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Electricity Specification 400O4

Issue 4 August 2024

LV ABC Overhead Lines and Services

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Contents

1 Introduction 7
2 Scope 7
3 Definitions 8
4 Design Criteria 8
4.1 General 8
4.2 Support Data 8
4.3 Span Lengths 9
4.4 Erection Data 9
5 Clearances 9
5.1 General Rules 9
5.2 Tree Clearances 9
6 Erection Criteria 10
6.1 Systems Attached to Poles 10
6.2 Pole to Building Flights 10
6.3 Systems Attached to Buildings 11
6.4 Systems within Buildings 11
6.5 Sectioning Points 11
6.6 Variations for 3-Wire and 5-Wire ABC 11
7 Supports 12
7.1 General 12
7.2 Foundations 12
7.3 Unstayed Angles (Including Service Attachments) 13
7.4 Stayed and Transition Supports 13
8 Stays 13
9 Conductor Erection 13
10 Material Requirements for the Erection of an ABC Line 14
10.1 Conductor 14
10.2 Conductor Fittings 14
10.3 Poles 15
10.4 Pole Fittings 15
10.5 Backfill/Compaction Material 16
10.6 Stay Materials 16

10.7 Service Cables 16
10.8 Fasteners and Washers etc 16
11 Electrical Connections 16
11.1 General 16
11.2 Mains-to-Mains Connections 17
11.3 Service Connections 17
11.4 Mains Cable Termination and Connection to ABC 18
12 Auxiliary Equipment (Including Fuses) 18
13 Earthing 18
13.1 General 18
13.2 Earthing of Supports Carrying BT Attachments 19
13.3 Retention of Guard Wires 19
14 Cable Guards 19
15 Signing 19
16 Anti-Climbing Devices 19
17 Agreements with third Parties 19
18 Documents Referenced 20
19 Keywords 22
Appendix A – General Arrangement Drawings and Material Lists 23
Appendix B – Index to Materials 84
Appendix C 92
C1 Design Data for Conductor, ABC, 2x35mm^2 92
Table 1: Conductor, ABC, 2x35mm^2 – In Line Structures 92
Table 2: Conductor, ABC, 2x35mm^2 – Angle Structures 92
Table 3: Conductor, ABC, 2x35mm^2 – Terminal Structures 92
Table 4: Conductor, ABC, 2x35mm^2 – Design Sag/Tension 93
Table 5: Conductor, ABC, 2x35mm^2 – Pole Data (Ground Good/Average) 94
Table 6: Conductor, ABC, 2x35mm^2 – Single Pole Stay Capability 95
Table 7: Conductor, ABC, 2x35mm^2 – Single Pole Strut Loading (Level Conditions) 96
Table 8: Conductor, ABC, 2x35mm2 – Single Pole Strut Loading (1:10 Downpull Conditions) 97
C2 Design Data for Conductor, ABC, 4x35mm^2 98
Table 1: Conductor, ABC, 4x35mm^2 – In Line Structures 98
Table 2: Conductor, ABC, 4x35mm^2 – Angle Structures 98
Table 3: Conductor, ABC, 4x35mm^2 – Terminal Structures 98

Table 4: Conductor, ABC, 4x35mm^2 – Design Sag/Tension 99
Table 5: Conductor, ABC, 4x35mm^2 – Pole Data (Ground Good/Average) 100
Table 6: Conductor, ABC, 4x35mm^2 – Single Pole Stay Capability 101
Table 7: Conductor, ABC, 4x35mm^2 – Single Pole Strut Loading (Level Conditions) 102
Table 8: Conductor, ABC, 4x35mm^2 – Single Pole Strut Loading (1:10 Downpull Conditions) 103
C3 Design Data for Conductor, ABC, 2x95mm^2 104
Table 1: Conductor, ABC, 2x95mm^2 – In Line Structures 104
Table 2: Conductor, ABC, 2x95mm^2 – Angle Structures 104
Table 3: Conductor, ABC, 2x95mm^2 – Terminal Structures 104
Table 4: Conductor, ABC, 2x95mm^2 – Design Sag/Tension 105
Table 5: Conductor, ABC, 2x95mm^2 – Pole Data (Ground Good/Average) 106
Table 6: Conductor, ABC, 2x95mm^2 – Single Pole Stay Capability 107
Table 7: Conductor, ABC, 2x95mm^2 – Single Pole Strut Loading (Level Conditions) 108
Table 8: Conductor, ABC, 2x95mm^2 – Single Pole Strut Loading (1:10 Downpull Conditions) 109
C4 Design Data for Conductor, ABC, 4x95mm^2 110
Table 1: Conductor, ABC, 4x95mm^2 – In Line Structures 110
Table 2: Conductor, ABC, 4x95mm^2 – Angle Structures 110
Table 3: Conductor, ABC, 4x95mm^2 – Terminal Structures 111
Table 4: Conductor, ABC, 4x95mm^2 – Design Sag/Tension 112
Table 5: Conductor, ABC, 4x95mm^2 – Pole Data (Ground Good/Average) 113
Table 6: Conductor, ABC, 4x95mm^2 – Single Pole Stay Capability 114
Table 7: Conductor, ABC, 4x95mm^2 – Single Pole Strut Loading (Level Conditions) 115
Table 8: Conductor, ABC, 4x95mm^2 – Single Pole Strut Loading (1:10 Downpull Conditions) 116
C5 Design Data for Service Spans (ABC and Concentric Cables) 117
C5.1 ABC Conductors: 2x35mm^2; 4x35mm^2 117
Table 1: Design Sag/Tension for ABC Conductors: 2x35mm^2; 4x35mm^2 117
Table 2: Design Sag/Tension for ABC Conductors: 2x95mm^2; 4x95mm^2 119
C5.2 Service, Pole-To-House, Concentric, Cu, Single Phase, 25mm^2 120
Table 3: Service, Pole-To-House, Concentric, Cu, Single Phase, 25mm^2 – Design Sag/Tension 120
Table 4: Service, Pole-To-House, Concentric, Cu, Single Phase, 25mm^2 – Erection Sag/Tension 122
C5.3 Concentric, Cu, Three Phase, 25mm^2 123
Table 5: Concentric, Cu, Three Phase, 25mm^2 – Design Sag/Tension 123
Table 6: Concentric, Cu, Three Phase, 25mm^2 – Erection Sag/Tension 125
C5.4 Concentric, Cu, Single Phase, 35mm^2 126

