

Overhead service mains installation for Level 2 Accredited Service Providers and authorised persons

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Contact Information

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1 Documentation Scope

This instruction covers all aspects of aerial service mains construction, detailing material requirements and responsibilities.

2 References

External Regulations

Electricity Supply Act 1995 (NSW)

Electricity Supply (Safety and Network Management) Regulation 2014

Gas and Electricity (Consumer Safety) Regulation 2018

National Electricity Network Safety Code (ENA DOC 001-2019)

Service and Installation Rules of New South Wales (2019)

External Standards

AS/NZS 3766:1990 – Mechanical fittings for low voltage aerial bundled cables

AS/NZS 4396:1999 - Connectors – Insulation piercing – for 0.6/1kV aerial bundled cables

AS/NZS 7000: 2016 – Overhead line design

Company Policies and Procedures

Company Policy (Network) 9.6.1 – Network Connection

Company Policy (Network) 9.9.1 – Network Asset Maintenance

Company Procedure (Network) GAM 0114 – Granting Dispensation for Engineering Documents

Electricity Network Safety Management System (as amended)

Electrical Safety Authorisations – Authorisations Manual – Electrical & Public Safety (September 2024)

Company Standards

Equipment Technical Specification ETS 0050 – In-line service connectors for 100A overhead services

Equipment Technical Specification ETS 0059 – Aerial bundled cable

Mains Design Instruction MDI 0031 – Overhead line design

Earthing Design Instruction EDI 100 - Distribution earthing design

3 Definitions and Abbreviations

Term	Definition
AL	Aluminium
AS	Australian Standard
ASP	Accredited Service Provider
AUP	Authorised person
Connection Point	As defined in the Service and Installation Rules of NSW, the connection point is the junction where the Distribution System is connected (by means of a Connection Device) to the Customers Installation. Refer to Service Rules for further information.
CU	Copper
Flying Fox	Overhead suspended service
HSC	House service connector
IPC	Insulation piercing connector
LVABC	Low voltage aerial bundled cable – (Al conductor, XLPE insulated)
MCI	Mains Construction Instruction
MDI	Mains Design Instruction
NOSW	Notification of service work
NZS	New Zealand Standard
POA	Point of attachment
PVC	Poly-vinyl chloride insulation
RAG NOSW	Remove all gear Notification of service work
UV	Ultra violet
XLPE	Cross linked polyethylene cable

4 Actions

Aerial service mains shall be installed only by persons or organisations accredited by NSW Department of Planning and Environment and authorised by Endeavour Energy in accordance with Electrical Safety Authorisations – Authorisations Manual – Electrical & Public Safety.

Aerial service mains are to be designed and erected in accordance with this document, MDI 0031 – Overhead line design and the *Service and Installation Rules of NSW*.

4.1 Installation and material specifications

Only materials approved by Endeavour Energy shall be used. Approved materials, including the product approval numbers, are listed on the Endeavour Energy ASP website.

4.1.1 Aerial service cable

New aerial service cable shall be LVABC and meet the requirements of ETS 0059 - Aerial bundled cable.

Services up to and including 100A on each phase shall be 1 x 2core 25mm² or 1 x 4core 25mm².

Services greater than 100A and not more than 200A on each phase shall be 1 x 4core 95mm².

Services greater than 200A and not more than 400A on each phase shall be 2 x 4core 95mm².

The use of twin 2core 25mm² LVABC for a 3ph 4 wire service is not acceptable.

Note: To ensure adequate load capacity is available from the network, an *Application for Connection of Load* must be submitted to Endeavour Energy Network Connections Branch for loads greater than 63A on each phase for 3 phase loads, 100A on each phase for single phase loads, and all new or additional loads in rural locations.

A “*Permission to Connect*” will be issued for approved connections.

4.1.2 Accessories

Mechanical fittings for LVABC shall meet the requirements of AS/NZS3766:1990.

4.1.3 Service connectors

The approved Endeavour Energy service connectors are insulation piercing with the neutral connection incorporating a double bolt arrangement (each bolt/clamp acting independent of the other). This requirement refers to both the point of common coupling and the connection point. See clause 4.2.10 for neutral service connection.

As the integrity of the connection relies on the absence of water, the service cable must remain sealed and therefore the insulation piercing connectors must not be removed or re-used.

