

Code of Practice 012

Issue 3 September 2023

Electricity Geographical Information System (GIS)



Amendment Summary

ISSUE NO. DATE	DESCRIPTION
Issue 3	Updated to new template only.
September 2023	Prepared by: Julie Jackson Approved by: Policy Approval Panel and signed on its behalf by Paul Turner, PAP Chairperson

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used by, or its contents divulged to, any other person whatsoever without the prior written permission of Electricity North West Limited.

1 Introduction

There is a legal requirement for the company to keep and make available an up to date record of all of its underground cable locations which are installed in land that it does not control. In order to hold a complete record of all other cable locations together with all overhead line and substation locations, this locational information will be held in a single record system currently known as the Power Geographical Information System (PGIS). The electricity distribution network is constructed in accordance with a set of rules that governs its connectivity (that will link customer supplies with all the circuits to which they are connected). The record of this connectivity will also be held within PGIS. These connectivity rules will be reflected in the functionality available with the GIS Database.

The GIS database will record Electricity North West Limited' electricity assets against a background of regularly updated digital Ordnance Survey landline maps and builders' plans.

The Electricity North West Limited GIS database is also populated with details of other connected electricity assets.

2 Scope

This Code of Practice (CP) states the requirements for operating and maintaining the Electricity North West Limited electricity distribution network locational records and network connectivity as recorded in a GIS database and details the approved symbols and terminology to be used and examples in their use.

Compliance with this CP will ensure that Electricity North West Limited meets its relevant statutory obligations and that Electricity North West Limited staff and others understand the symbology used in the GIS database.

Data held and maintained in other systems are outside the scope of this CP.

3 General

The Data Management section shall be responsible for maintaining an accurate and up to date GIS database.

The GIS database shall be maintained in accordance with the GIS Operating Manual.

4 Information to be Recorded

All Electricity North West Limited Mains and Services up to and including 132kV shall be plotted to scale where this is unambiguous or shown symbolically and relative to its surroundings in a way which aids its location, as specified in this Code of Practice. Relevant Plant and ancillary equipment shall also be recorded where appropriate.

Asset records may also be maintained of third party equipment for which Electricity North West Limited has operational and/or maintenance responsibilities.

These may take the form of either:

- (a) Asset records plotted in accordance with the provisions of this Code of Practice.

- (b) Customers' own records if these are of an adequate standard.

Disused equipment shall remain recorded and visible. Removed equipment shall remain recorded but will not normally be visible to the GIS user.

The basic principle is that the record shall provide the best indication of an asset's location relative to its surroundings. Dimensions will not normally be shown, and equipment shall be located by scaling where there is agreement between the OS map background and the as-built drawings. Only dimensions, which are considered to give essential additional assistance, are to be shown. To aid the re-alignment of assets, dimensions are to be recorded for work carried out on builder's sites. These dimensions will be held on the recovered layer and will not be made visible to the GIS user.

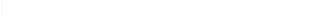
It is impracticable to maintain valid detail of the depth of buried equipment because it is not known if this depth will remain unaltered. Wherever practicable, the depth of buried equipment shall be recorded, if it is known to be abnormal, e.g. at variance from NJUG Volume 1, especially wherever it is less than standard. Any depths required for Electricity North West Limited' own purposes will also be recorded. Where depths are recorded, the depth/height marker flag shall be used. (See [Appendix A](#), Flags.)

5 Symbols and Attributes

Underground power cables and overhead lines shall be recorded in the GIS database in colour depending on their operating voltage. The colours to be used are described below and shown in [Table 1](#).

- 132kV cables are shown Black on a White background (White on a Black background) and identified as a thicker line width.
- 33kV cables are shown Green.
- 22 – 25kV cables are shown Yellow.
- 11kV cables are shown Red.
- 6 - 6.6kV cables are shown Blue.
- 1kV – 6kV cables are shown Violet.
- LV and auxiliary cables are shown Orange
- Cables where the operating voltage is unknown are shown Brown

Table 1

OPERATING VOLTAGE	COLOUR CODE	LINE COLOUR
132kV	Black	
33kV	Green	
22kV-25kV	Yellow	
11kV	Red	
6kV-6.6kV	Blue	
1kV-6kV	Violet	
LV	Orange	
Unknown	Brown	

Symbols to be used shall be in accordance with [Appendix A](#). Examples showing the use of the symbols are in [Appendix B](#). Cable abbreviations and Overhead Abbreviations are shown in [Appendix C](#).

