obtaining the approval of Evoenergy. Any approval previously given shall be void if any of these conditions are changed.

6.1.7 Balancing of load

The loading of an installation, or a separately metered part of an installation, which is supplied by more than one phase, must be arranged so that the maximum demand in an active service conductor is not more than 25 Amps above the current in any other active service conductor.

The total current in the service neutral conductor of a three-phase supply must not exceed the highest simultaneous current in any active conductor, including the effects of harmonic currents.

To determine which phase a single phase EG is to be connected to a three-phase supply refer to Section 7 more details.

Evoenergy may agree to other setting limits.

6.1.8 Protection from prospective short circuit currents

The electrical installation must be designed and installed in compliance with AS/NZS 3000 requirements so that it will perform satisfactorily under all fault conditions. Refer to 2.3 for more details.

Voltage of load units (volts AC)	Connection of load	Switching arrangement	Number of phases of supply	Acceptable changes of line current for indicated frequency of change (Amps)			
				More than 1/min	From 12/hour up to 1/min	From 4/hour up to 12/hour	Up to 4/hour
230	Line to Neutral	-	1	Refer to AS/NZS 61000.3.3 and AS/NZS 61000.3.5	13	18	25
		Phases not switched simultaneously	2 or 3		13	18	25
			2		13	18	25
		Phases switched simultaneously	3		21	30	43
400	Line to Line (no neutral connected)	Phases switched simultaneously	2		21	30	43
			3		21	30	43

Table 9. Limitations on connection and operation of equipment

Motor voltage (volts AC)	No of phases of supply	Acceptable starting current for starting frequency (Amps)			
		More than 1/min	From 12/hour up to 1/min	From 4/hour up to 12/hour	Up to 4/hour
230	1	Refer to AS/NZS 61000.3.3 and AS/NZS 61000.3.5	19	29	38
400	3		32	48	64

Table 10. Limitations on connection and operation of motors

6.2 Consumer mains

A consumer main is defined as the cable or overhead wire between the connection point/Network Boundary (as defined in the Electricity Network Boundary Code Determination 2013) and the main switchboard of the customer's installation.

1. Joints in unmetered consumer's mains are not permitted in any type of installations other than single domestic premise type installation unless approved by Evoenergy. In single domestic premise type installations, a joint in consumer main can be permitted by Evoenergy Person In-Charge, subjected to compliance with below conditions:

   a. The joint must comply with AS/NZS 3000

   b. The joint must be located in an area that readily accessible by Evoenergy,

   c. The joint must be made between cables of the same size, type and material

2. The conductors of consumer's mains shall be insulated in different colours for identification purposes. Where necessary, core identification may be achieved by sleeving in accordance with AS/NZS 3000 Wiring Rules. The use of electrical tape for this purpose is not acceptable.
3. The size of the consumer's mains shall be selected to the requirements of AS/NZS 3000 and these rules. The minimum size of the consumer mains shall be 6mm^2
4. The consumer's mains shall be installed in such a manner that in the event of a fault in the consumer's mains the impedance of the fault current path i.e. fault loop impedance path shall be low enough to allow sufficient current to flow to ensure proper operation of the protective devices.
5. The insulation resistance between conductors and between conductors and earth of consumer's mains shall comply with AS/NZS 3000 when tested by a 500V D.C. insulation resistance tester.
6. The consumer's mains must be in a condition that is fit for purpose and not physically damaged in any way.

6.2.1 Consumer main cable selection

The termination of large consumer mains cables at substations can present manual handling issues to Evoenergy personnel and electrical contracting personnel.

Consumer mains cables are terminated onto Evoenergy's equipment by installing the cable through a 90 degree bend upwards to terminate onto the switchgear. The flexibility of the consumer mains cable reduces as the cable size increases. Table 12 specifies the cable type and size that shall be used when connecting to the Evoenergy network.

6.2.2 Consumer mains termination

The customer shall supply Evoenergy with suitable lugs for all phase and neutral conductors and earth cables if required. Lugs shall be suitable for the cable (copper or aluminium) and bell-mouth type if being used with flexible cable.

A 12mm hole is required for all lugs and the holes must be deburred. An authorised worker/person may fit the lugs and terminate the consumer mains at the network boundary unless its access is restricted by Evoenergy (e.g. Substations)

Cable Size	Cable Type	
Up to 70 mm2	Hard Drawn	At Installers Discretion
	Soft Drawn	
	Flexible	
Up to 300mm2	Soft Drawn	At Installers Discretion
	Flexible	
Greater than 300mm2	Flexible	Mandatory

Table 11. Consumer mains types for connection to the evoenergy network

6.2.3 Mineral insulated metal sheathed cable

The customer is responsible for terminating MIMS cables in a manner satisfactory to Evoenergy.

6.2.4 Earthing

New electrical installations, and alterations or additions to existing installations must be earthed using a Multiple Earthed Neutral (MEN) system complying with the requirements of AS/NZS 3000.Refer also to 2.2.2.

1. The main earthing conductor or a bonding conductor must not be connected to the service neutral link or bar.
2. The MEN connection must be made at the first downstream consumer's neutral link. All subsequent customers' neutral links installed at the service position/main switchboard must originate from the first downstream customer's neutral link (at which the MEN connection is established).

6.3 Power factor

6.3.1 General

If the power factor, as determined by Evoenergy, of the supply taken by a customer's installation is such that, in the opinion of Evoenergy, the electricity network is not or would not be efficiently utilised or the supply to another customer is or would be adversely affected, the customer shall maintain such power factor at a value not less than 0.9 lagging.

No condition of operation of power factor correction equipment or variation of inductive load shall at any time cause the power factor of the installation to become leading.

The requirements for the installation of power factor correction capacitors at customers' installations are described in Appendix B.

6.3.2 Luminous discharge tubes and fluorescent lighting units (Other than single dwelling domestic installations)

The power factor of luminous discharge tube lighting installations, signs, fluorescent lamps, etc. shall not be less than 0.9.

Power factor correction is not required in installations with a total uncorrected connected load not exceeding 10 amperes.

6.4 Connection and disconnection of electrical installations

Legislation requires that electrical installations must comply with relevant safety standards at the time of connection and remain safe while connected to supply.

Disconnection by Evoenergy is possible if the contract conditions are not satisfied, but only after reasonable notice is given under customer connection / supply contracts and NECF provisions.

6.5 Availability of supply capacity

Customers should give notice as specified by Evoenergy of their supply requirements so that appropriate arrangements can be made. This particularly applies where a customer intends to install items of equipment which:

1. Place significant electrical loads on the electricity distribution system
2. May affect the quality of electricity supply to other customers
3. Export to the network and may have adverse effects on the network or the customer's installation.

Failure to apply in writing to Evoenergy may result in delays for connection. It may be necessary to reinforce the electricity distribution system or impose special conditions or restrictions on the operation and use of the equipment prior to any upgrading work that may be necessary to ensure satisfactory operation of the equipment.

6.6 Safe installation

The Electricity Safety Act 1971 requires that installation work on an electrical installation must:

1. Be compliant with AS/NZS 3000.

2. Not be connected to the network unless Evoenergy has permitted the connection to its distribution system.
3. Before commissioning is tested for safe operation and compliance with AS/NZS 3000 by a person authorised under the Electricity Safety Act to do electrical wiring work without supervision.
4. Be recorded and notified to Evoenergy and the owner of the electrical installation within 14 days of:
   a. Commissioning any installation work; and/or
   b. Completion of any safety and compliance tests.
5. Be maintained so as to ensure that:
   a. The safe and satisfactory operation of the installation is not impaired by interference or damage; and
   b. The live parts of the installation remain properly insulated, or protected against inadvertent contact with any person; and
   c. The installation is not used in a manner that exceeds the operating limit imposed by the design or installation.

6.7 Bush fire risk mitigation

The ACT Strategic Bushfire Management Plan for the ACT requires Evoenergy to have a Safety Management System in place covering the management of bush fire risk relating to electricity lines including electrical installations of customers connected to the network.

Further, in accordance with the Plan, in bush fire prone areas, Evoenergy may require customers to rectify defective installations including vegetation management. Where such work is not carried out, Evoenergy may carry out this work at the customers cost or alternately may disconnect an unsafe installation.

6.8 Inspection

Where an officer of Evoenergy, an appropriately authorised person or a duly appointed inspector as per the Electrical Safety Act performs an inspection, including any tests as part of the inspection, the assessment is limited to what can be observed or checked. This will depend upon the state of completion of the installation and does not guarantee that the work complies with standards in every respect.

If the board is not inspected by an Access Canberra Inspector by means of completed Certificate of Electrical Safety (CES) with testing sheet, the installation will be left de-energised. The service cable may only be connected but fuses won't be installed until Access Canberra Inspector has inspected the board with completed Certificate of Electrical Safety (CES) with testing sheet.

6.8.1 Point of entry / switchboard plan approval process

The point of entry cubicles must comply to Evoenergy standards and standard drawings that are available on Evoenergy website under Key documents. Evoenergy will not review/approve the Point of Entry / Switchboard Plans where proposed network boundary/service protection device is installed and, switchboard plans past the network boundary point. The areas past network boundary point are required to meet Australian Standards.

Point of entry/Switchboard manufacturers may contact network.connectionadvice@evoenergy.com.au for any guidance or queries relevant to point of entry cubicles for specific project site

Since 1 January 2021, the Access Canberra electrical inspections team require a Compliance statement for Main Switchboards (MSB) greater than 100 Amps, to be attached with the Certificate of Electrical Safety (CES) for the Main Switchboard (MSB) of a new electrical installation.

6.9 Disconnection

As a result of its inspection an officer of Evoenergy, an appropriately authorised person or a duly appointed inspector as per the Electrical Safety Act may disconnect, refuse to connect, or plan to disconnect supply to the installation or parts thereof that contravene AS/NZS 3000 or relevant installation provisions of these Rules.

When this occurs, the officer of Evoenergy an appropriately authorised person or a duly appointed inspector as per the Electrical Safety Act will give written notice to the customer and/or the customer's contractor advising of the contravention or defect.

If the defect creates dangerous situations, the officer of Evoenergy, an appropriately authorised person or a duly appointed inspector as per the Electrical Safety Act may take immediate disconnection action.

For defects of a minor nature Evoenergy may allow connection subject to rectification being completed within a period stated in the written notice.

Evoenergy may also disconnect or discontinue supply with reasonable notice to a customer for a breach of the customer connection or supply contract or NECF rules

6.10 High voltage installations

Application must be made to Evoenergy for the installation of facilities which will enable the connection of a high voltage installation to its distribution system.

Installations incorporating high voltage equipment must comply with Evoenergy's requirements and its Safety Management Systems.

Refer to Section 8, which provides further information on requirements for high voltage customer installations.

6.11 Private generation

6.11.1 Standby generation

Where the customer installs an alternative source of electrical supply, e.g. a standby generator, the proposed arrangements must be approved by Evoenergy. Approval must be given for facilities to connect the alternative source of supply to the electrical installation normally supplied from the distribution system.

Where Evoenergy agrees to the installation of facilities to enable an installation to be disconnected from the distribution system and connected to the alternate source, the systems must comply with Evoenergy's requirements. They must prevent the electricity retailer's service and metering equipment and distribution system from being energised by the alternative source. The switching of the generator neutral may be required to avoid multiple MEN connections. The normal supply neutral must not be switched.

A notice must be fixed to the main switchboard and other affected switchboards to show:

1. That the alternative supply facilities exist.
2. The section(s) of the installation they can supply.
3. Their point of control.
4. The conditions under which they may be operated.

Refer to Section 7 for more details.

6.11.2 Parallel generation

Application must be made to Evoenergy for the installation of facilities which enable the connection of a privately owned generation plant to its distribution system.

Installations incorporating inter-connectable (parallel) generation must comply with the Evoenergy's requirements. A customer requiring inter-connectable (parallel) generation will be required to comply with specific terms and conditions which may be incorporated in the negotiated customer connection contract.

The cost of designing, installing, operating and maintaining the private generating equipment is the customer's responsibility. Parallel operation of the generating equipment cannot commence until Evoenergy gives written approval. Evoenergy will advise of the conditions applicable.

Evoenergy must inspect and provide formal approval of all large, >30 kW, installations before the generating unit can be energised in parallel with the network. Refer to Section 7 for more details.

6.11.3 Temporary generation for customer installations

The temporary connection of a mobile generator to a customer's installation (which is considered as permanent load/installation typically supplied via Evoenergy's distribution network), must be carried out by licenced and authorised electrician. This requirement does not apply to temporary installation (such as show grounds, carnivals, tent etc) which has no means to interconnectivity with Evoenergy's distribution network, however it still requires

careful planning and execution to ensure safety and compliance with electrical standards and local governance bodies.

When connecting a generator to a permanent installation:

- Parallel operation is strictly prohibited. The generator must not operate in parallel with Evoenergy's distribution network under any circumstances.
- Isolation is mandatory. Both the active and neutral conductors must be physically disconnected from Evoenergy's network before any connection to the generator is made.

This arrangement is distinct from embedded generation, which involves approved systems designed to operate in parallel with the network under controlled conditions and with appropriate protection schemes.

Note: Customer's electricians should note connections to network neutrals regularly become disrupted during outages for network maintenance activities.

6.11.3.1 Customer installations with an earthing system

Where a mobile generator is to be connected to a customer's installation, the mobile generator and its connections shall be in accordance with:

- The principals of AS 2790 (Electricity Generating sets – transportable (up to 25kW)), (irrespective of the size of the mobile generator).
- 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

6.11.3.2 Connection to a customer installation without an earthing system

Where a mobile generator is connected directly to a customer's installation that does not incorporate an earthing system, (e.g., supply to individual item of equipment or a distribution switchboard remote from a main switchboard) a connection shall be made between the mobile generator bonding system and the generator winding neutral or star point connection. This is irrespective of whether the mobile generator is fitted with a residual current device.