Table 7: Concentric, Cu, Single Phase, 35mm^2 – Design Sag/Tension 126
Table 8: Concentric, Cu, Single Phase, 35mm^2 – Erection Sag/Tension 128
C5.5 Concentric, Cu, Three Phase, 35mm^2 129
Table 9: Concentric, Cu, Three Phase, 35mm^2 – Design Sag/Tension 130
Table 10: Concentric, Cu, Three Phase, 35mm^2 – Erection Sag/Tension 131
C6 Design Data for Unstayed Supports 132
Table 1: In-line Support with Service Span Attachments 132
Table 2: Angle Support with no Service Span Attachments (Medium Poles) 132
Table 3: Angle Support with no Service Span Attachments (Stout Poles) 133
Table 4: Angle Support with One Service Span Attachment (Medium Poles) 133
Table 5: Angle Support with One Service Span Attachment (Stout Poles) 134
C7 Solutions to Out-of-Balance Problems 135
C7.1 Forces Involved and pole Considerations 135
C7.2 Options for Solving an Out-of-Balance Problem 135
Table 1: Forces Involved at Conductor Transitions 136

1 Introduction

This specification covers the design and erection requirements of Low Voltage Insulated Aerial Bundled Conductors (LV ABC) and services employed on the overhead line network owned by Electricity North West Limited (Electricity North West). It is based on ENA TS 43-12 and also meets the requirements of the Electricity Safety, Quality and Continuity Regulations (refer to EPD101).

All new LV ABC overhead lines shall be designed and constructed to this specification. Refer to EPD473 for the policy governing the use of LV ABC lines in other circumstances, eg refurbishment and use in high risk areas. More detailed information on each of the topics included in this specification is given in CP420 Part 1 Chapter 24.

Electricity North West's engineering practice and procedures for constructing an LV ABC line are given in CP420 Part 1 and CP430 Part 1 respectively. Practice specific to refurbishment is covered in CP421.

LV ABC comprises insulated conductors bundled together. The insulation is made from cross-linked polyethylene (XLPE); the cross-links between the molecular polyethylene chains give the material additional strength and rigidity. The ABC is supported and terminated in accordance with the General Arrangement (GA) Drawings included in this specification.

This system incorporates Protective Multiple Earthing (PME). Refer to CP332 and CP420 Part 1 Chapter 21 for more detail on PME.

This specification is basically split into four parts:

- The specification text, which provides the background information for the detail of the appendices.
- Appendix A, which contains GA Drawings with lists of materials.
- Appendix B, which contains a reference list of all materials quoted in Appendix A in alphanumeric order.
- Appendix C, which contains design data.

2 Scope

This specification covers the design and erection requirements for all LV ABC lines and associated services, including service flights and landings on buildings (but not LV mural wiring) and operating in the range up to and including 1kV. LV mural wiring systems (systems attached to buildings) shall be designed and constructed to ES400O4a.