Details of equipment belonging to other undertakers shall be excluded except where a special relationship to Electricity North West Limited' equipment exists e.g. access considerations. Equipment, ancillary to the operation of the power network, but, which is maintained by an appointed Service Provider, such as a telecommunications provider, shall be shown. The boundaries of the Electricity North West Limited licensed area shall be shown in the GIS database and annotated accordingly.

The attributes of an electricity distribution underground power cable shall include the following: -

- (a) Number of cores.
- (b) Nominal core cross-sectional area and material.
- (c) Other constructional details e.g. insulation, sheathing, armouring.
- (d) Operating voltage.
- (e) Specification voltage if different from operating voltage but excluding 11kV cables operating at 6.6kV and 400V cables running at 230V or 460V.
- (f) Indication of installation by a third party connector.
- (g) Date installed.

The attributes of auxiliary multicore and multipair cables shall, include the following: -

- (a) Number of cores and/ or pairs.
- (b) Number and diameter of strands for each core or pair.
- (c) Other constructional details, e.g. insulation, where known and considered necessary.

The attributes of an overhead line shall include the following: -

- (a) Number of conductors, including neutral and earthwire.
- (b) Number of sub-conductors if a conductor bundle (bracketed).
- (c) Size of conductors.
- (d) Existence of earthwire.
- (e) Insulation (type-if known) or uninsulated.
- (f) Operating voltage. Excluding 400V cables running at 230V or 460V.
- (g) Line number.
- (h) Specification voltage, if different from operating voltage, but excluding 11kV operating at 6.6kV.
- (i) Indication of installation by a third party connector.
- (j) Special notes e.g. switch wires, telecommunication wires, etc.
- (k) Designation letters and/or numbers for each support.

Further details relating to attributes can be found in the GIS Operating Manual. The provision of an accurate and up to date GIS Operating Manual is the responsibility of the Data Infrastructure Manager.

6 Plotting of Location

The aim of recording the position of an asset is to aid its later location and identification. The most appropriate way of doing this is for its position to be plotted to scale on an accurate map background, so that the record is unambiguous. However, for various practical reasons this is not always possible. In such cases the asset should be shown symbolically and relative to its surroundings in the most appropriately accurate way in order to aid its location. Examples of this are:

For cable and overhead line routes, in reducing order of preference are:

- Relative to its position in the footpath, i.e. nearer to the back edge of footpath than to the kerb.
- Where there is more than one cable of the same voltage in the same footpath, record them in their positions relative to each other and the kerb line.
- When the cable runs in the footpath, it shall be shown anywhere in the footpath rather than the road.
- Use of a detail sheet to show the location at larger scale in a congested area

For features along the route of a circuit, such as buried equipment, joints or linkboxes, etc, their location needs to be reasonably accurate so that they can be readily located. In such cases the location should be measure to the centre of the feature and be accurate to within $\pm 0.5\text{m}$.

Where Global Positioning Satellite (GPS) locations have been obtained for individual assets these shall not be used for the plotting of the assets position. This is because variances in the accuracy of the map background are likely to lead to the asset location not being displayed with suitable accuracy. However, where GPS location information has been gathered for point assets, it shall be recorded in a suitable table of attributes for that asset, such as the alternate reference table in MAMS.

7 Dimensions and Accuracy

Cable and overhead line conductor cross-sectional area shall be expressed in square millimetre or square inch (using only standard sizes, depending on the manufacturing specifications), but with the unit symbol omitted. However, the sizes of older conductors, originally specified using Standard Wire Gauge are to be expressed as cross-sectional area in square inches.

Where dimensions are to be recorded they shall be recorded as follows with the tolerances as indicated in brackets.

Linear dimensions shall be recorded in metres correct to the first decimal place, ($\pm 0.1\text{m}$).

The diameter of pipes and ducts shall be expressed in millimetres correct to the nearest millimetre, ($\pm 1\text{ mm}$).

Non standard depth measurements shall be recorded in millimetres, correct to the nearest 50mm, ($\pm 50\text{mm}$).

Height measurements, when displayed shall be recorded in metres, correct to the first decimal place, ($\pm 0.1\text{m}$).

Dimensional units shown on existing detail sheets and associated documents may vary from those specified above.

8 Special Notes

Unusual items should be identified that could give rise to dangerous situations or system problems if account is not taken of their abnormal features.

Such items should be marked thus:



Details of the unusual items shall be stored in the GIS database.