Where the mobile generator is fitted with a RCD, it shall be enabled. The mobile generator bonding system shall be earthed by means of a separate earth electrode and the mobile generating bonding system shall be connected to all exposed metal of each item of equipment being supplied by the mobile generator. This is illustrated following in Figure 6. Following obtaining Before You Dig Australia (BYDA) plans the earth electrode must be driven into consolidated ground to a depth of at least 500mm.

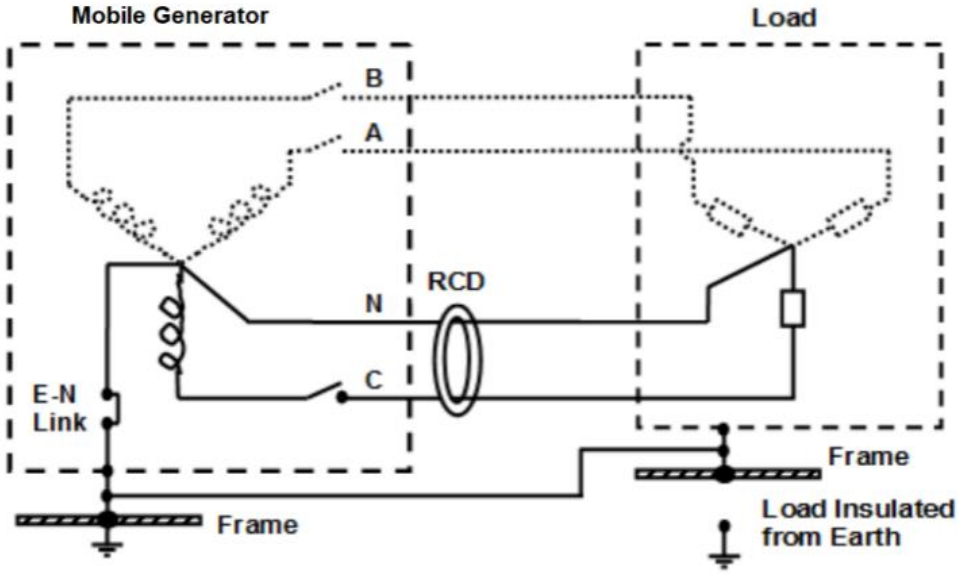

Figure 6. Configuration for mobile generator connection to customer installation without earthing

6.11.3.3 Electrical protection

- Generator must be provided with a circuit breaker with over-current and short circuit protection.
- Generator must be equipped with frequency-based protection systems that isolate the generator in case of the output frequency going beyond the prescribed limits.
- Generator must not be able to operate in parallel with Evoenergy network and therefore Anti-islanding check is not required.
- Adjustment of frequency and voltage may be required after the generator has taken load. generators 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. The single-phase voltage level must be checked and recorded to be as close to 240 V as possible. The load current should not exceed the generator rating.
- Residual current device (RCD) or Earth leakage relay must be fitted and 'Enabled' to establish the connection between the frame and the winding neutral or star point. Which is necessary to permit correct operation of the device.
- Residual current device (RCD) or Earth leakage relay are not required and if present then must be disable" when connected to an MEN system. With fixed MEN system 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.
- When shutting down a generator, the load must be first isolated by operating the circuit breaker without reducing the load and then the generator should be shut down in accordance with the manufacturer's instruction.

6.12 Unmetered supplies

Unmetered supplies are a restricted type of connection only provided for public facilities in public places where the energy consumption can be accurately assessed without the need for a meter.

Typical installations include traffic signals, small telecommunications installations, monitoring and surveillance equipment for public entities, and lighting for public facilities where standard public lighting criteria is not met. Small commercial connections, which otherwise meet the criteria for an unmetered network connection are also permitted provided the organisation has entered a separate agreement with Evoenergy and nominated retailer.

There are two different types of unmetered network connections, market and non-market.

- Non-market unmetered connections are recognised as installations settled directly between the electricity distributor (e.g. Evoenergy) and the local retailer.
- Market unmetered connections (or Type 7 metering installations) are recognised as installations settled in the National Electricity Market (NEM) and these connection customers are allowed to choose their energy retailer.

However, customers must apply through AEMO if they intend to be a market unmetered connection as well as applying to Evoenergy. Refer to AEMO's website for additional information about market approved unmetered loads.

Customers must obtain approval from Evoenergy before making a connection application if the customer does not already have an Approved Customer Number and an Approved Load Identification (Load ID) number for the proposed installation. Generally, the following minimum load requirements must be met:

- Maximum of 10 Amps single-phase.
- Supplied from one network Point of Common Coupling, or otherwise as agreed with Evoenergy.
- Energy consumption that can be assessed without a meter.
- Test Certificates and load analysis of the proposed device for connection.

To service un-metered installations the customer shall provide consumers terminals and suitable facilities as per Evoenergy Drawings 8913-212-01 and 8913-212-02.

6.13 Street Lighting

Streetlights may be connected to Evoenergy's network as an AEMO approved Type 7 un-metered supply. At the design stage all new street lighting projects are to be authorised by the customer or its delegated authority.

6.13.1 Street Light Approval Procedure

Where the customer undertakes additions and circuit modifications and there is no resultant additional AEMO approved Type 7 metering load greater than 5 Amps per phase to Evoenergy's network, the customer or its delegated authority can complete their construction work without requesting approval from Evoenergy. Otherwise, approval from Evoenergy must be obtained.

For each case, the customer or its delegated authority will need to request de-energisation/re-energisation of the street light controllers as part of managing their construction works

6.13.2 Identification of lighting installations in streets, parks or other public areas (not owned by the distributor)

Where a Street Lighting Customer installs a street lighting installation, then Evoenergy's requirements include that the installation conforms to:

- Australian Standard AS/NZS 3000, AS/NZS 1158 series; and
- Evoenergy's Service and Installation Rules.

6.13.3 Overhead and underground supplied street lighting system

All new street lighting projects are to be electrically connected between each street light column in the light circuit to an approved street light controller. Unless agreed between the customer and Evoenergy, street light equipment will not be permitted to be co-located with Evoenergy's infrastructure network including distribution poles, substations, pillars and pits.

Evoenergy will only connect to street light circuits where there is:

- Adequate detailed designs to ensure the augmentation, installation, commissioning and maintenance can be carried out without risk to the health and safety of any person when using these designs.
- An adequate system of record keeping of the construction drawings and electrical schematics which can be accessed via platforms such as "Before you Dig Australia."
- Instructions surrounding the adequate identification and labelling of circuits (especially when controlled and un-controlled circuits are within a single asset)

Street lighting loads must be balanced over the three distributor phases. The customer's electrical design must indicate on the low voltage street lighting plan the phase to which each luminaire is to be connected and receive approval from Evoenergy.

6.13.4 Cabling

Evoenergy requires that where underground low voltage mains are available for supply to streetlights, individually controlled streetlights shall be supplied by underground cable from the suitable Evoenergy service facility including a mini-pillar, link-pillar, POE cubicle, underground service pit, pole or substation. For lights which are near the underground low voltage network, a stand-alone arrangement with each steel lighting pole and luminaire is required.

6.13.5 Direct connection of consumers mains

For dedicated street lighting circuits, where the low voltage network does not extend to the location of the lights, the customer shall install consumer mains to a set distance from the nominated Evoenergy facility and provide a length of coiled up cable to be extended and terminated by Evoenergy. Refer to Table 13.

A consumer main minimum of 6mm² Copper double insulated cable compliant with AS/NZS 4026 is required.

The consumer end of the customer mains shall be connected at the MSB of the installation in accordance with the requirements of AS/NZS 3000. The customer's consumer mains will not be energised unless a Certificate of Electrical Safety in line with 1.1.20 has been affixed at the installation main switchboard. The customer is required to maintain records showing the route of the customer's mains and shall make these records available on a monthly basis and through a location's advice mechanism such as "Before You Dig Australia".

Service Facility	Distance from Service Facility	Amount of Cable Coil to be provided by the Customer
Pillar/Pit	0.5m	2.5m
Cubicle	0.5m	2.5m
Substation	1.5m	3.5m
Pole	0.5m	10m

Table 12. Customer cable lengths to be provided for connection to evoenergy assets

6.13.6 Assigning an un-metered connection point to an NMI

AEMO procedures define rules around creating an NMI. In assigning an un-metered connection point to an NMI, the LNSP must exercise additional judgement regarding the scope and materiality of any uncertainty in the allocation of the NMI for an un-metered load.

It needs to be understood that with any further infrastructure alteration/change of ownership, a single point of supply will restrict Evoenergy's connection to each customer/consumer and the requirement to isolate the entire connected load (via a single isolation point).

7 Alternate sources of supply

7.1 Alternate sources of supply

Evoenergy is committed to connecting renewable generation to its distribution network, while ensuring at all times that power supply to its customers is delivered in accordance with Evoenergy and Industry standards.

7.2 Connection and technical documentation

Evoenergy provides proponents of all embedded generator connections four documents, which contain information about their obligations for connection to, and interfacing with, Evoenergy's network. The relationship between the documents is displayed in Figure 7.

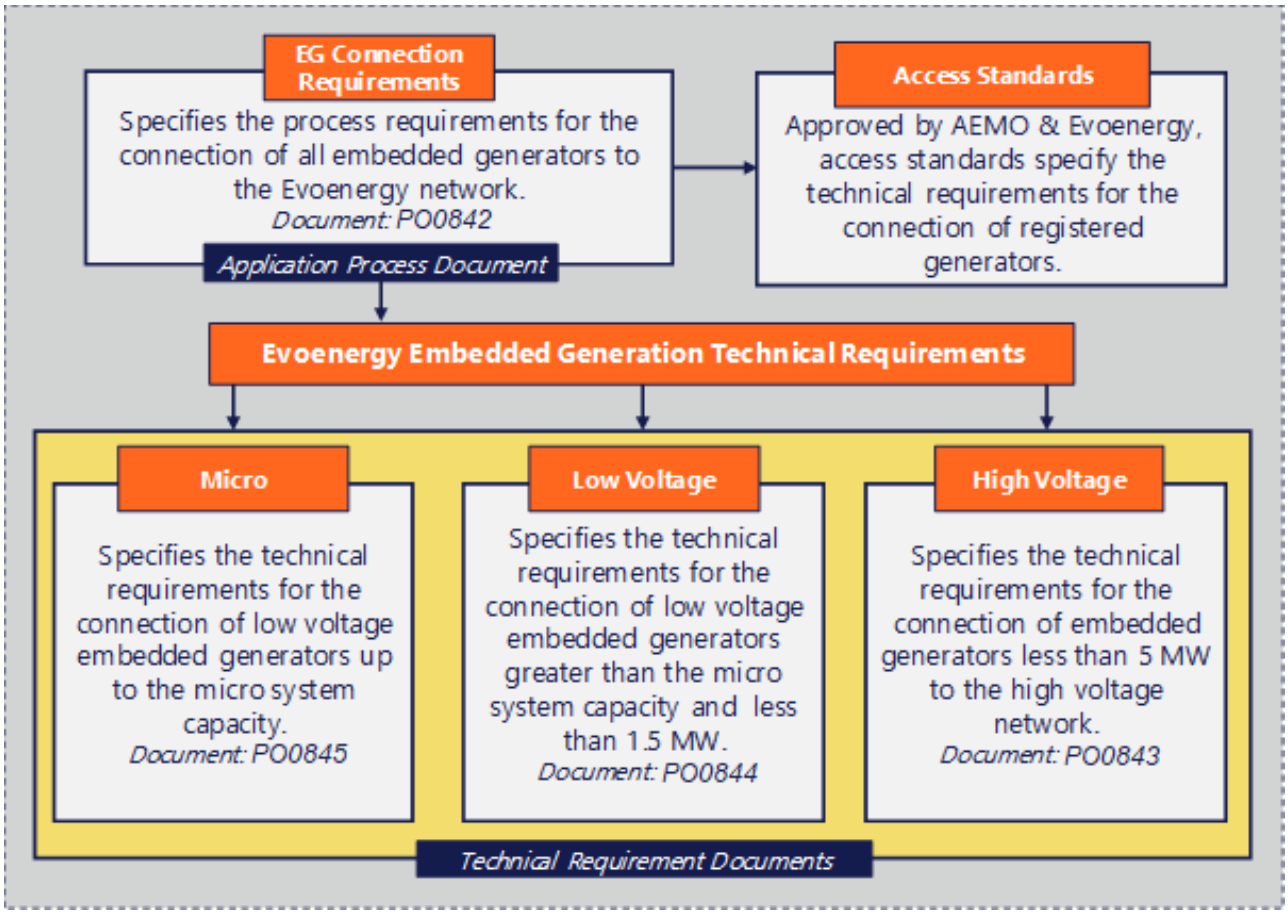

Figure 7. Connection and technical documentation

All Embedded Generators are subject to the requirements outlined in the embedded generation documents unless formally advised in writing by Evoenergy. The requirements are applicable to all new connections and modifications of existing systems where the system consists of an Inverter Energy System (IES), Energy Storage System (ESS), synchronous generators, asynchronous generators or any combination these categories. Embedded Generators that are outside the scope of the requirements include:

- Electric vehicles, unless the on-board battery storage system is capable of exporting to the network (in which case the requirements shall apply)
- Distributed energy resource systems that do not generate electricity including demand response / demand management systems, unless they impact on the ability of the system to meet the technical requirements
- Systems that are off-grid or operate in a non-parallel configuration

PO0842 contains requirements relevant to Embedded Generators registered within the National Electricity Market. However, PO0843 only form the basis for the technical requirements for Embedded Generators that are registered within the National Electricity Market and additional technical requirements will apply.

Evoenergy technical requirements documentation comply with the ENA National DER Connection Guidelines, with the exemption of the listed deviations within each document.

All information, including links to relevant technical and connection documents, can be found on the Evoenergy website http://www.evoenergy.com.au.