The ABC lines used on the Electricity North West network comprise:

- Conductor, ABC, 2x35mm^2
- Conductor, ABC, 3x35mm^2
- Conductor, ABC, 4x35mm^2

- Conductor, ABC, 5x35mm^2
- Conductor, ABC, 2x95mm^2
- Conductor, ABC, 3x95mm^2
- Conductor, ABC, 4x95mm^2
- Conductor, ABC, 5x95mm^2

(Where 2x35mm^2 denotes 2 wires bundled together, each of which contains one 35mm^2 effectively insulated conductor, etc.)

All the above conductors are specified in ES400C3.

Concentric service cables are covered in ES400C8.

3 Definitions

Definitions are as given in CP420 Part 1.

4 Design Criteria

4.1 General

A full set of design and construction data for each ABC type is given in Appendices C1 to C4. Design data for service spans (including concentric cables) are covered in Appendix C5, and a separate set of design data for unstayed supports is given in Appendix C6.

3-wire or 5-wire ABC shall be treated as the equivalent 2-wire or 4-wire ABC. For example, for ABC, 3x35mm^2, refer to Appendix C1 (ABC, 2x35mm^2).

The data are based on the GAs and materials included in this specification. Variations to the GAs for 3-wire and 5-wire ABC are covered in Section **Error! Reference source not found.**.

NOTE: that the erection tables include creep at 10%; the design tables do not include creep. The erection tables are for use by the linestaff. They are intended to be used in conjunction with a dynamometer or sag board.

4.2 Support Data

Stresses in unstayed intermediate supports are bending stresses caused by wind load on iced conductors equivalent to two service spans normal to the line. (Loading point = 300mm below pole top.)

Unstayed capability of supports gives a minimum factor of safety (FoS) for all conductors of 2.5.

Stresses in stayed supports are crippling stresses caused by stay tension and conductor weight.

Strut capability of supports gives a minimum FoS for all conductors of 2.5.

Poles/stays shall be selected in accordance with the data included in the relevant Appendix C.

These data are for poles without electrical plant. For poles supporting plant, strut loadings need to be considered and recalculated where necessary. (For this purpose, a 1000kg weight can be approximated to 1000kgf of additional strut loading.)

4.3 Span Lengths

Recommended and maximum span lengths for each ABC/concentric cable type are given at the beginning of the relevant design data appendix.

Treat 3-wire or 5-wire ABC as the equivalent 2-wire or 4-wire ABC. For example, for ABC, 3x35mm^2, refer to Appendix C1 (ABC, 2x35mm^2).

4.4 Erection Data

Main lines shall be erected in accordance with the data in Appendix C1 to C4. Service spans shall be erected in accordance with the data in Appendix C5.

The data in the erection sag tables take account of the following:

- Loads on clamps shall not exceed 40% of breaking load, nor shall they be sufficient to damage the conductor insulation.
- The tension shall allow connections to be made to an ABC bundle under normal working conditions.

The tension shall be sufficient to maintain effective operation of anchor clamps and required clearances throughout the design temperature range.

5 Clearances

5.1 General Rules

The following rules shall be incorporated in the design:

- Clearances from external objects and structures shall comply with CP420 Part 1 Chapters 15 and 15A. The design sag tables (Appendix C), using the maximum operating temperature of 75°C, shall be used to evaluate clearances.
- Line build clearances shall comply with CP430 Part 1 and CP420 Part 1 Chapter 15A.
- ABC shall not oversail roofs unless it is unavoidable. If it is necessary to oversail a roof, the relevant spans shall not contain any in-line connections.
- ABC shall not terminate within 0.5m of any thatched roof.

5.2 Tree Clearances

The points listed below shall be considered where an ABC system passes through trees. For detailed information on LV ABC tree clearances, refer to CP420 Part 1 Chapter 15.

- The possibility of abrasion of the ABC by branches, etc. Although there is a significant lateral reduction in the amount of tree-cutting for ABC (when compared with conventional open wire), the XLPE insulation shall not be allowed to come into contact with tree trunks, mature branches or heavy outer growth under any circumstances, due to its susceptibility to abrasion. Tree guard may be used to protect the ABC against abrasion as described in CP420 Part 1 Chapter 15. When tree guard is used, the tree clearances give in Chapter 15 do not apply. However, the ABC must be able to move vertically without the possibility of it resting on a branch or being forced up into a branch. Extensive application of tree guard over a span is not permitted: it will have a detrimental effect on sag and tension.
- Effects of the wind on conductor swing and sag.
- Effects of snow and wind loading on trees or branches bearing onto the ABC.
- The proximity of the trees providing unauthorised access for climbing.
- Provision shall be made to protect the conductor and pole supports by fitting weak links between the pole hook and the suspension clamp on in-line supports only where there is a danger of trees falling within the span. Weak link arrangements shall not be used on spans on either side of a road crossing, railway or navigable waterway.
- Where there is a danger that the ABC may be used as unauthorised access (e.g. children attempting to access trees), the ABC shall be positioned outside the reach of all climbable limbs. If necessary, branches shall be removed with the owner's permission.