Where a Cathodic Protection scheme is known about, a note reading "Cathodic Protection Scheme/s exist" shall indicate the presence of any apparatus protected by the scheme. Even if such a scheme exists in a locality where there is no Electricity North West Limited equipment the GIS database map of this area shall be so marked.

Assets installed by Independent Connection Providers and connected to the Electricity North West Limited electricity distribution network shall be identified.

9 Documents Referenced

DOCUMENTS REFERENCED	
National Joint Utility Group, NJUG Volume 1	NJUG Guidelines on the positioning and colour coding of underground utilities' apparatus
GIS Operating Manual	

10 Keywords

GIS; Record; Cable; Line; Plant; Substation; Transformer

Appendix A – Approved Gas Symbols

A1 Underground Cables

(symbol colour defined by operating voltage)

<u>3c 95 AC CAS 11</u>	HV Cable
<u>3c 95 SAC XC</u>	LV Cable
<u>35 SAC XC</u>	Service Cable
<u>4cP</u>	Pilot
<u>3c 95 SAC XC</u>	Assumed Route
<u>-----</u>	Inferred Cable (same as assumed, though no label is produced)
<u>3c 95 SAC XC OOC</u>	Cable Out of Commission/Unfit for Service

A2 Joint and Terminations

(symbol colour defined by operating voltage)

		Straight joint, Tee joint, Breeches joint, Dividing box (cable box), Service connection, Auxiliary cable termination or Insulated end (bottle end)
	CE	Uninsulated end (capped end)
		132kV joint
	PDJ	Phase disconnection joint
		Closed metered/unmetered service termination
		Open metered/unmetered service termination (cut-out with fuse removed)
		Terminal block
		Wall termination
		Oversheath repair

A3 Routes, Cross-Sections, Attachments and Other Features

3 x 150


Route (eg duct, trough, cable tray etc)



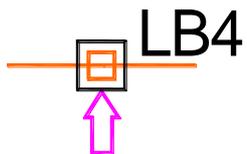
Cross section



Attachment

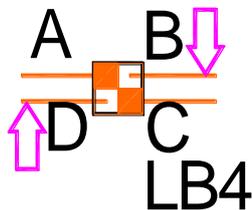


Open point



2-way link box (open)

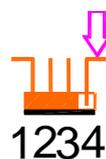
Centre block solid colour when closed



4-way link box

(Ways B and D are open.)

FP26



Feeder pillar

A4 Substations and Related Equipment

BARLEY BRIDGE

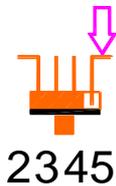
Substation text name and number

656404

Substation curtilage



(The colours of the symbols below are defined by the operating voltage.)



LV board with 1 incoming linkway and 4 fuseways

(Way 5 is open.)



Open LV fuseway, breaker or linkway



Closed LV fuseway, breaker or linkway



Transformer or auxiliary transformer (ground-mounted)



Busbar



Open disconnect (ground-mounted)



Closed disconnect (ground-mounted)



Open breaker



Closed breaker



Open switch-fuse



Closed switch-fuse



Generation set

A5 Overhead

	Lightning arrester
	Tower
	Wall bracket
	Pole
	H pole
	Strut
	Stay
<p>(The colours of symbols below are defined by the operating voltage.)</p>	
	HV wire - overhead
	LV wire - overhead
	Service wire - overhead
	Overhead termination
	Support cable termination
	Open fuse or link
	Closed fuse or link
	Open earth switch, fault thrower or disconnect
	Closed earth switch, fault thrower or disconnect
	Sectionaliser
	Recloser



Pole-mounted transformer



REG

Voltage regulator



BAL

Static balancer

A6 Feature Labels Commonly Found in GIS

FEATURE	LABEL	DESCRIPTION
FUSE	FUSE	HV fuse
	FSL	Automatic fault sectionalising link
	RFUSE	Repeater fuse
RECLOSER	AR	Autorecloser
	GVAR	Gas-insulated vacuum autorecloser
SECTIONALISER	AFS	Sectionaliser
DISCONNECTOR	ISOL	Pole-mounted disconnecter
	M	Motorised disconnecter
	MFI	Motorised fault-interrupting disconnecter
	ABS	CB busbar or feeder disconnecter
LINK	LINK	HV link
EARTH SWITCH	ES	Earth switch
FAULT THROWER	FT	Fault thrower
TRANSFORMER	REG	Voltage regulator
	BAL	Static balancer
JOINT	CE	Uninsulated end
UNMETERED TERMINATION SERVICE	SL	Street light
	SLS	Street lighting supply point
	SLC	Street lighting control lamp
	TS	Traffic sign
	TCB	Telephone call box
	TL	Traffic light control box
	UFH	Underfloor heating