Insulation piercing connectors have been developed for use with LVABC XLPE insulated cables, however the use with existing PVC service cable is acceptable provided the insulation is in good order. Any service cable found with defective insulation is to be reported in accordance with clause 5.2.1.

Note: High visibility-coloured indicators connected to shear heads are no longer incorporated to approved Endeavour Energy service connectors.

4.1.3.1 POA - up to 100 Amps (25mm² LVABC service cable)

The service connector shall be an approved Endeavour Energy product meeting the requirements of ETS 0050 – In-line service connectors for 100A overhead services.

The connector shall be an HSC comprising of a tunnel portion for consumers' mains, and an IPC portion for the service cable. The tunnel portion will allow for the disconnection and reconnection of the service. The connector shall be weatherproof and UV stabilised with clear markings to indicate the house side, service side and conductor size suitability. The two (2) bolt HSC shall only be used for the neutral connection.

See clause 4.2.10 for neutral connection requirements.

4.1.3.2 POA - 100 Amps to 200 Amps (95mm² LVABC)

The service connector shall be an approved Endeavour Energy product meeting the requirements of AS/NZS4396: 1999.

The connector shall comprise of a tunnel portion for consumers' mains, and an IPC portion for the service cable. The tunnel portion will allow for the disconnection and reconnection of the service. The connector shall be weatherproof and UV stabilised with clear markings to indicate the conductor size suitability.

See clause 4.2.10 for neutral connection requirements.

4.1.3.3 LVABC to bare conductor network mains

The LVABC service connector shall be an approved Endeavour Energy product meeting the requirements of AS/NZS4396:1999 (refer Figure 3 and 4).

The service connector will comprise of a single tunnel IPC and single tunnel contact plate and be clearly labelled with details of conductor size suitability.

See clause 4.2.10 for neutral connection requirements.

4.2 Construction requirements

4.2.1 Aerial services

The following table is a guide to responsibilities for insulated aerial service cable repair and replacement:

Condition	Action	Responsibility
Lengthening	No joint is permitted in an aerial service cable and therefore lengthening is not an option. Replace with new LVABC service with either 2 core or 4 core, to suit existing phases. The level 2 ASP must submit a NOSW application within 2 business days of completing service works.	Endeavour Energy/ASP (depending upon work initiation)
Increase from 1ph to multiphase.	Replace with new 4 core LVABC service. The level 2 ASP must submit a NOSW application within 2 business days of completing service works.	ASP
Defective insulation of service cable	ASP/AUP to advise Endeavour Energy. Endeavour Energy to replace with new LVABC service, either 2 core or 4 core, to suit existing phases.	Endeavour Energy
Service cable broken between Endeavour Energy pole and POA.	Make safe. ASP/AUP to advise Endeavour Energy. Endeavour Energy to replace with new LVABC service, either 2 core or 4 core, to suit existing phases.	Endeavour Energy
Broken road crossing	Make safe. ASP/AUP to advise Endeavour Energy. Endeavour Energy to replace with new LVABC service, either 2 core or 4 core, to suit existing phases.	Endeavour Energy
Service removal	Remove completely all assets related to the redundant service, including cable, insulators and fittings. The level 2 ASP must submit a RAG NOSW within 2 business days of completing service works.	Endeavour Energy/ASP (depending upon work initiation)

Table 1: Responsibilities for insulated aerial cable repair/replacement/removal

Note: Refer to Service and Installation Rules of NSW Clause 3.1.5 for additional requirements.

4.2.1.1 Existing Aerial Services

When it is necessary to carry out work on a service cable and it is found to be unsealed (that is, it does not have sealed connectors at both ends of cable), the cable must be replaced.

When an old service cable breaks or is not long enough due to the attachment, for example, of relocation works, the cable must be replaced (full tension joints must not be used to extend the cable).

When working on services for maintenance or replacement, check that the connection on the neutral is made with a two (2) bolt connector.

4.2.2 Insulation piercing connections (IPCs)

IPCs on overhead LV ABC must not be reused.

Once an IPC has been installed on LV mains, it must not be loosened, removed or have a new IPC installed at the same location. If the tee-off or joint is no longer required, cut the cable and cap the tail.