6 Erection Criteria

6.1 Systems Attached to Poles

Systems attached to poles shall comply with the relevant GA drawings and their associated lists of materials from Appendix A. Note that these arrangements include service connections and structures containing plant. Variations for 3-wire and 5-wire ABC are covered in Section 6.6 below.

All fittings supporting the ABC system shall comply with this specification and shall provide an insulation barrier rated at 1000V between the core insulation and the mechanical attachment.

The ABC shall be attached in such a manner that it does not make direct or inadvertent contact with any steelwork or stays.

6.2 Pole to Building Flights

Flights from a pole to a building must be insulated where they are ordinarily accessible and at a suitable height where they are unlikely to be damaged, or where people going about their everyday activities cannot come into contact with them. A "suitable height" depends on what the flight is crossing and on the cable type.

Only concentric service cable or ABC shall be used for new and replacement flights between pole and building.

Clearances shall comply with CP420 Part 1 Chapter 15 and 15A.

Landing points on buildings and the suitability of buildings to be used to support mural wiring systems shall be assessed in accordance with Section 6.3 below.

6.3 Systems Attached to Buildings

Systems attached to buildings shall comply with the relevant GA drawings and their associated lists of materials from Appendix A. Variations for 3-wire and 5-wire ABC are covered in Section 6.6 below.

Routing of ABC shall take into account potential points of hazard to the installed system.

Proposed attachment points on buildings shall be inspected to ensure that, as far as is reasonably practicable, they are structurally sound and can support the ABC and fittings, given the rest of the requirements described in this section. Good quality brickwork or stonework should be adequate for the purpose. Therefore, brickwork, for example, shall be inspected for damage, signs of crumbling and loose (or lack of) mortar. If there is any doubt about the integrity of the proposed attachment points or supporting structure, they shall not be used to support the ABC. It is not acceptable for any type of fixing to be into a bargeboard or other wooden part of a building.

Mechanical loadings on a building shall not exceed 1.3kN per fixing unless special precautions are taken. Preferably, fixings will be loaded in shear, not in tension. The approach angle of the ABC to a building surface under load shall be minimised. Corners or other structural features can be used to achieve this. No system shall be constructed with full aerial tension acting directly on a building.

Refer to ES400O4a for design and construction of LV mural wiring systems attached to buildings, i.e. wiring running along a building from a landing point. Note that ES400O4a also covers underground fed LV mural systems.

6.4 Systems within Buildings

ABC shall not be installed within buildings: it is not an all-insulated system.

6.5 Sectioning Points

Fuses shall be installed in positions such that the number of customers affected by loss of supply will be limited if sections of the ABC need to be made dead.

6.6 Variations for 3-Wire and 5-Wire ABC

6.6.1 Types of 3-Wire and 5-Wire ABC Available

The following types of 3-wire and 5-wire ABC are available:

- Conductor, ABC, 3x35mm^2 – CC 012105.
- Conductor, ABC, 5x35mm^2 – CC 012108.
- Conductor, ABC, 3x95mm^2 – CC 012075.

Conductor, ABC, 5x95mm^2 – CC 012077.

6.6.2 General

Because the third or fifth wire (the earth wire) is the same size as the other wires in the effectively-insulated bundle, and because the earth wire will either be in tension or non-tension as per the other wires in the bundle, compression fittings will generally be the same as for the other wires in the bundle.

6.6.3

The additional earth wire shall be taken around the outside of any clamps as shown in GA Drawing **Error! Reference source not found.**. Because of the catenary support of the rest of the bundle, the earth wire will not be in tension, therefore, where necessary, non-tension compression fittings may be used as shown.

6.6.4 Effect on GA Materials of the Additional Earth Wire

At section poles where there is an anchor clamp (refer to Drawing **Error! Reference source not found.**):

- One additional non-tension compression fitting is necessary (same as CC as for other wires) where lengths of ABC need to be connected.
- Additional cable ties are needed as shown.

In other cases, an earth wire shall be connected to another length of wire using the correct size of compression fitting as follows:

- Full tension fitting if the joint is in tension or non-tension fitting where there is slack, and the joint is not under tension.

Appropriate bimetallic fitting if wires are of different metals.

7 Supports

7.1 General

Supports shall be configured in accordance with the appropriate GA drawing. Wood poles used shall be manufactured and fabricated to ES400W2. All wood poles covered by this specification shall be either medium or stout. Refer to the relevant Appendix C for details of support type for each ABC configuration and arrangement.

Refer to CP421-4 for policy on third party attachments.

7.2 Foundations

Planting depths are given in Appendix C. Wood blocks shall be fitted to all section poles and terminal poles. Unstayed intermediate supports do not normally need wood blocks unless specified otherwise. One case where intermediate poles may need foundations is covered in Appendix C7 (Solutions to out-of-Balance Problems).