7.3 Obligations

Embedded Generation Proponents and Evoenergy have certain obligations to ensure the purpose of the embedded degeneration requirements is met. Proponents are required to:

- Comply with the technical requirements as well as relevant national standards, industry codes, legislation and regulations. In the event of inconsistency legislation and regulations, followed by the technical requirements, followed by national standards and industry codes shall prevail
- Withhold from connecting additional inverters, undertaking system modifications or installing additional embedded generation units, including ESS, without prior written agreement from Evoenergy
- Maintain compliance with the Evoenergy connection agreement
- Ensure the requirements are met with regard to the design, installation and operation Embedded Generating systems
- Meet the connection and commissioning requirements to the Evoenergy network

Evoenergy has an obligation to ensure the safe and reliable operation of the distribution system for operating personnel, customers and the general public.

7.4 Shared generation

Shared generation is where an embedded generation unit/s, or system, is electrically connected to, supplying, and shared between, multiple generators. For more information refer to shared generation clause in Evoenergy's Embedded Generation Technical Requirements Documents.

Document Number	Document Title
PO0843	Evoenergy HV EG Technical Requirements
PO0844	Evoenergy LV EG Technical Requirements
PO0845	Evoenergy Micro EG Technical Requirements

Table 13. Applicable embedded generation documents

8 High voltage customer installations

8.1 Introduction

This Section outlines the procedures and requirements for the supply of electricity at voltages higher than 1000V AC.

The purpose of this Section is to ensure the customer's high voltage installation consists of suitable equipment, provides a safe environment to operating personnel and the general public and does not adversely affect Evoenergy's supply system.

This section is to be considered in conjunction with Sections 1, 2 & 6 of these Rules, the High Voltage Electrical Installations Section of AS/NZS 3000, AS 2067 and Evoenergy's Safety Management Systems and applicable Australian or other approved Standards.

For loads above 5MW which are either likely to grow or cause significant voltage fluctuations to Evoenergy's supply system, supply at 11kV should be considered.

This section also applies to embedded generators connecting to the network at high voltage. For additional information, refer to Evoenergy document PO0843 Evoenergy HV Embedded Generation Technical Requirements. Enquiries on high voltage supply and installations should be directed at Network.ConnectionApplication@evoenergy.com.au.

8.2 General information

Supply of electricity will depend on:

- Availability.
- System constraints.

Customers who take supply at high voltage must bear the costs associated with:

1. Transformer energy losses.
2. The purchase, installation, operation, testing and maintenance of high voltage equipment
3. Spare equipment.
4. Insurance, interest and depreciation.
5. Compliance with the Evoenergy's Safety Management System.

Customers must also bear the cost of fees, deposits, charges or capital contributions which may be required by Evoenergy.

8.3 Submission of proposal

Where Evoenergy has agreed in principle to supply a new high voltage installation, alter or add to an existing high voltage installation, the proponent must lodge a detailed proposal and include the following key points:

1. The date at which supply is required.
2. Whether temporary or permanent supply is required. If temporary for how long is supply required.
3. A locality plan of the property.
4. The proposed system voltage.
5. A schematic diagram of the proposed electrical installation.
6. Loading details including, load characteristics and duty cycles of equipment.
7. Protection and control details.
8. The fault level gradients throughout the installation.

Considerable planning time may be necessary for Evoenergy to consider augmentation and/or an extension to the existing distribution system to accommodate the proposed high voltage installation. In particular, where the proposed load is relatively large or is located in a remote and un- reticulated area.

Potential high voltage customers are advised not to purchase or install any high voltage equipment before the design and construction programs have been accepted by both parties.

8.4 Provision of facilities for metering equipment

All metering equipment will be provided, installed and maintained by the customer subject to the agreed Customer Connection Contract and Operating Protocol offered by Evoenergy and the metering provider. The customer must arrange for the supply and installation of the metering equipment, including CT's, VT's and meters, in a suitable location, in accordance with Evoenergy's requirements, the metering provider's requirements and Chapter 7 of the National Electricity Rules.

The general requirements of Section 5 of these rules also apply where applicable.

8.5 Customer's high voltage installation

8.5.1 Connection point

The HV installation commences at the Connection Point, which is the point agreed between the customer and Evoenergy.

8.5.2 Compliance

The high voltage installation and equipment must comply with the requirements of:

1. The HV Electrical Installations Section of the AS/NZS 3000 and AS 2067.
2. These Service and Installation Rules.
3. Evoenergy HV requirements.
4. The Evoenergy Safety Management System
5. Applicable Australian or other approved Standards.

Evoenergy may disconnect high voltage installation from its network, where it is satisfied, on reasonable grounds that high voltage installation:

- Presents a safety hazard to Evoenergy's network, persons accessing or working upon Evoenergy's network, the public or any emergency services
- Is affecting the quality or reliability of supply to other customers supplied by Evoenergy.
- May or is affecting the safety, quality or reliability of the transmission network; or
- Is not compliant with these Rules.

8.6 High voltage customer safety management plan

Each HV customer shall have a High Voltage Installation Safety Management Plan. This plan considers the compliance requirements of these Rules and other relevant codes, guides and plans and must include the safety related plans, rules, maintenance procedures and relevant competencies of staff and contractors, to ensure the safe operation and maintenance of the installation.

An operator of a high voltage installation must provide Evoenergy with any changes to the above plan after energisation which may affect the operation of Evoenergy's network.

8.7 Fault levels

AS/NZS 3000 states that the electricity installation shall be designed to function as correctly as intended (including capable of performing satisfactorily under fault conditions). The short-circuit current which may occur at the customer's installation is dependent upon:

1. The prospective fault level at the Connection Point.
2. Any contribution which may be made by large rotating electrical plant connected within the installation.
3. Impedances within the installation.

The effect of the short-circuit current must be considered in the installation design. Evoenergy will advise in writing of the maximum prospective fault level on the distribution system at the Connection Point, under normal operating conditions. The fault level will be used to determine minimum equipment fault ratings.

Evoenergy will also advise of the network protection settings to the Connection Point so the customer protection settings can be graded accordingly.

The design submission must include details of the calculated fault levels throughout the installation.

8.8 Consumers mains

The required size and type of cables (and associated termination kits) shall be selected in consultation with Evoenergy.

Cable selection should consider the possibility of future load growth and be adequate for the maximum prospective fault level.

8.9 Bush Fire Precautions

High Voltage installations may represent particular hazards in relation to bush fire risk such as bare overhead lines, earthing systems, expulsion fuses and other protective devices, etc. For further pertinent information refer to the relevant clauses of AS/NZS 3000 and AS 2067.

8.10 Protection and control of incoming supplies

The customer must include protection devices in each incoming supply, as well as the control device required by the AS/NZS 3000.

Protection devices must ensure adequate discrimination with Evoenergy's protection devices, in the event of a fault on any part of the customer's installation.

The customer shall include the details of the proposed protection devices in the design submission.

Where batteries are used to operate the incoming supply circuit breaker's trip mechanism, the battery must be provided with:

1. Automatic charging equipment.
2. A battery-condition indicator.
3. An under-voltage alarms.

Refer to Attachment (B), which sets out the typical details on Evoenergy's requirements.

8.11 Insulation co-ordination

The safety clearances, separation of live parts and insulation levels (impulse strength) shall be in accordance with AS 2067 and other relevant Australian Standards.

8.12 Earthing

The earthing system of the customer's high voltage installation shall comply with AS 2067 and these rules.

8.13 Testing, witnessing and inspection

The customer must arrange and pay for the testing (to Evoenergy's satisfaction) of all high voltage equipment:

1. Within a new installation.
2. Involved in the repair, alteration or addition to an existing installation.

The testing must be completed before Evoenergy may permit the connection of the installation, or any part of it, to their supply.

Evoenergy reserves the right to witness any testing onsite of high voltage equipment.

The customer must provide Evoenergy with copies of all test reports from a NATA registered laboratory or an international equivalent indicating that the equipment has passed the required tests. These tests must be provided prior to the connection of the installation.

Evoenergy shall be provided with evidence of installation's compliance to the relevant standards, codes and legislations.

The person responsible for carrying out the work is required to submit the installation details on the relevant notification of electrical work form.

Evoenergy will not energise a new installation to the electricity network until that work has been inspected in line with 1.20.

8.14 Operation of the Customer's High Voltage Installation

The customer is responsible for the operation of the high voltage installation, including any switching of the customer's equipment.

The prospective high voltage customer shall establish and document effective operational procedures as part of their High Voltage Customer Safety Management Plan.

Evoenergy will agree to supply you at high voltage, only if the customer has:

1. The applicable high voltage operating authority
2. A trained electrical operator available and qualified to safely operate the high voltage switchgear.

The customer must provide the required safety and operating equipment for people working on the electrical installation, as outlined in AS 2467 'Maintenance of Electrical Switchgear'.

Attachment (C) of this section must be read in conjunction with this standard.

8.15 Maintenance

The customer must maintain the high voltage installation to ensure the electrical equipment is always in sound operating condition. It must be maintained to safely perform the functions for which it is designed.

Some of the relevant standards in this regard are:

Standard Number	Standard title
AS 1940	The storage and handling of flammable and combustible liquids
AS 2467	Maintenance of Electrical Switchgear
AS 60422	Mineral insulating oils in electrical equipment - Supervision and maintenance guidance
AS 60296	Fluids for electrotechnical applications - Unused mineral insulating oils for transformers & switchgear
IEC 61230	Live Working Portable equipment for earthing or earthing and short-circuiting

Before working on the installation, it must be earthed. The customer must provide suitable direct earthing equipment or use equipment with built-in earthing facilities.

8.16 Power factor correction

The customer must maintain the power factor at all metering points at a value not less than 0.9 lagging (customers supplied at a voltage in excess of 50 kV refer to the National Electricity Rules).

The customer may need to consider for power factor correction equipment in the initial design, refer *to 6.3* and Appendix B.

8.17 Power Quality Considerations

The customer must maintain the power quality limits set by Evoenergy and in accordance with Evoenergy's license conditions and these Rules. Refer to 2.13 and 6.1 of these Rules for further details.

ATTACHMENT (A)

[Required primary assets details for new or altered HV customer installations]

Some additional material that may be useful when considering a High Voltage Connection to Evoenergy's Network.

1. Circuit Breaker

- Manufacturer and Type
- Class - indoor or outdoor
- Rated voltage and load current
- Rated insulation level
- Rated short circuit current
- Secondary Schematics
- Details of any interlocking systems
- Set limits (e.g. SF6 alarms, lockout)

2. Power Transformer

- Manufacturer
- Rated voltages
- Rating (MVA, kVA)
- Vector group symbol
- Insulating medium
- Lightning impulse withstand level
- Tap Changer Details (Type, Range)
- Connections Type
- Secondary Schematics
- Set limits (e.g. Alarms and Trips)

3. Underground Cables

- Manufacturer
- Voltage designation and rating
- Number of cores
- Conductor material and size
- Type of insulation
- Site Installation details
- Type of terminations
- Faults withstand rating of core and screen
- Site Specific Rating
- Screen earthing details for all incoming supply cable

Note: Refer to 1.7 as it provides a useful reference to the applicable guidelines and standards.

ATTACHMENT (B)

[Required secondary assets details for new or altered HV customer installations]

For Evoenergy to assess the proposed secondary scheme(s), the customer must provide the following detailed information:

1. Single line diagram of the high voltage installation, including main transformers winding configurations, e.g. 11kV Delta- 415V Star
2. Loading details, e.g. maximum expected load, load characteristics, duty cycles, large motor starting details, etc.
3. Where the incoming protection device is a fuse:
   - Make and type
   - Rated current, Rated breaking current
   - Current-time characteristic curves
4. Where the incoming protection device is a circuit breaker:
   - A control and protection schematic diagram of the incoming circuit breaker(s).
   - Make, type, rated load current and rated fault MVA or rated breaking current of incoming circuit breaker(s).
5. Details of protection relays used, including:
   - Make and type
   - Thermal ratings of input circuit
   - Supply and I/O details
   - Setting range
   - Characteristic curves
   - Nominated Settings
   - Protection Design Report
   - Test reports/certificates
6. Details of Current and Voltage Transformers, specifying its:
   - Accuracy Class
   - Ratio
   - Short time rating (CT)
   - Excitation Voltage (CT)
   - Rated voltage factor and duration, Rated Burden
   - Proposed location
   - Length and size of secondary circuit wiring
   - Test reports/certificates

Note:

- CT's which utilise primary taps for ratio changes are not preferred.
- CT's located within a transformer tank or bushings are not preferred
- Protection design report detailing the next line of protection within the installation and demonstrating a realistic grading is being achieved.
- AC and DC supply schemes details. e.g., Switchboard, Battery and battery charger details
- Indicative date of when the protection is to be placed in-service.
- Refer to 1.7 as it provides a useful reference to the applicable guidelines and standards.

ATTACHMENT (C)

[Schedule of minimum operating procedures and safety equipment- HV customer installations]

Customers taking supply at high voltage must employ adequately trained staff or contractors. Customers must establish operating procedures and provide safety equipment to ensure the safe performance of all work on your installation.