A7 Labels



ADDRESS SEED



SPECIAL CUSTOMER



BATCH EDGE NODE



LINK NODE



UNUSUAL ITEM MARKER FLAG

- Unusual item
- Cable Special Circumstance



ASSET INFORMATION

- Cable with reserved capacity
- Non-standard neutral colour
- Non-standard cable
- Cable unusable
- Underground to overhead transition



RECORDS WARNING MARKER FLAG

- Missing metered service
- Missing unmetered service
- Data capture query marker
- Edge matching problem in this area
- Other records warning



DEPTH / HEIGHT MARKER FLAG

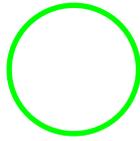
1200

- Depth marker (mm)
- Height marker (metres)

A8 Fault Flow Indicators

AUD	AUDIBLE
FFH	HAND RESET
LED	LIGHT EMITTING
SR	SELF RESET (ELECTRICAL RESET)
T	TELECONTROL
POD	POWER OUTAGE DEVICE
EFI	EARTH FAULT INDICATOR

A9 Associated Devices



NEUTRAL EARTHING RESISTOR



SHEATH VOLTAGE LIMITER OR EARTH LINK BOX



EARTH ELECTRODE



EARTH WIRE

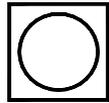


GAS OR OIL FILLED PRESSURE PIPE



PRESSURE TANK GAUGE PILLAR OR OIL TANK

A10 Miscellaneous Symbols



OBJECT e.g. ACCESS POINT, DRAW BOX, DRAW BOX ENTRY, BLIND BOX OR PIT



MARKER POST

BFD

BIRD FLIGHT DIVERTERS

CG

CABLE GUARD



PLANNED SCHEME CONSTRUCTION NOTE



PLANDEX EDGE (OS MAP TILE BOUNDARY)