Excavation/backfill of pole holes is covered in CP420 Part 1 Chapter 03, and pole erection is covered in CP420 Part 1 Chapter 04.

Augering can be used, but only for intermediate poles, and only if the ground is suitable. An augered hole shall be 0.5m deeper than the equivalent hand-excavated hole, hence a longer pole will be needed. After augering, the hole shall be backfilled with approved compaction material (refer to ES400R5).

7.3 Unstayed Angles (Including Service Attachments)

It is preferable to use stays for all angle poles, and stays shall be used where wayleaves for stays can be obtained. However, unstayed angle poles are allowed in accordance with Appendix C6, but not close to foundations, supporting walls or buildings.

7.4 Stayed and Transition Supports

All angle supports (intermediate and section) shall be supported by stays, except for the cases covered by Section 7.3 above. Refer to Section 8 for general stay information and the relevant Appendix C for stay spread and minimum stay angles.

All tee-off and terminal supports (excluding service attachments) shall be supported by stays. Refer to the relevant Appendix C for minimum stay angles.

Transition arrangements introduce out-of-balance problems, due to the differences between the ABC and open wire conductors. Refer to Appendix C7 for solutions to out-of-balance problems.

8 Stays

Stay arrangements, including stay strand, insulators, pole top attachments and anchors, shall comply with CP420 Part 1 Chapter 07. The use of flying stays, struts and outriggers shall be avoided wherever possible.

A stay plate may be used as an alternative to a pole top makeoff for securing a stay to the pole. However, a light duty stay plate may only be used where the safe working load of the attached stay does not exceed 28kN. For a structure of restricted height, the use of a stay plate may be preferable: the pole-top fixing to stay insulator distance is less for a stay plate than that of the equivalent pole top makeoff.

Only screw-in type or standard wooden 4-tonne stay blocks shall be used generally. Load lock anchors may be used, but calculations shall be done on a case-by-case basis to ensure that a minimum FoS value of 2.5 is maintained. The maximum working load for a load lock anchor is 28kN.

NOTE: that the ideal stay angle (between pole and stay) is 45°. This angle can be varied between a minimum of 30° and a maximum of 50°, however, in exceptional circumstances a minimum of 20° can be considered, provided that the additional strut load imposed on the pole is taken into account.

In certain circumstances, where visibility of the stay may be a problem (e.g. hedgerow next to footpath), a stay marker to ES400H2 shall be fitted to bring attention to the stay.

9 Conductor Erection

ABC conductors shall be erected in accordance with CP420 Part 1 Chapter 06. Because ABC has an XLPE covering, it is particularly important to ensure that the bundle is not in contact with the ground or any other potentially abrasive surfaces during stringing out.

Full tension joints are not permitted in new sections of LV ABC.

10 Material Requirements for the Erection of an ABC Line

10.1 Conductor

10.1.1 Standard for Manufacture and Delivery

LV ABC shall comply with ES400C3.

10.1.2 Identification of Phases, Neutral and Earth

Phases, neutral and earth are identified by ribs or no ribs on the insulation as follows:

Phase L1 – 1 rib
Phase L2 – 2 ribs
Phase L3 – 3 ribs
Neutral – fully ribbed
Earth – smooth (no ribbing)

It is important to ensure that the above phase/neutral/earth identification is maintained when ABC tails are used in the construction of a GA.

10.2 Conductor Fittings

10.2.1 General

Conductor fittings for LV ABC systems shall comply with ES400C29 with the exception of helical fittings which shall comply with ES400H2.

It is important to ensure that the LV ABC is correctly secured to the fittings to ensure: even distribution of load; only insulated parts of the clamps are in contact with the LV ABC.

10.2.2 Suspension Clamp

Suspension clamps shall be used to carry the conductor on intermediate supports. The angles stated on the relevant GA drawings shall not be exceeded. These clamps incorporate rollers which are used during running out. For angles of line deviation exceeding 30°, but not exceeding 60° (maximum angle for these clamps), extension rollers shall be fitted during running out to prevent snagging. These extension rollers shall be removed once the section has been terminated.

On supports where uplift could cause the clamp to slip off the supporting hook, the clamp can still be used in the following configuration provided that the vertical line deviation is less than 30°: the clamp can be inverted and fixed in position by an M20 bolt. Alternatively, a section support can be used at that position.

10.2.3 Anchor Clamps

Anchor clamps are used on all section, terminal and tee-off supports to take the line tension. An anchor clamp is also used to secure the LV ABC service connection.

10.2.4 Insulation Piercing Compression Connectors

Insulation piercing compression connectors (IPCCs) shall be used as follows:

To make non-tension connections to the LV ABC, eg tee-off connections or service connections. IPCCs may be used as an alternative to non-tension compression connectors (see below).