All operating procedures must meet the overall conditions of AS 2467 ‘Maintenance of Electrical Switchgear’ namely:

1. The High Voltage Installation (HVI) responsible person must have a documented set of electrical safety rules covering all aspects of operating the high voltage installation. The Safety Rules documented in Appendix A of AS 2467 ‘Maintenance of Electrical Switchgear’ is the minimum requirement.
2. The HVI responsible person must provide all persons engaged in work on the high voltage electrical substations and/or installation with a copy of the electrical safety rules.
3. The HVI responsible person must prominently and permanently display the installation’s high voltage system operating diagram in each high voltage electrical substation.
4. The HVI responsible person must provide and cause the operators to be trained in the use of:
    a. High voltage earthing equipment designed to facilitate the earthing of all types of high voltage equipment within the installation
    b. Insulating mats, screens and other similar equipment necessary for the safe operation of the high voltage installation.
5. The HVI responsible person must provide testing equipment to prove that high voltage mains and apparatus are dead.
6. The HVI responsible person must provide appropriately coloured tape barriers and stands to display access permits clearly identifying isolated, proven de-energised and earthed sections of the high voltage installation on which work can safely be performed. White tape is impractical for snow prone areas.
7. The HVI responsible person must provide labelled storage facilities as close as practicable to the point of use for the equipment described in items 4 to 6 inclusive.
8. The HVI responsible person must display a safety poster prominently and permanently in each high voltage station within the installation. The poster must outline resuscitation methods and provide instruction in the release of persons from contact with live conductors.
9. The HVI responsible person must provide “access permit forms” to facilitate the monitoring of all persons accessing isolated sections of your electrical installation, to perform work and to ensure all such persons are clear prior to re- energising of the isolated section of the installation.
10. The HVI responsible person must ensure that only persons trained in the operation of the installation perform switching within the high voltage installation, and issue access permits authorising persons to work on isolated and earthed sections of the installation.
11. If the HVI responsible person requires isolation of Evoenergy’s high voltage supply(s), Evoenergy requires a completed “Operating Agreement”. This agreement must be between the HVI authorised operator and Evoenergy’s system controller.

The customer must submit documentation to Evoenergy outlining the practices, procedures and equipment proposed to be operated, to ensure the high voltage installation is managed in a safe and responsible manner.

For assistance with the written submission and formulation of the required HV switching and safety procedures consult Evoenergy’s Safety Management System.

9 Version control

Version	Details	Updated
-	Original	30th June 2003
1.0	Appendix A11, Clause 8.3 – Drawing connected	6th August 2003
2.0	Note regarding linked drawings added to cover page	28th April 2005
	Page re-numbered	
	Index of drawing added at page 8	
	Hyperlinks added for all drawings	
	Appendix 5, Clause 11 – Drawing list corrected	
3.0	Clauses 1.1 and 1.3 amended	13th July 2005
	Clauses 2.1 and 2.2 amended	
	Appendix A1 – Clauses 2 and 9 amended	
	Appendix A5 – Clause 2 amended	
	Appendix A7 – Title corrected	
	Appendix A8 – Clause 11 – Drawing list amended	
	Appendix A11 – Clauses 2 and 4 amended	
	Appendix A13 - Added	
	General – Improvements to fonts and layout	
4.0	References to BEPCON changed to ACTPLA	13th March 2007
	Clause 2.2 amended	
	Clause 3.5 amended	
	Clauses 4.2.2, 4.3.3, 4.3.5 and 4.4 (v) amended	
	Clauses 5.5 and 5.7 amended	
	Appendix A1 – Clauses 2 and 5 amended	
	Appendix A4 – Clause 4.3.3 amended	
	Appendix A14 - Added	
5.0	Index of drawings – drawings added for unmetered supplies and HV pole mounted metering unit	27th June 2013

Version	Details	Updated
	References to ACTPLA changed to ACT government	
	Clauses 1.1, 1.3, 1.4, 1.6, 1.10, 1.13 and 1.14 amended	
	Clauses 2.2 and 2.4 amended	
	Clauses 2.3 – Exceptional circumstances deleted	
	Clauses 3.1, 3.2, 3.4, 3.5, 3.7, 3.9 and 3.11.2 amended	
	Clauses 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8 and 4.9 amended	
	Clauses 5.1, 5.2, 5.3, 5.5 and 5.7 amended	
	Appendix A1 – Clauses 2,3,5,6,8 and 9 amended	
	Appendix A2 – Clauses 2.1, 2.2, 2.3, and 2.6 amended	
	Appendix A3 – Clauses 3.1, 3.2, 3.3, 4.2and 4.3 amended	
	Appendix A4 – Clauses 2, 3.1, 3.2, 4.1, 4.3, 5.1, 5.7 and 8 amended	
	Appendix A5 – Clauses 2, 6, 9 and 10 amended	
	Appendix A6 – Clauses 2, 3.2, 4.1, 4.2, 4.3, 4.6 and 5.3 amended	
	Appendix A7 – Clauses 2.1, 2.2, 3.1, 3.3, 4.3and 6 amended	
	Appendix A8 – Clauses 2, 3.2, 4 and 5 amended	
	Appendix A9 – Clauses 2, 3.1, 3.2, 3.3, 3.8, 4.2, 5, 6 and 7 amended	
	Appendix A10 – Clauses 1, 2, 3, 4 and 5 amended	
	Appendix A11 –Deleted	
	Appendix A12 – Clauses 3.6 and 4 amended	
	Appendix A12 – Clauses 3.9 - Added	
	Appendix A13 – Deleted	
	Appendix A14 – Deleted	
6.0	Drawings added for dual tenancy switchboard layout	26th September 2013
	Clause 5.5.1 amended	
	Appendix A10 – Clause 6 and 8 - amended	
	Appendix A11 - amended	

Version	Details	Updated
7.0	Drawing added for clearance requirement for swimming pool from electrical infrastructure	18th May 2015
	Clause 3.1 amended	
	Clause 5.7 amended	
8.0	Major re-drafting of Service and Installation Rules to comply with Power of Choice implementation. There have been substantive changes made to the various sections in the Service and Installation Rules therefore it is advised that you should read the entire document.	17th Nov 2017
8.1	Document updated for rebranding (Evoenergy)	11 Jan 2018
9.0	Minor amendments to sections 2.9, 5.2, 7.2 and 7.4.1, Appendix B	09th Nov 2018
10.0	Web link updates. Chapter 7 complete revision. New POE drawing updates and additions	4 November 2019
10.1	Amendment to table 7.1 to reference EG >5MW requirements	Jan 2020
11.0	Document updated on new template	Aug 2021
	Clause 1.6 updated	
	Clause 1.7 updated	
	Clause 5.2.3 updated with clause 1.9.1	
	Clause 2.4 updated	
	Clause 3.6 and 6.8 updated	
	Clause 5.8.5 updated and new Clause 5.8.6 added	
	Clause 8.1 amended 10MW to 5MW	
	Appendix C added for old installations	
11.1	Reference of “PO07107 Conduit Technical Standard” replaced with “PO0793 Civil Works Manual Volume 2” and Clause 6.2 updated	Mar 2022
11.2	Section 1.7.4 Industry Standard Reference “AS/NZS 4801” replaced and updated with “ISO 45001”	Mar 2022
11.3	Section 1.6 “RSM” definition, Section 1.1, 2.4.2, 2.12.4, 6.8.1 & 8.6 amended & 2.12.4 added	September 2022
11.4	Sections 4.4 and 4.7 neutral bonding requirements clarified, 4.7 roof structures clarified. Section 1.7.5, Removed reference to PO0812 and updated the document in new template.	October 2023

Version	Details	Updated
11.5	Clause 1.22 added for idle installation	March 2024
11.6	Drawing number and hyperlinks updated	July 2024
12.0	Definitions updated with reference to connection devices (SPD/NPD), network boundary and fuses	September 2025
	Terminology updated along with clause 1.16 as Basic Design Application (formerly the RSM), and the Basic Connection Application (formerly the RFS)	
	Clause 2.4 updated about number of services and their after application process	
	Clause 2.12 updated about load balancing requirement and maximum permissible single appliance load on a single-phase electrical system.	
	Clause 5.9 updated as connection devices either service protectice devices or non-protective devices.	
	Clause 6.11.3 added for temporay generators, highlighting the prohibition about parallel operation prohibition and mandatory isolation.	
	App ‘C’ &‘D’ updated in line with network boundary	
	Document updated on new template	

10 Document control

Document owner	Document custodian	Published date	Review date
Group Manager Strategy and Operations	Principal Engineer Standards and Specifications	02/12/2025	0PO1/12/2028

Appendix A
[Temporary installations]

Scope

This document outlines procedures relating to the connection of temporary installations. The following procedures will assist in meeting the reasonable needs of customers, contractors and Evoenergy, and avoid misunderstandings and delays.

General warning against premature expenditure

Evoenergy advise that no expense should be incurred by the prospective customer towards the erection of a temporary installation until Evoenergy has indicated, that connection to the network can be made available, and the conditions under which connection to the network is to be given.

Where it is not necessary to extend or augment the electricity network in an area, Evoenergy may install a temporary connection for a limited duration to supply electricity for specific purposes, such as a builder's power switchboard.

Where it is necessary to extend or augment the electricity network to provide connection services, the terms and conditions for connection will be subject to negotiation, upon receipt of a written request for connection to the network. Provision of a temporary connection in these circumstances is conditional upon availability of adequate construction resources.

Where a temporary connection is provided for construction purposes it will normally be disconnected at the time of installation of the permanent service equipment unless prior arrangements have been made by the customer.

Cost of temporary supply installation will be imposed upon the applicant.

Connection of Temporary Installations ≤ 100 Amps per Phase

Evoenergy will connect the installation if it complies with the following conditions:

1. A basic design application (BDA) form has been completed and submitted
2. Payment has been made for such charges, for any works required of Evoenergy, as may be determined by Evoenergy
3. A licensed electrician has submitted a Request for Service form and/or that a Certificate of Electrical Safety has been lodged with the ACT Government
4. An ACT Government electrical inspector has attached a sticker to the meter board that reads: “Authorisation for temporary supply for construction and demolition purposes” or “Authorisation for connection of permanent electrical installation to an electricity network”
5. An electricity account has been established with an electricity retailer.

Evoenergy will check the installation and, if found to comply with the conditions set out herein, will connect the installation. The connection of the temporary installation by Evoenergy will constitute Evoenergy's initial permission for the temporary installation to remain connected for a period not normally exceeding twelve months, unless discussed with Evoenergy.
For information on permanent supply along with temporary supply please refer to 2.4.

Connection of Temporary Installations > 100Amps per phase

Evoenergy will connect the installation if it complies with the following conditions:

1. A Request for preliminary electricity network advice (PNA) form to Network.ConnectionAdvice@evoenergy.com.au.
2. Payment of such charges, for any works required of Evoenergy, as may be determined by Evoenergy.
3. A licensed electrician submits a Request for Service form and/or that a Certificate of Electrical Safety has been approved by ACT Government; and
4. An electricity account established with an electricity retailer.

Evoenergy will check the installation and, if found to comply with the conditions set out herein, will connect the installation.

The connection of the temporary installation by Evoenergy will constitute Evoenergy's initial permission for the temporary installation to remain connected for a period not normally exceeding twelve months, unless discussed with Evoenergy.
For information on permanent supply along with temporary supply please refer to 2.4.

Temporary installation arrangements

Customers Installations

The customer is responsible for the erection of an approved metering enclosure and meter panel and, where required, an approved pole and or electrical conduits within the block.
The electrical installation shall be installed in accordance with this Appendix, AS/NZS 3000 Wiring Rules and AS/NZS 3012 Electrical installations - Construction and demolition sites.

Mounting of Switchboards

Switchboards and metering enclosures shall not be mounted on Evoenergy's poles or on poles located outside the block. A domestic metering enclosure temporarily supported in its permanent position by commercially available support arrangement may also be used. These support arrangements must be structurally certified to perform the functions for which they were designed and approved by both Evoenergy and ACT Government Electrical Inspectorate.
Evoenergy Drawing 8913-22-03 shows the minimum requirements for the support arrangement.

Earthing

The Multiple Earthed Neutral (M.E.N.) system of earthing shall be used. Refer to 2.2 and 6.2.4.

Metering (Where applicable)

Refer to Section 5, 1.13 and 1.20 for the associated requirements

Overhead Connection

Evoenergy will provide an aerial service cable to a point not further than 15m from its pole, for further details refer to Evoenergy Drawing 8914-201.

Underground Connection for Domestic Installations

Evoenergy will provide an underground service cable to the permanent metering position in a domestic installation. The customer shall provide an underground conduit from the boundary to the metering enclosure. See Evoenergy Drawings 8912-02 and 8912-03.
The electrical contractor shall install consumer's mains to supply the temporary installation (refer to Evoenergy Drawing 8914-202) and no additional charge will be made by Evoenergy to reconnect these mains to the permanent metering equipment during normal working hours.

Underground Connection for Commercial Installations

Evoenergy will provide an underground service cable to an agreed temporary metering position on a commercial installation. The customer shall make provision for the installation and termination of the service cable, and the installation of all metering equipment.
Any person carrying out work or other activities under, over or adjacent to any Evoenergy asset which could in any way affect access to, clearances from or the safety of persons near such asset is required to notify Evoenergy and to obtain the necessary approvals.

Shows, carnivals and tents

Temporary installations for shows, carnivals and tents shall comply with AS/NZS 3001 Electrical installations - Relocatable premises (including caravans and tents) and their site installations, AS/NZS 3002 Electrical installations - Shows and carnivals, AS/NZS 3004 Electrical Installations – Marinas and recreational boats, AS/NZS 3012 – Electricity installations – Construction and demolition sites for providing a temporary electricity supply to a customer and AS/NZS 3000 Wiring Rules.

Any person proposing to carry out a temporary electrical installation is required to provide notification to ACT Government and Evoenergy, to obtain the necessary approvals and to pay the applicable fees and charges.

Evoenergy drawings

The following Evoenergy drawings form part of this publication:

Drawing Number	Drawing title
8912-02	Underground Service Conduit Requirements
8912-03	Typical Underground UG & OH Service Cable Conduit-Requirements for a Single Domestic or Commercial Installation
8914-201	Temporary Installation Residential Blocks O/H Supply
8914-202	Temporary Service Installation Residential Blocks with Underground Supply Connection
8913-22-03	Domestic Meter Box/Enclosure Support Arrangement

Table 14. Applicable Evoenergy drawings

Appendix B
[Installation of power factor correction capacitors at customers installations]

Industrial and commercial loads require significant amounts of reactive power (kVArs) for the operation of motors, furnaces, electric discharge lighting and the like. The result is a low power factor. The low power factor can be improved by applying capacitors to supply this reactive power.