If an IPC is already installed but the line needs to be occasionally disconnected / isolated, do not remove or loosen the existing IPC. The following must be the practice in priority:

- Install a LVABC switch by cutting the cable and installing cable droppers to the switch using IPCs on tails, and cap any tails.
- Cut the tail to a length which will allow the installation of a new IPC. If the new IPC is not to be used immediately, cap the tail and leave it for future installation of the new IPC which is in series with the original IPC.

Install an IPC with a bolted connection (generator connection unit). Disconnect the bolted joint in a no load situation when isolation is needed, and re-bolt the connection when supply needs to be restored.

If an IPC is damaged and is required to be removed and the condition of conductor is still acceptable then the exposed conductor and cable insulation must be cleaned or any debris and a mastic lined tape or similar must be used to seal the damaged area.

4.2.3 Road crossing poles

4.2.3.1 Services up to 100 Amps

A road crossing pole will be provided by Endeavour Energy when the length of the service between the network mains pole and the customer's property boundary is in excess of the permitted service cable span of 50 metres and there is no practical alternative.

Any service cable connection at a road crossing pole is to be insulation piercing, requiring two (2) connectors installed in series for the neutral conductor (see clause 5.2.10 Figure 2). House service connectors are not to be used for this purpose.

4.2.4 Suspended overhead service - flying fox

An aerial service shall be installed to fully contain the service on the supplied property with no neighbouring property encroachment. An existing service installed with property encroachment may be replaced over the route of the existing service. If the service is upgraded, it will have to be considered as a new service and the route should not cross an adjoining property unless a suitable easement is obtained over the encroached property.

Where it is considered necessary to install a *flying fox* service to avoid a service property cross, the following apply as per the Service and Installation Rules:

- The customer's property shall be on the same side of the street as the distribution mains.
- The distance between the line poles does not exceed 45m.
- The service must be erected as close as practicable to 90° to the mains and does not exceed 20m.
- Written application must be made to the Engineering Delivery Manager or Customer Connections Manager as appropriate. Approval must be obtained before installation.

Generally, this type of service should be avoided and will be approved only where there is no practical alternative. The service must consist of a continuous service cable from the line pole to the POA and restrained to an adjacent line pole. Construction shall be as per Endeavour Energy drawing 332055.

A mid-span suspended services (using tee-off connection with IPCs) from LV mains or a single service cable span is not permitted.

4.2.5 Telstra poles

Telstra poles have been used to support cross-road service mains in various locations throughout the Endeavour Energy franchise area.

Due to the unknown strength capacity of these poles, their use is no longer approved for the support of new or up-graded cross-road service aerials. In situations where an existing cross-road service is supported by a Telstra pole, like for like replacement is permitted.

4.2.6 Rewiring of consumers mains

The rewiring of existing dwellings where new consumers mains are installed shall also require the existing service cable to be replaced where the customer applies for the connection of additional load and the assessed maximum demand exceeds the current carrying capacity of the existing service cable.

4.2.7 Access to point of attachment

If access to the POA from the ground is obstructed by an awning, carport or other permanent structure/s, the POA must be relocated to a position where access for inspection and maintenance can be gained from the ground (refer to *Service and Installation Rules of NSW Clause 3.6*).

Where the POA to an existing installation requires relocation, the service shall be treated in accordance with Table 1 of this document.

4.2.8 Defective service cable and fittings

Accredited Service Providers or authorised persons must notify Endeavour Energy Customer Network Solutions if they are aware that any of the following conditions exist.

- service cables are found to be defective from UV degradation at the POA,
- service cable is less than 6mm²; or,
- service cable or fittings are unsafe due to other defects.

4.2.9 Pole fuses

Where pole fuses are installed at the customer's POA, the connection to the service cable shall be made with the use of a service connector.

The service connector will be an approved Endeavour Energy IPC, clearly labelled with details of conductor size suitability, and shall meet the requirements of ETS 0059 – Aerial bundled cable and AS/NZS4396: 1999.

4.2.10 Neutral connections

To improve the integrity of the overhead service neutral connection, a two (2) bolt neutral connection shall be used for all service installations. Each bolt/clamp shall act independently of the other.

Where the connection point is established a two (2) bolt house service connector shall be used. Refer to Figure 1. House service connectors shall incorporate tightening bolt heads that are shear-off, with a second bolt head provided for the removal of conductors. Clear inspection covers are included to provide confirmation that the cables have been fully inserted.