Certain IPCCs contain a connector part enabling bare copper to be connected to ABC – these are specified on the appropriate GA Drawings.

The integrity of the insulation (electrical insulation, mechanical integrity and environmental protection) shall be maintained by the use of appropriate shrouds; these may be supplied with the IPCC. Special requirements for the use of IPCCs are included in Section 11.

10.2.5 Full Tension/Non-Tension Compression Connectors

Full tension or non tension compression connectors shall be used as necessary to maintain the continuity of the main line and earths. These connectors should not be needed on new lines except in the mandatory positions shown on the GA Drawings. IPCCs may be used as an alternative to non-tension compression connectors.

10.2.6 Helical Dead Ends

Helical dead ends shall be used to secure CNE, SCNE or open wire service connections only to the main line pole.

10.2.7 Weak Links

Weak links shall be fitted between the hook and suspension clamp on in-line supports only where it is considered necessary to protect the line as described in Section 5.2.

10.3 Poles

10.3.1 General

The material and fabrication of wood poles shall comply with ES400W2.

10.3.2 Pole Caps

Pole caps shall not to be fitted to poles.

10.4 Pole Fittings

10.4.1 General Fixing Details

Two 22mm diameter pre-drilled holes, 150mm apart, are provided on a standard LV ABC wood pole for securing the pole-top fittings.

10.4.2 Hook Bolt

The hook bolt, which comprises a pigtail hook with an integral M20 bolt, is used to support the suspension clamp. Hook bolts shall comply with ES400F1.

10.4.3 Outrigger Hook

The outrigger hook is used in place of the hook bolt to give the required additional clearance where the ABC is running through an inside angle, or to remove the need for angled arrangement. Outrigger hooks shall comply with ES400S11. There is a 22mm hole in the integral supporting bracket of the outrigger hook.

10.4.4 Eye Nut and Eye Bolt

Eye nuts and eye bolts are used to support anchor clamps. The eye bolt comprises an eye, to take the anchor clamp, and an integral M20 bolt. The eye nut comprises the same eye as the bolt, but with an integral M20 nut. Eye nuts and eye bolts shall comply with ES400F1.

10.4.5 Fall-Arrest, Reliable Anchor Points

Fall-arrest, reliable anchor points (FARAPs) shall not be fitted, unless shown on the GA Drawing and/or list of materials. Where fitted, FARAPs shall comply with ES400S11.

10.5 Backfill/Compaction Material

Backfill/compaction materials shall comply with ES400R5.

10.6 Stay Materials

Material requirements of stay components are fully specified in CP420 Part 1 Chapter 07.

10.7 Service Cables

The following concentric service cables are covered by this specification:

- Split Neutral Earth (SNE) – in this case Split Concentric Neutral Earth (SCNE) – to ES400C8.
- Combined Neutral Earth (CNE) to ES400C8.

10.8 Fasteners and Washers etc

All fasteners (e.g. nuts, bolts, security ties) and washers used to secure the above components shall comply with ES400F1.

11 Electrical Connections

11.1 General

Full tension joints are not permitted on new ABC lines.

Connections down the pole to earth electrodes are shown on applicable GAs. For further information on earthing refer to Section 13.

The integrity of the insulation (electrical insulation, mechanical integrity and environmental protection) at any ABC bare end shall be maintained by the use of appropriate end caps.

ABC shall be secured to the pole by cleats, as necessary. All cleats shall comply with ES400C20.

11.2 Mains-to-Mains Connections

Non-tension connections shall be made using the IPCCs in accordance with the following rules and as specified on the GAs:

- Single phase 35mm^2 connections: one IPCC shall be used at each phase connection; one shall be used at each neutral connection.
- Single phase 95 mm^2 connections: one IPCC shall be used at each phase connection; two shall be used at each neutral connection.
- All three phase connections: one IPCC shall be used at each phase connection; two shall be used at each neutral connection.
- At network isolation points, section fuses shall be used as shown on the relevant GA drawings. IPCCs shall not be used at these positions.

11.3 Service Connections

One IPCC shall be used for each service connection as shown on the relevant GA. (Note that a 95mm^2 ABC service shall be treated as a mains-to-mains connection above, i.e. two IPCCs shall be used on the neutral earth.) The following general rules shall be followed:

- The cable termination break-out kits shall be used to terminate CNE and SCNE cables at the pole as shown on the appropriate GA drawing. Details of the break-out kits are included in CP411 LV.
- Non-standard service cable: a phase balance shall be maintained on the main where possible; heatshrink sleeving shall be applied to the stranded neutral prior to connection.
- A security tie shall be used to secure the service conductor to the bundle to avoid eventual failure due to hardening.
- The integrity of the insulation (electrical insulation, mechanical integrity and environmental protection) where ABC insulation is pierced for connection shall be maintained by the use of appropriate shrouding or tape; the protection applied shall allow for any insulation retraction.
- If it is necessary to remove an IPCC, the integrity of the insulation (electrical insulation, mechanical integrity and environmental protection) shall be maintained by suitable self-amalgamating tape. Note that an IPCC shall not be applied where an IPCC has been previously removed.
- If more than four connections (i.e. two single phase services or one three phase service) are needed, or there is a reasonable likelihood that they will be needed in future, connection to the bundle shall be via a distribution box as shown in Drawing I-400O4-GA-016. Note that it is mandatory to connect the distribution box neutral down the pole to a separate earth electrode.
- For 3- and 5-wire ABC (SCNE), a separate earth may be run down the pole from the distribution box where considered necessary.

11.4 Mains Cable Termination and Connection to ABC

Cables shall be terminated on ABC poles in accordance with the jointing procedures in CP411LV. Refer to the appropriate GA drawing for connection details between the cable termination and the overhead line. All compression fittings, lugs and IPCCs shall comply with ES400C29.

12 Auxiliary Equipment (Including Fuses)

Connections to plant and fuses are shown on the relevant GA drawings. Transformers shall comply with ES321. Multi-service distribution boxes and fuses shall comply with ES400L6. Fuse-links shall comply with ES334. Regulators shall comply with ES325.

Connections between ABC tails and copper cores shall be via bimetal transition compression connectors (refer to ES400C29).

ABC shall be connected to ancillary equipment at balancer and regulator supports (refer to the associated GA drawings) via ABC tails.

All bare metal connections shall be fully shrouded to maintain the integrity of the insulation (electrical insulation, mechanical integrity and environmental protection).

LV fuses shall be installed not less than 3m above the datum line, or 500mm above an anti-climbing device (ACD) if one is fitted. In most cases, the datum line will be ground level. However, the datum line (and thus the fixing height) shall be adjusted to take account of any walls, fences, etc, within 1.5m which could be used for unauthorised climbing. Additionally, fuses installed below 4.3m shall have a fuse holder or blank in place (ie no bare metal to be left visible/accessible).

13 Earthing

13.1 General

Protective multiple earthing (PME) is covered in CP332.

PME electrodes shall be connected to those poles identified in accordance with the rules given in CP420 Part 1, Chapter 21. The connections from the bundle down to earth electrode(s) shall be in accordance with the relevant GA Drawings. The number of buried electrodes is determined by the method given in CP420 Part 1, Chapter 21.

Mandatory and non-mandatory earths are indicated on the GA drawings.

Generally, earth wires shall be run down the side of the pole opposite that on which neutral IPCCs, fuses, etc are fitted. Cables running down the pole shall be kept as far apart on the pole as possible and shall be run down the pole in a straight line as close to vertical as possible.

Earthing components shall comply with ES400E8.

CP420 Part 1 Chapter 21 covers conversion of earthing systems.

13.2 Earthing of Supports Carrying BT Attachments

BT attachments shall be earthed in accordance with Engineering Recommendations PO5/1 and EB/BT2.

13.3 Retention of Guard Wires

The guard wire shall be retained where an ABC system replaces an open wire system crossing under an HV system.

14 Cable Guards

All cables running down the pole, ie underground cables and earths, shall be protected by appropriate cable guards as specified in ES400G1. Clearances shall be as specified in CP420 Part 1 Chapter 15A.

15 Signing

Although there is no legislative requirement to fit danger-of-death notices to LV poles carrying effectively insulated conductors, it is Electricity North West's policy to fit two danger-of-death notices to all poles as detailed in CP420 Part 1 Chapter 09, such that a warning is visible from any direction of approach.

Other notices shall be fitted as specified in CP420 Part 1 Chapter 09.

16 Anti-Climbing Devices

Although there is no legislative requirement to fit anti-climbing devices to LV poles supporting LV lines, it is Electricity North West's policy to fit enhanced ACDs to poles classified as high risk and have cables or climbing aids, or there is evidence of unauthorised pole climbing. The enhanced ACD shall be fixed at 2.75m above the datum line in accordance with CP420 Part 1 Chapter 10. (The datum line is as defined in Section 12 above.)

17 Agreements with third Parties

In cases where LV ABC lines are erected in close proximity to other bodies' plant or infrastructure, e.g. telecommunications equipment or railway infrastructure, the provisions of any joint agreements shall be followed. Clearances relating to joint agreements are covered in CP420 Part 1 Chapter 15. Joint agreement documents are listed in CP420 Part 1 Chapter 15.