Minimum Power Factor Clause

An electrical installation shall have a power factor of 0.9 or greater lagging.

What is Power Factor?

Power Factor is all about the effective use of Evoenergy's distribution system. It is a measure of how effectively you turn the electricity supplied to your business into actual productive power (i.e. light, heat, motive power). By improving your power factor you could reduce your energy costs if it is charged at a tariff incorporating a kVA demand component or a power factor penalty.

The costs of a kVA demand type tariff and a kWh tariff are not the same. There is a difference between the power supplied to your premises Apparent Power (measured in kVA) and the power consumed in your electrical equipment Real Power (measured in kW).

This difference is due to electromagnetic fields. Reactive Power (measured in kVAr) is required to establish electromagnetic fields which allow magnetic coils to operate. These coils are found in fluorescent and mercury vapor lighting, electric motors and many other types of equipment.

Expressing Power Factor

Commercial and industrial customers, by the very nature of their activities, require in addition to real power, a significant proportion of reactive power.

Magnetic fields in motors, induction furnaces, transformers and discharge lighting are maintained by reactive current.

Reactive power is not seen by the kWh energy meters, but its presence causes a demand kVA to be significantly higher than the kW value, as shown below.

This relationship is represented mathematically by the cosine of the angle Ø between real power and apparent power.

Power Factor = kW/kVA = Cos Ø

Obviously, correction of the power factor to near unity (Cos Ø =1, Ø = 0 degrees), will minimise the kVA demand.

Connecting capacitors to an electrical installation achieves this.

Why Power Factor is Important to your Business

Improving power factor can result in significant benefits and can be achieved in two ways:

1. Higher power factor will reduce peak kVA demand and save money on the maximum demand component of an electricity bill.
2. If the main switchboard or service/consumers mains are loaded to capacity, an improvement in power factor may provide additional capacity at a lower cost than the replacement of the switchboard or upgrading of the service/consumers mains.

Power Factor Correction

A higher power factor for the installation can be achieved by reducing the total amount of reactive power required by your electrical installation.

In most cases power factor is best corrected by connecting capacitors at the load terminals, for example, at each motor or each luminaire. However, for economic reasons power factor correction usually takes place at the customer's main switchboard using switchable capacitor banks. The cost of installing power factor correction capacitors can usually be recovered through reductions in electricity costs

Improvement of power factor is usually achieved by the installation of capacitors but unless these are correctly installed, serious problems can arise such as overcompensation, generation of excessive harmonics, and creation of over voltage transients. These problems can affect the quality of the electricity supply, both in the customer's installation and also in the installations of other customers.

Evoenergy Requirements

The requirements set out below must be observed in order to minimise these and other associated problems. These requirements are intended for application at switchboards or significant individual loads, although some aspects are also relevant to small individual loads.

Power Factor

Customer power factor at the point of common coupling (PCC) with the Evoenergy network shall be between 0.9 lagging and unity. Leading power factor is not acceptable.

Compliance with Relevant standards

Compliance is required with the relevant parts of AS/NZS 61000 Electromagnetic compatibility (EMC) with respect to harmonic limits and voltage fluctuation limits during steady state operation and switching conditions. Notwithstanding the above, compliance is also required with the Evoenergy Service and Installation Rules; especially with respect to a customer not causing undue interference to another customer quality of supply, and Evoenergy reserving the right not to assign the complete fluctuating load capability, or voltage distortion capacity, of the system to any one customer, in order to reserve capacity for future customers or other existing customers.

Switching Steps

On LV circuits, automatic control of capacitors shall not exceed 50 kVAr steps. On HV circuits the allowable step size will depend on compliance with the above Standards.

Resonance Mitigation

Appropriate measures shall be employed to avoid resonance with the network and to limit in-rush currents. These measures could include, for example, detuning reactors and resistors. On HV circuits the impedance values of this equipment shall be provided with sufficient adjustment capability (for example, ± 20%) to cater for future Evoenergy network impedance changes that may arise from transformer tap changes, network feeder changes, etc.

Fault Isolation

Protection schemes that rapidly detect and isolate faults in the power factor correction installation so as not to adversely impact on the network shall be included. Phase voltage imbalance protection across the capacitors shall also be provided on HV circuits.

Switchgear

Switchgear used for capacitor bank fault breaking/making, switching and isolation has a more onerous duty cycle than that used on general circuits, and must be suitably rated for capacitive currents, fault levels, and possible associated over voltages. All power factor correction equipment shall comply with relevant Australian Standards with an appropriate allowance for over voltages and over currents due to harmonics, resonance and power factor.

Switching and fault isolation equipment shall operate on all phases simultaneously. The switching device shall comply with the requirements of IEC 947-5-1 and VDE 0660-200 which defines the duty of the device as suitable for “switching of capacitors”.

Isolation

Isolation of the capacitor bank via fuse links or the power factor controller that operates capacitor contactors is not acceptable.

Discharge of Capacitors

All capacitors shall be self-discharging (not via fuses) and shall be provided with independent means of direct capacitor discharge and with earthing facilities. Prominent labels advising workers of the correct application method and discharge time duration to avoid electrical hazard shall be provided.

Disposal of Capacitors

Capacitor units shall not contain any material that is classified as hazardous or which will require special disposal provisions, e.g. PCB's.

Avoidance of Back Generation

Power factor correction installations shall be designed to prevent self-excitation to ensure that back generation into Evoenergy's network does not occur.

Star Point Earthing

Capacitor banks that are Wye connected shall have the star point unearthed to avoid triple harmonic current flow, and to avoid de-sensitisation of earth fault protection schemes. Evoenergy may consider alternative connection arrangements if proposed by the customer.

Documents required for a connection proposal

Power factor correction proposals submitted to Evoenergy shall include a Single Line Diagram, calculations and other documentation to demonstrate compliance with these requirements.

The information submitted shall include:

- Equipment ratings
- Capacitor switching step sizes
- Data for calculation of harmonic current and voltage content at the PCC
- Data for calculation of the natural resonant frequency of the installation
- Magnitude and duration of inrush currents and transient voltages during switching
- Details of protective devices
- Manufacturer's type and routine test certificates.

Acceptance by Evoenergy of an installation proposal is only in relation to connection to the Evoenergy network. Any installation approvals required by ACT Government shall be the responsibility of the licensed electrician submitting the proposal.

Upon request, Evoenergy will advise network fault levels at the customer's PCC to facilitate installation calculations.

Appendix C
[Network Boundary]

'Network Boundary' shall refer to the boundary between Evoenergy's electricity network and customer's premises.

1. Active conductor(s): The network boundary is on the customer's side termination of connection device (which could be service protection device or non-protection device depending upon the type of connection).
2. Neutral conductor: The network boundary may be on either the customer or Evoenergy side of neutral link, neutral connector or neutral bar depending upon the type of connection.
3. For HV customers; the network boundary to be agreed in writing between the customer and Evoenergy.

C.1 For underground supplies up to 100Amps:

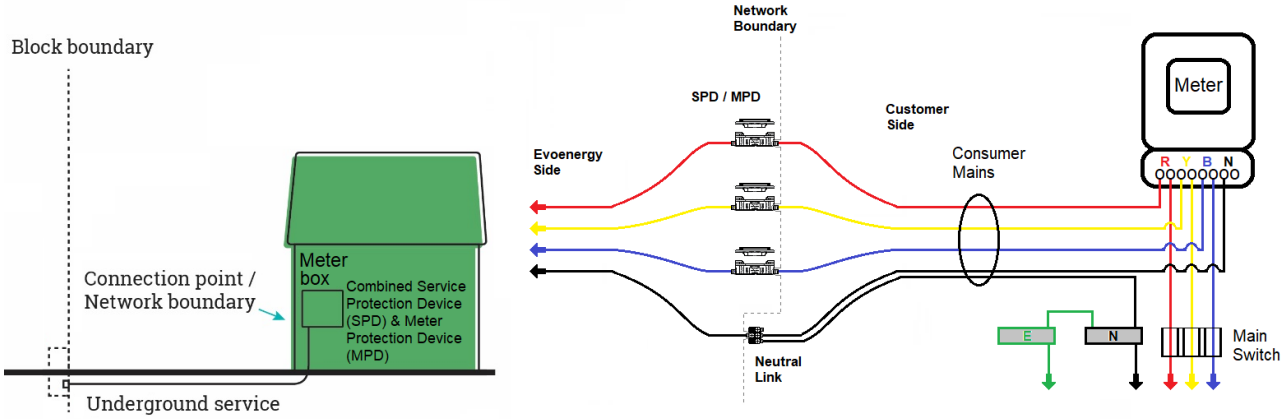

Figure 8. For underground supplies up to 100Amps

- SPD / MPD to be provided and installed by Evoenergy along with Evoenergy side of phase cables in SPD / MPD.
- Consumer mains to be provided and installed by Customer's electrical contractor, but to be terminated in SPD by Evoenergy.
- Neutral link to be provided and installed by Customer's electrical contractor along with Customer side of neutral cable terminated in neutral link (if authorised), otherwise by Evoenergy.
- Evoenergy to install & terminate its side of neutral cable in neutral link.

C.2 For overhead supplies up to 100Amps:

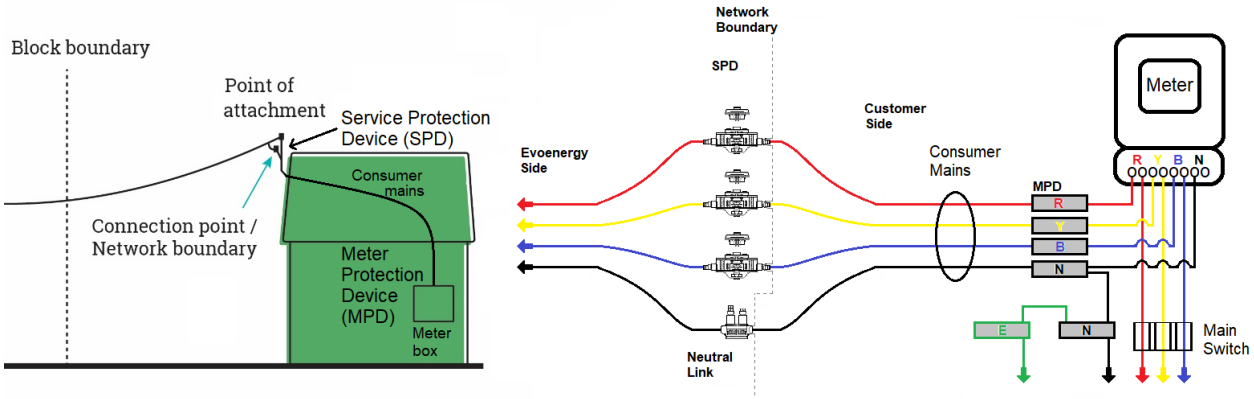

Figure 9. For overhead supplies up to 100Amps

- SPD to be provided and installed by Evoenergy along with Evoenergy side of phase cables in SPD.
- In some old installation, separate MPD may not be present before meter, so the protective device at the point of attachment may be as combined SPD / MPD.
- Consumer mains to be provided and installed by Customer's electrical contractor, but to be terminated in SPD by Evoenergy.
- Neutral link (IPC) to be provided and installed by Evoenergy.
- Customer side of neutral cable can be terminated in neutral link (IPC) by Customer's electrical contractor (if authorised), otherwise by Evoenergy.
- Evoenergy to install & terminate its side of neutral cable in neutral link (IPC).

C.3 For commercial overhead supplies up to 315Amps:

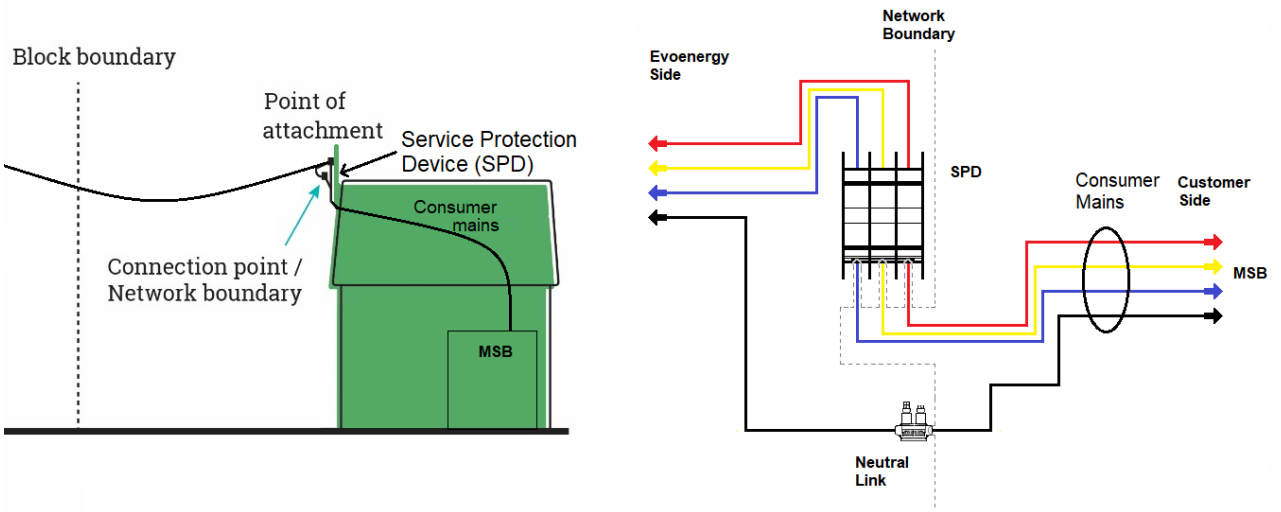

Figure 10. For commercial overhead supplies up to 315Amps

- SPD to be provided and installed by Evoenergy along with Evoenergy side of phase cables in SPD.
- Consumer mains to be provided and installed by Customer's electrical contractor, but to be terminated in SPD by Evoenergy.
- Neutral link (IPC) to be provided and installed by Evoenergy.
- Customer side of neutral cable can be terminated in neutral link (IPC) by Customer's electrical contractor (if authorised), otherwise by Evoenergy.
- Evoenergy to install & terminate its side of neutral cable in neutral link (IPC).