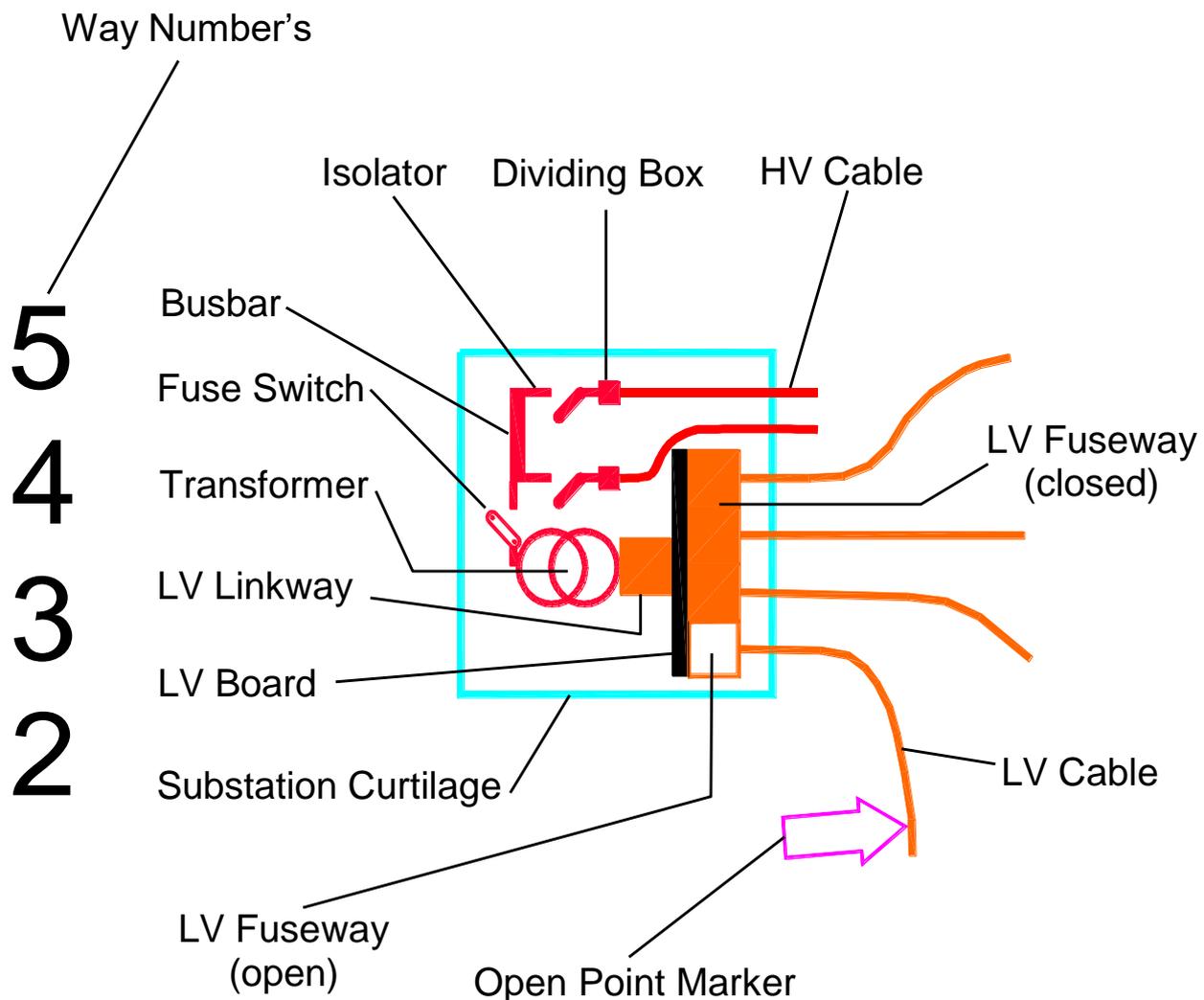


POLYGON FEATURE (SSSI) DATA CAPTURE BATCH BOUNDARY

Appendix B

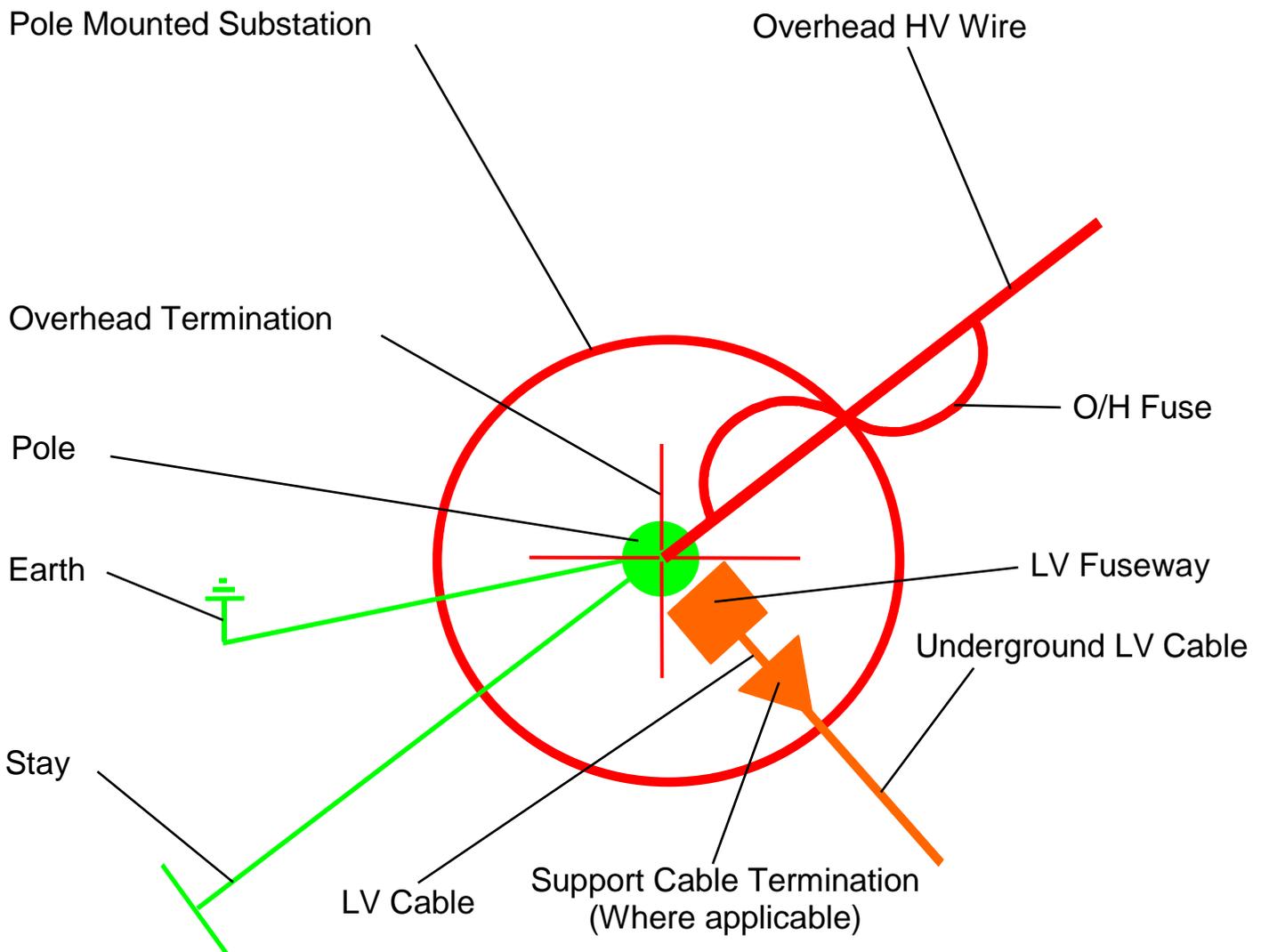
B1 Example Layout 1 – Ground Mounted Substation (unit)