Figure 1- Typical HSC two bolt insulation piercing neutral connector

Consumer mains smaller than 4mm² are to be twisted, double backed and sealed with self-amalgamating tape.

Where the point of common coupling is established, all network service neutral connections shall incorporate two (2) bolt connectors, as shown below.



Figure 2
ABC service to ABC main



Figure 3
ABC service to Al main



Figure 4
ABC service to Cu main

4.2.11 Conductive (concrete/steel) transmission poles

Where the LV network has been installed on conductive (concrete/steel) transmission poles, any service cable attachment must be supported/insulated from the pole to achieve a nominal 22kV insulation with a 125kV BIL rating or better.

Refer Figure 5 below for separation and insulation of LV/service cable from transmission voltages.

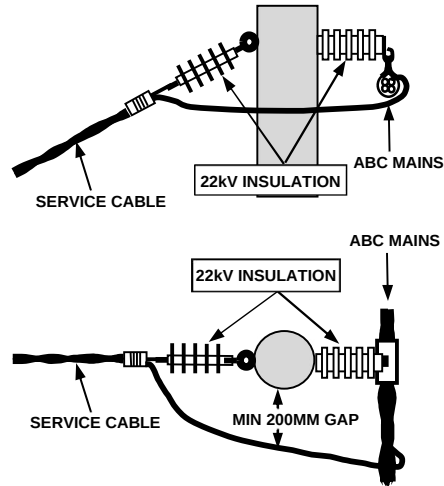


Figure 5

4.2.12 Strain Clamp

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. The strain clamp must be positioned at an angle so that there is no direct pull on the service connector hook by the service cable.

It is important to note that it is the customer's responsibility to provide the hardware supporting the service main strain clamp at the POA. The hardware must be installed in such a manner so as not be affected by direct pull from the service.

5 Authorities and Responsibilities

General Manager Future Grid & Asset Management has the authority and responsibility for:

- approving major changes to this standard.
- making all decisions concerning compliance with this standard delegating any of these authorities and responsibilities to the Head of Asset Planning & Performance.

Head of Asset Planning & Performance has the authority and responsibility for:

- approving minor changes to this standard.
- Making recommendations to the **General Manager Future grid & Asset Management** for major changes in respect to this standard.

Engineering Delivery Manager has the authority and responsibility for:

- periodic review of and any required amendments to this standard.
- managing dispensation requests for variations to requirements of this standard.
- approval of equipment and materials within the scope of this standard.

The **Head of Customer Network Solutions** has the responsibility and authority:

- to provide resources to carry out inspections of complete service installations as specified in the ASP scheme rules.
- for ensuring that contestable service work is audited for compliance to the requirements of this instruction and that any construction not in accordance with this instruction has dispensation granted in accordance with Division Procedure GNV 1062 – Granting Dispensation From Network Standards.

Endeavour Energy staff and contractors have the authority and responsibility for:

- implementing the requirements of this standard.
- working in accordance with local and statutory requirements.
- maintaining a high level of public safety.
- working in accordance with Endeavours policies and procedures.
- confirming that personnel engaged to perform work have appropriate qualifications.

Annexure 1: Drawings

Drawing no.	Title
332004/B	OH Service Const LUGOH Transition from OH to UG Cable –ABC or Bare Mains
011996/J	Overhead Service Cable Standard Construction Customer Service Mains Method of Service Ties
059596/E	Overhead Service Cable and Strain Clamp Arrangement
078520/D	Overhead Construction BCC Cable Installation Near Service Mains
332055/C	OH Service Const LS01 Service Connections 100A and below Multiple Service Connections and Flying Fox detail
332011/B	Overhead LVABC Combinations 3-Way and 4-Way Tee-off
332010/A	Overhead LVABC Combinations Tee-off from bare mains Const A05+BO1
249488/D	Urban Pole Substation Service connection assembly
086232/K	Overhead Lines Minimum Clearances near Structures
011985sh1/H	Overhead Const. Insulated Aerial Service Min Clearance to Structures sh1
011985sh2/E	Overhead Const. Insulated Aerial Service Min Clearance to Structures sh2
086242/G	Overhead Const. Aerial Consumer Mains Minimum Clearances