C.4 For underground supplies through fuse at POE:

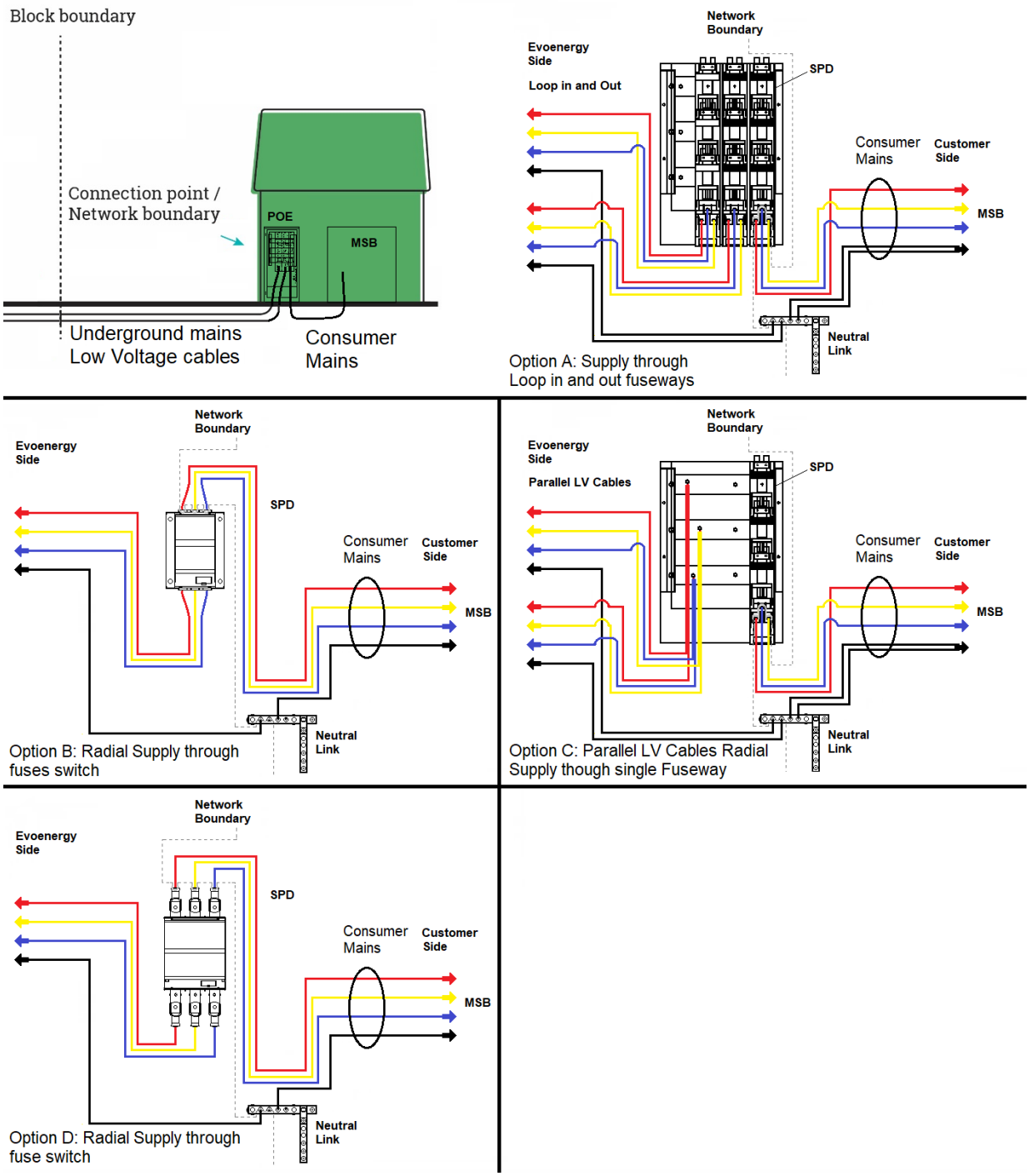

Figure 11. For underground supplies through fuse at POE

- SPD to be provided and installed by Evoenergy along with Evoenergy side of phase cables / busbars in SPD.
- Consumer mains to be provided and installed by Customer's electrical contractor but to be terminated in SPD by Evoenergy.
- Neutral link to be provided and installed by Customer's electrical contractor along with Customer side of neutral cable in neutral link.
- Evoenergy to install & terminate its side of neutral cable in neutral link.

C.5 For underground supplies through fuse/breaker at Padmount/Chamber Substation inside property boundary:

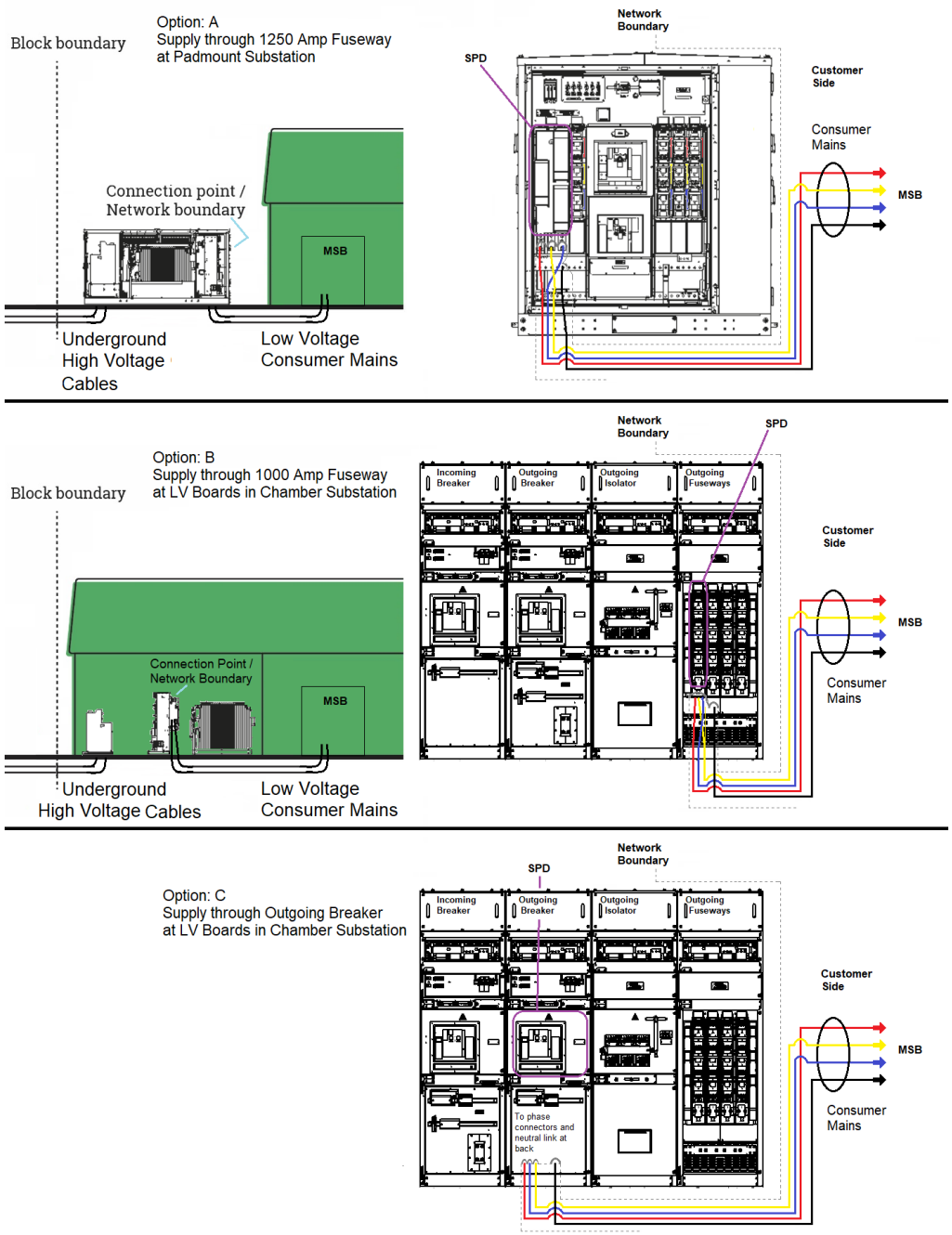

Figure 12. For underground supplies through fuse/breaker at Padmount/Chamber Substation

- SPD (fuse / breaker) to be provided and installed by Evoenergy along with Evoenergy side of phase cables / busbars in SPD.
- Consumer mains to be provided and installed by Customer's electrician / contractor but to be terminated in SPD/MPD by Evoenergy.
- Neutral link to be provided and installed by Evoenergy along with Evoenergy side of neutral cable / busbar in neutral link.
- Customer side of neutral cables to be provided and installed by Customer's electrician / contractor but to be terminated in neutral link by Evoenergy.

C.6 For underground supplies through non-protective devices (Isolator, Load Break Switch, Links, etc) at Padmount/Chamber Substation inside property boundary:

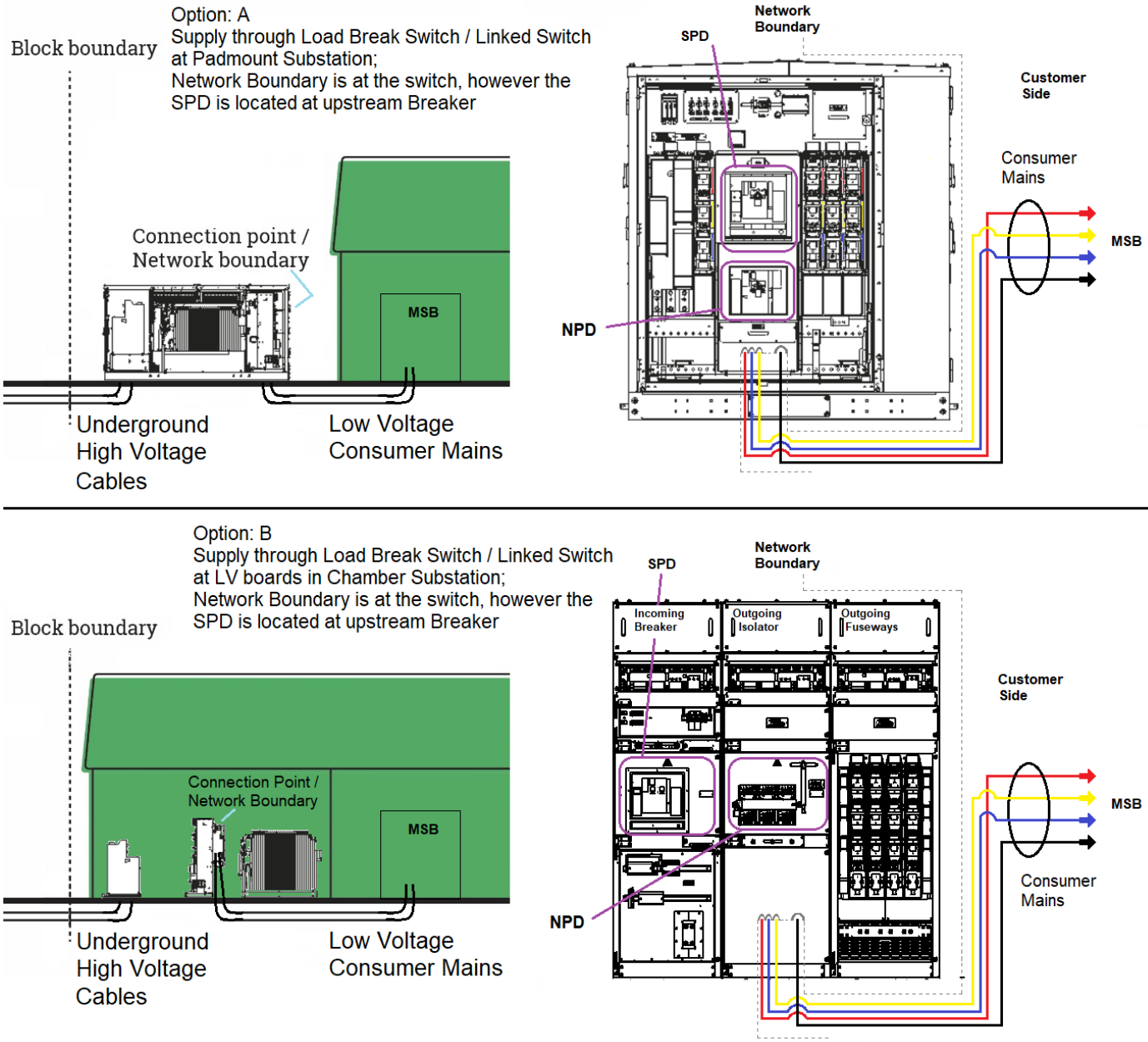

Figure 13. For underground supplies through Links at Padmount/Chamber Substation

- SPD in this case will not be along with network boundary but to be located upstream protecting the non-protective devices (Isolator, Load Break Switch, Links) at network boundary.
- Non-protective devices at network boundary to be provided and installed by Evoenergy along with Evoenergy side of phase cables / busbars from SPD to the non-protective devices.
- Consumer mains to be provided and installed by Customer's electrical contractor but to be terminated in non-protective devices by Evoenergy.
- Neutral link to be provided and installed by Evoenergy along with Evoenergy side of neutral cable / busbar in neutral link.
- Customer side of neutral cables to be provided and installed by Customer's electrical contractor but to be terminated in neutral link by Evoenergy.