LUNESIDE (LANCASTER) 643242



B2 Example Layout 2 – Pole Mounted Substation

COACH HS BARN 643227



Appendix C

C1 Standard Abbreviations Commonly Found in GIS

ATTRIBUTE	LABEL
Number of Conductors	
Core (the number of cores in an underground cable, eg 3c)	c
Telephone pair (the number of pairs in a telephone cable, eg 19p)	p
Other conductor (eg the number of wires on an overhead line, 4x)	x
Conductor Material	
Copper Stranded (no code displayed)	
Copper Solid	Sol Cu
Hard Drawn Copper	Cu
Cadmium Copper	Cd
All Aluminium Alloy Conductor	AAAC
Aluminium Conductor Steel Reinforced	ACSR
Stranded Aluminium Core	AC
Stranded Aluminium Wire	Al
Solid Aluminium Core	SAC
Overhead Line Type	
Electricity North West Specification (denoted by Specification number) e.g.	ES 400-O2
Aerial Bundled Conductor	ABC
BEBS L1	BEBS L1
BS 1320	BS 1320
Compact Covered Construction	CCC
Tower Double Circuit	Tower DC
Associated Overhead Conductor Type	
Aerial Earth Wire	AEW
Street Lighting Wire	SL
Underground Cable Type	
LV Paper Insulated Lead Covered Steel Tape Armoured and Served (assumed, therefore no label is displayed)	
HV Paper Insulated Lead Covered Steel Wire Armoured and Served	PLSWS
LV Paper Insulated Lead Covered Steel Wire Armoured and Served	PLSWS

HV Paper Insulated Lead Covered Steel Tape Armoured and Served	PLSTS
Lead Sheathed and Unarmoured Cables	UA
Aluminium Sheathed	AS
Corrugated Aluminium Sheathed	CAS
Consac (Aluminium Sheath Neutral)	ASN
Gas Pressure	GP
HSL	HSL
Oil Filled	OF
PVC Concentric	PC
PVC Split Concentric	PSC
XLPE Concentric	XC
XLPE Split Concentric	XSC
XLPE	XLPE
Auxiliary Cable Type	
Pilot	P
Telephone	T
Combined Pilot and Telephone	PT
Other	
Out of Commission	OOC
Installed by third party Independent Connection Provider	TP

C2 Standard Underground Abbreviations – Examples

COMPONENT/DESCRIPTION	LABEL
4 core 7/0 67mm pilot	4cP
11 kV 3 core aluminium sheath	3c (size) AC AS 11
11kV 3 core corrugated aluminium sheath	3c (size) AC CAS 11
132kV 3 core, copper conductor, paper insulated, oil filled lead alloy sheath, PVC oversheath,	3c (size) OF 132
Consac	3c (size) SAC ASN
LV Copper conductor, paper insulated, lead sheathed, steel tape armoured and served	(no of cores)c (size)
Single core copper, PVC insulated split-concentric neutral and earth	(size) PSC
Single core aluminium, XLPE insulated combined concentric neutral/earth	(size) SAC XC
Single core aluminium, XLPE insulated split concentric neutral and earth	(size) SAC XSC
Solid aluminium conductor, paper insulated, lead sheathed, steel tape armoured and served	(no of cores)c (size) SAC
Waveform	(no of cores)c (size) SAC XC
Polymeric Cables	
11kV and below	3c (size) AC XLPE (voltage)
Singles, 11kV and above	1c (size) XLPE (voltage)
Triplex	3x1c (size) SAC XLPE (voltage)