C.7 For underground supplies through non-protective devices (Isolator, Load Break Switch, Links, etc) at POE:

- SPD in this case will not be along with network boundary but to be located upstream protecting the non-protective devices (Isolator, Load Break Switch, Links) at network boundary.
- In this case SPD is located outside the property boundary, whereas the neutral link is located inside the property boundary along network boundary.
- Non-protective devices at network boundary to be provided and installed by Evoenergy along with Evoenergy side of phase cables in NPD.
- Consumer mains to be provided and installed by Customer's electrical contractor but to be terminated in non-protective devices by Evoenergy.
- Neutral link to be provided and installed by Customer's electrical contractor along with Customer side of neutral cable in neutral link.
- Evoenergy to install & terminate its side of neutral cable in neutral link.

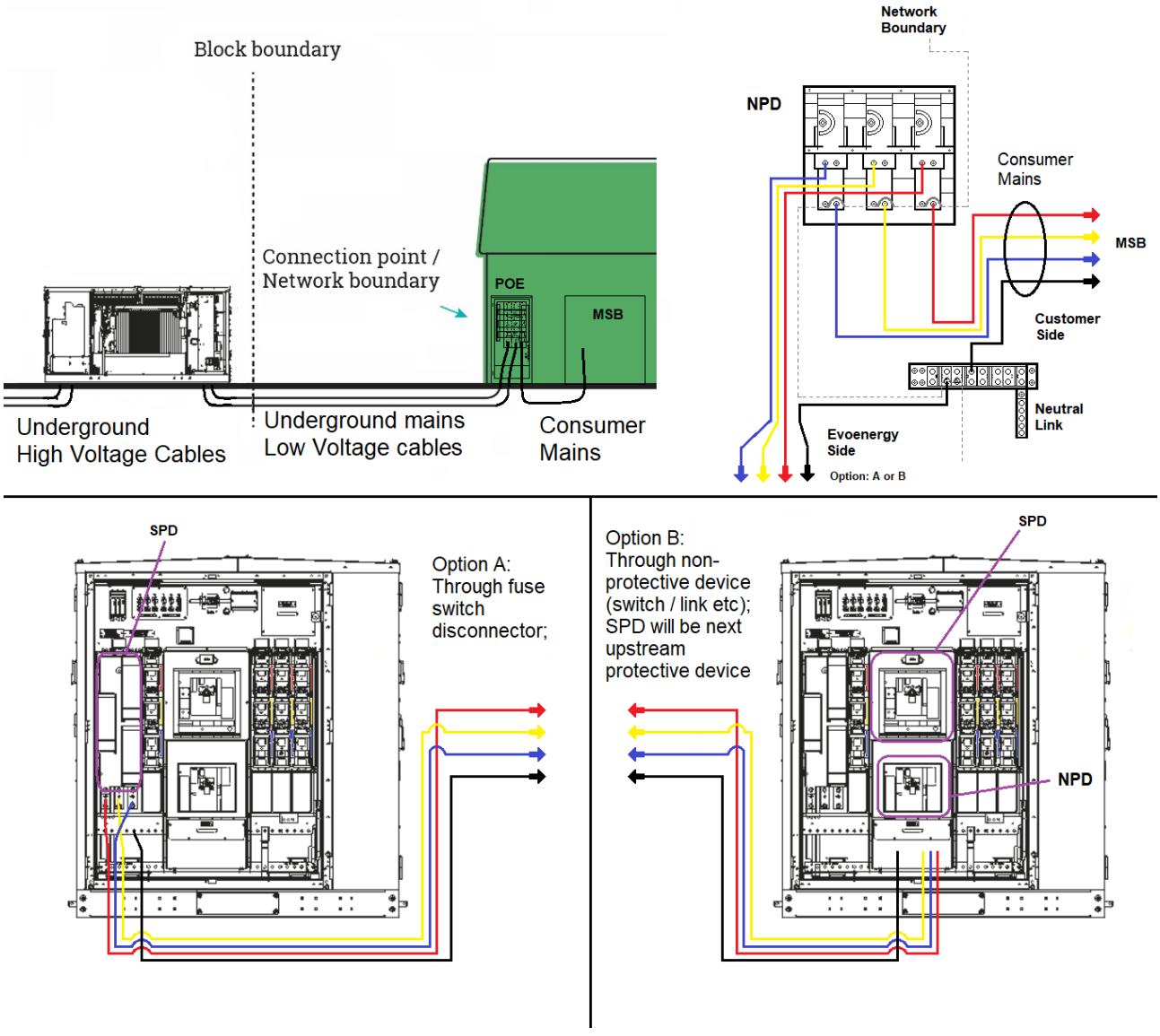

Figure 14. For underground supplies through Links at POE

C.8 For unmetered supplies through underground servicing arranagements via micropillar or POE:

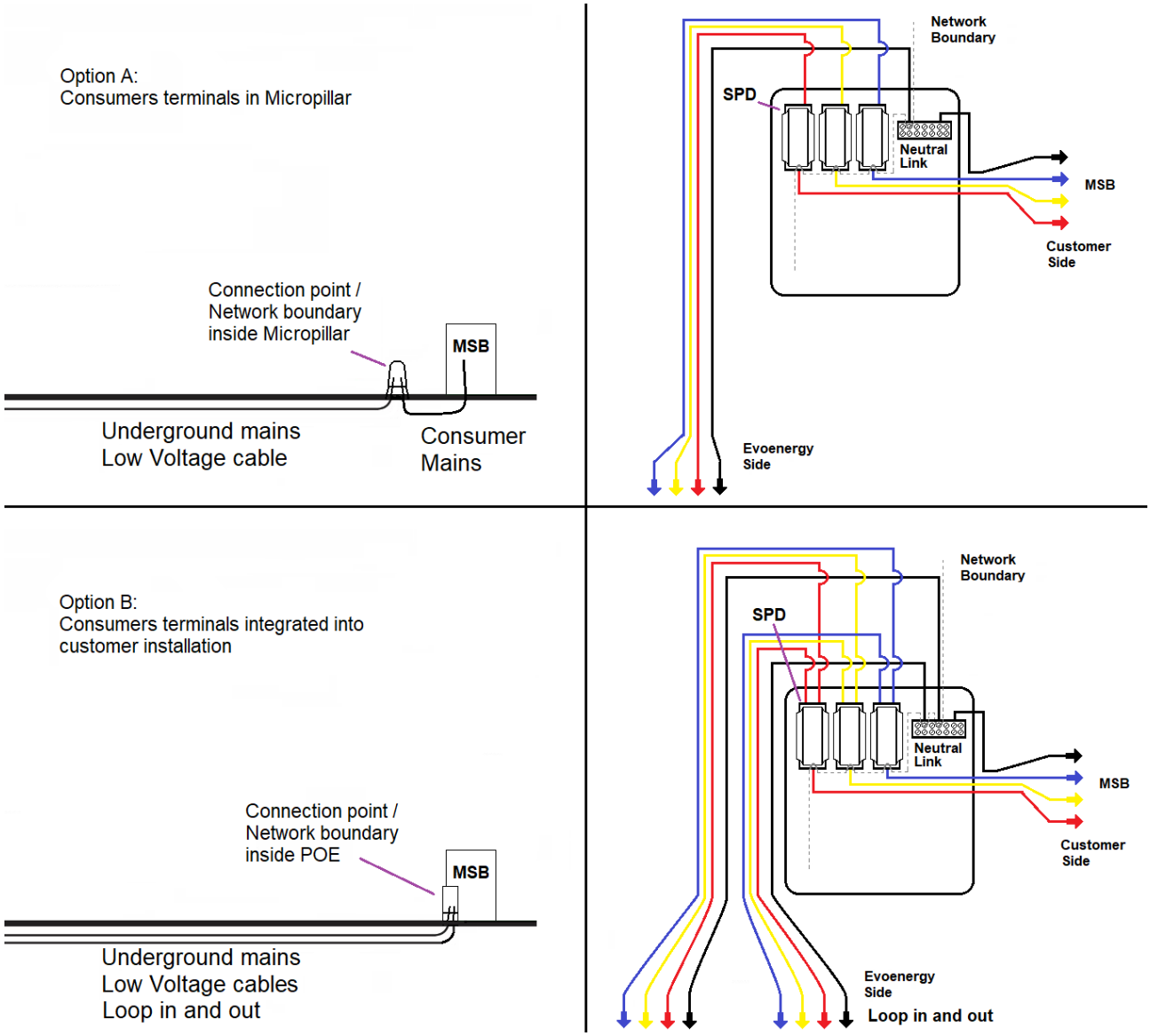

Figure 15. For unmetered supplies through underground servicing arrangements

- In this case there is no block boundary as this is unmetered supply to a fixed load such as streetlight control cubicle, lawn water controller, traffic light controller etc. For further details please refer to Evoenergy drawing No. 8913-212-01.
- The supply can be through micropillar, or POE integrated with MSB and can be radial or loop in & out based on the network requirement.
- The micropillar, or POE integrated with MSB to be provided and installed by Customer's electrical contractor.
- SPD to be provided and installed by Evoenergy along with Evoenergy side of phase cables in SPD.
- In case of the micropillar, consumer mains to be provided and installed by Customer's electrical contractor but to be terminated in SPD by Evoenergy.
- Neutral link to be provided and installed by Customer's electrical contractor along with Customer side of neutral cable terminated in neutral link (if authorised), otherwise by Evoenergy.
- Evoenergy to install & terminate its side of neutral cable in neutral link.

C.9 For unmetered supplies through overhead servicing arranagements:

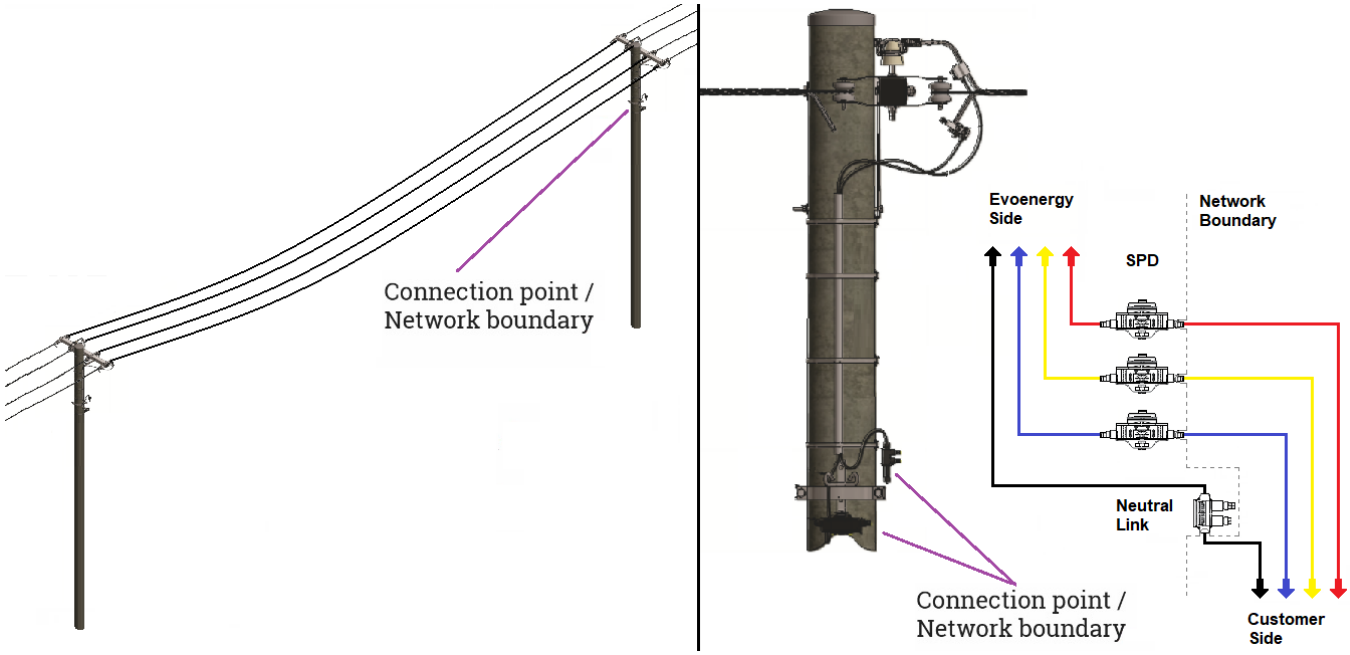

Figure 16. For unmetered supplies through overhead servicing arrangements

- In this case there is no block boundary as this is unmetered supply to a fixed load such as streetlight, comms devices, etc. For further details please refer to Evoenergy drawing No. D202-0070 & D202-0071.
- SPD and neutral link to be provided and installed by Evoenergy along with Evoenergy side of phase cables in SPD and neutral cable in neutral link.
- Consumer mains to be provided and installed by Customer's electrical contractor but to be terminated in SPD by Evoenergy, along with neutral cable in neutral link.

Appendix D
[Application of network boundary for legacy connections where installation does not have any connection device(s) or neutral link]

There are few types of legacy installations that have legacy meter boxes with meter without any connection devices (SPDs, NPD and/or MPDs) and no Neutral link as in following figures. These legacy meter boxes don't have any space for connection device or neutral link. In these cases, it is hard to define the network boundary, therefore network boundary is drawn in line with consumer mains and/or with hard bridge/links (based on type of connection) as per following figures so that Evoenergy can proceed with the requested work such as 3 Phase Supply Upgrade, Consumer Mains Upgrade or Relocation or Overhead to Underground Conversions.

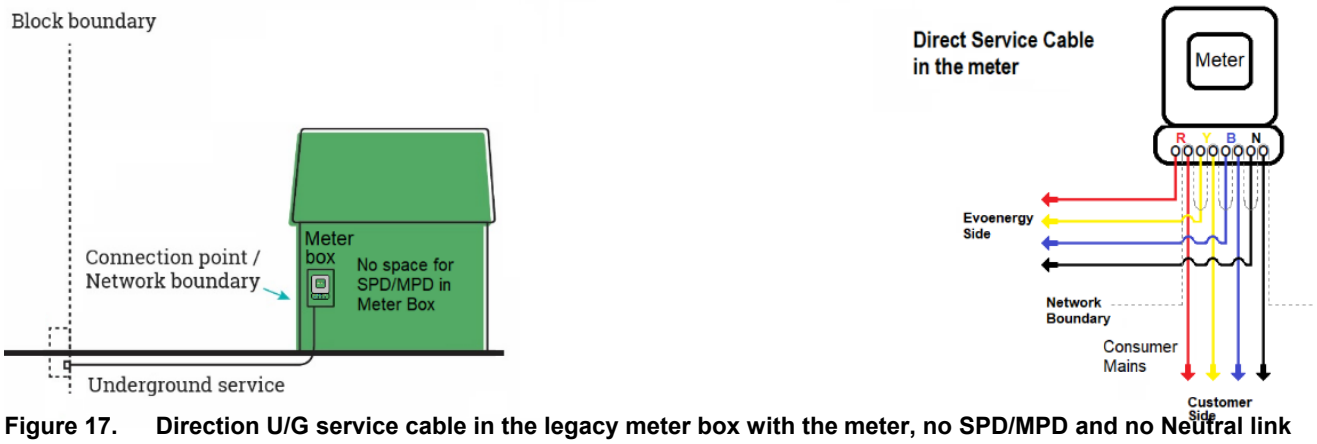

Figure 17. Direction U/G service cable in the legacy meter box with the meter, no SPD/MPD and no Neutral link

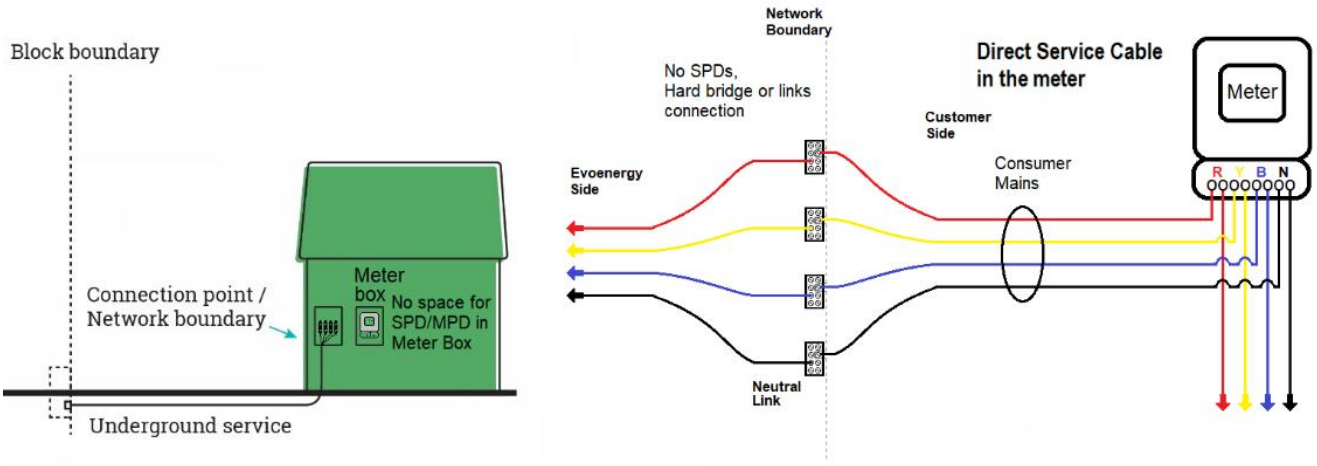

Figure 18. Direct U/G service cable in the legacy connection box then into meter box with the meter, no SPD/MPD and no Neutral link

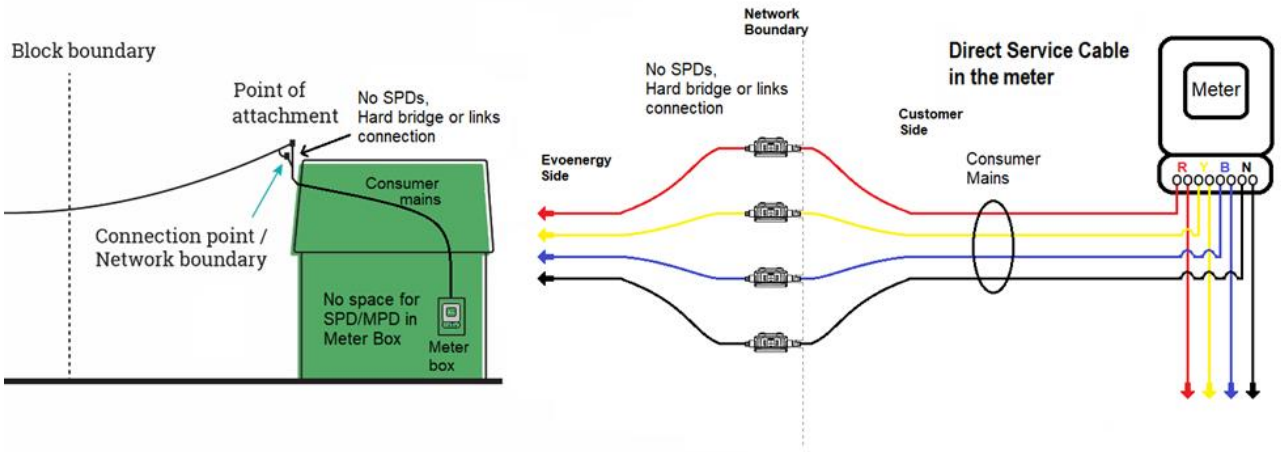

Figure 19. Direct O/H service cable in the legacy meter box with meter, no SPD/MPD and no Neutral linK

The installation in Figure 4 (in clause 5.8.5), is most common in Greenfield developments as there is no existing installation. However, in Brownfield developments (where existing meter box does not have SPD/MPD or Neutral Link), and it is not practical to replace the existing installation with a new board, therefore a retrofit solution may be required.

In all Brownfield development cases, SPDs are required as the first protection device on the network side to form the connection point and create the network boundary. SPDs along with neutral link can be retrofitted through the installation of a POE Box (as per 8913-22-02) next to the meter in an underground supply as per Figure 20. With underground supply, the neutral link will accommodate the meter's neutral and customer's neutral link (so the neutral is not loop in and out at the meter). Figure 20 illustrates the solution for the legacy cases shown in the figure 17 and 18, when customer has requested for supply upgrade including meter replacement for solar connection.

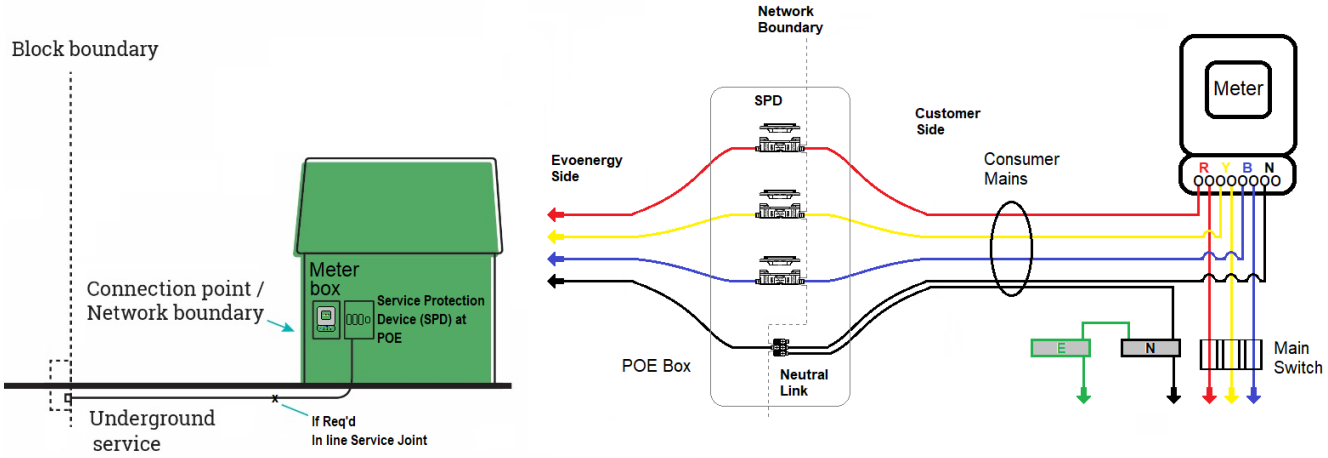

Figure 20. SPD and Neutral link in POE box next to meter box in U/G supply

In an overhead supply, SPDs along with neutral link are required at the POA as per Figure 21 or at a POE Box (if the supply is being converted from O/H to UG) as per Figure 22. In both cases there is no separate MPDs. With overhead supply, the neutral link (at the POA) will only accommodate the meter's neutral and meter's neutral will accommodate customer's neutral link (so the neutral is loop in and out at the meter). With underground supply (when supply is converted from O/H to UG), the neutral link will be accommodated at POE and meter's neutral and customer's neutral link both will be connected at POE. (so the neutral is not loop in and out at the meter). Figure 21 & 22 illustrates the solution for the legacy case shown in the figure 19, when customer has requested for supply upgrade including meter replacement for solar connection.

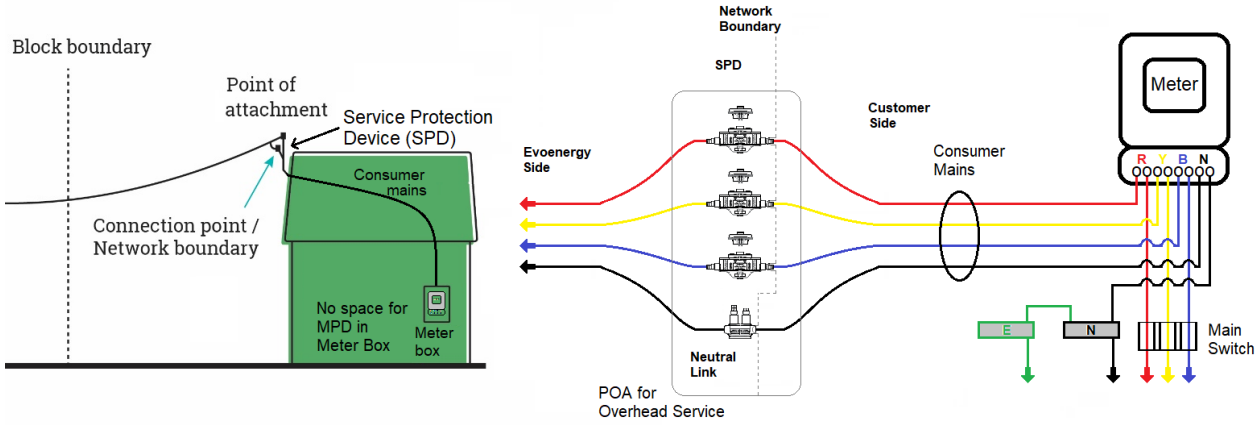

Figure 21. SPD and Neutral link at POA on O/H supply

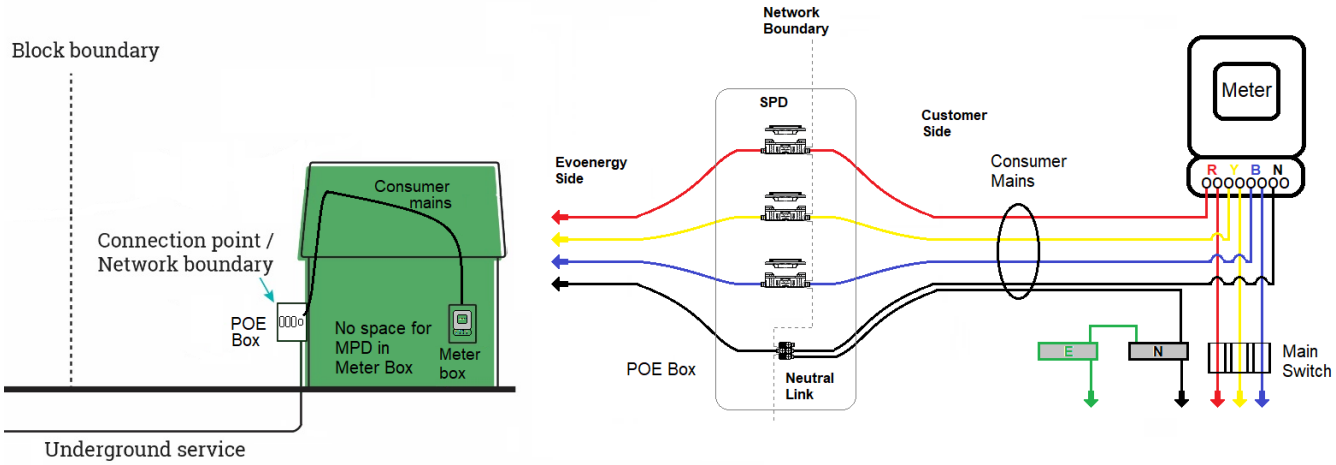

Figure 22. SPD and Neutral link in POE box at back in O/H to U/G supply

Above solutions are based on customer requested supply upgrade. However in some cases the request will initiate through retailer for meter replacement and customer may not require supply upgrade. This means, the cable connection either underground or overhead at POA and meter box may remain same. Such cases are to be individually assessed by Evoenergy based on availability of free space in the meter box for installation of the SPDs and/or Neutral Link if it is safe to do so. Evoenergy may also look into the option for removing Pot Head on paper led service cable through jointing with xlpe service cable or may replace hardbridge connections at POA with SPDs.