18 Documents Referenced

DOCUMENTS REFERENCED	
Electricity Safety, Quality and Continuity Regulations.	
BS 1990-1:	Wood poles for overhead power and telecommunication lines. Specification for softwood poles.
ENA ER L13/2:	Street lighting brackets recommendations for attachment to jointly used poles.
ENA TS 43-12:	Insulated aerial bundled conductors – erection requirements of low voltage overhead distribution systems.
ENA TS 43-14:	Conductor Fittings and Associated Apparatus for Use with LV Aerial Bundled Conductors.
EPD101:	Application of the Electricity Safety, Quality and Continuity Regulations.
EPD283:	Distribution System Design – Low Voltage Network.
EPD473:	Policy for Overhead Line Standards – Design, Construction, Refurbishment, Selection and Classification.
CP332:	LV Service Connections & Application of PME.
CP411LV:	Mains practice up to and including 132kV: cable jointing up to and including 1000Volts.
CP420 Part 1:	Policy and practice for wood pole overhead lines.
CP421:	Maintenance and Refurbishment of Wood Pole Lines and Steel Tower Lines up to 132kV.
CP430 Part 1:	Overhead line – linesmen's manual – wood pole.

ES321:	Pole mounted distribution transformers.
ES325:	Voltage Stabilisers.
ES334:	HV and LV Fuse-Links.
ES400C3:	Wood pole overhead line conductors (up to and including 132kV).
ES400C8:	LV service cables.
ES400C20:	Cleats and clips for overhead/underground conductors and cables.
ES400C29:	Connectors and fittings for overhead line conductors.
ES400C30:	Overhead line copper-work.
ES400E8:	Earthing components for overhead lines.
ES400F1:	Fasteners and washers for wood pole overhead lines.
ES400G1:	Cable guards for wood pole overhead lines.
ES400H2:	Supply and delivery of helical fittings.
ES400L6:	Pole-Mounted Fuse Cut-Outs, Distribution Boxes, Fuse Boxes and Connection Boxes for LV Overhead Lines and Mural Wiring.
ES400O4a	LV Mural Wiring (ABC Main and LV Services)
ES400R5:	Backfilling/Compaction materials for wood poles – overhead lines.
ES400S11:	Overhead line steelwork for wood pole lines and ancillary steelwork for lattice steel towers.
ES400W2:	Wood poles and miscellaneous wooden items.

PO5/1:	Protection of Telecommunication Lines from Power Lines.
EB/BT2:	Conditions for BT and Public Electricity Suppliers' joint use of poles.

19 Keywords

ABC; Line; LV; Main; Overhead; Service

Appendix A – General Arrangement Drawings and Material Lists

Index to Drawings

LV ABC Distribution Network Supports

Unstayed Intermediate Support	**Error! Reference source not found.**
Intermediate Support up to 60° Line Deviation	**Error! Reference source not found.**
Intermediate Inside Angle Support up to 30° Line Deviation	**Error! Reference source not found.**
Section Support for Angles 0° – 20° Line Deviation	**Error! Reference source not found.**
Section Support for Angles 20° – 90° Line Deviation	**Error! Reference source not found.**
Section Support with LV Fuses	**Error! Reference source not found.**
Transition Support for ABC to Open Wire System	**Error! Reference source not found.**
Terminal Support	**Error! Reference source not found.**
Terminal Support for ABC to Underground Cable	**Error! Reference source not found.**
Tee-off from Intermediate	**Error! Reference source not found.**
Tee-off from Section Support	**Error! Reference source not found.**
Tee-off from Section Support with LV Fuses	**Error! Reference source not found.**

LV ABC Service Connections (from Poles and Pole-Mounted Equipment)

Single Phase ABC Overhead Service from Support	**Error! Reference source not found.**
Single Phase CNE/SCNE Overhead Service from Support	**Error! Reference source not found.**
Single Phase CNE/SCNE Underground Service from Support	**Error! Reference source not found.**
Multiple Service Distribution Box (Fused)	**Error! Reference source not found.**

LV ABC Pole-Mounted Equipment

Transition Support for ABC to Open Wire System via LV Fuses	**Error! Reference source not found.**
Intermediate Support with Cable Termination and LV Fuses	**Error! Reference source not found.**
Terminal Support with Cable Termination and LV Fuses	**Error! Reference source not found.**
Transformer Pole	**Error! Reference source not found.**
Support with Balancer	**Error! Reference source not found.**
Support with Regulator	**Error! Reference source not found.**
Transformer to Underground Cable	**Error! Reference source not found.**

Connections to/between Buildings (Excluding Terminations Within Property)

CNE/SCNE and ABC Service Spans	**Error! Reference source not found.**

Typical Arrangements to Buildings **Error! Reference source not found.**

Typical Concentric Service Cable Attachments to Buildings (Pole to House) **Error! Reference source not found.**

Typical Concentric Service Cable Attachment to Wood Pole and Open Wire Line **Error! Reference source not found.**

Using Extension Brackets for Additional Clearance **Error! Reference source not found.**

For Mural Wiring Arrangements refer to ES400O4a -

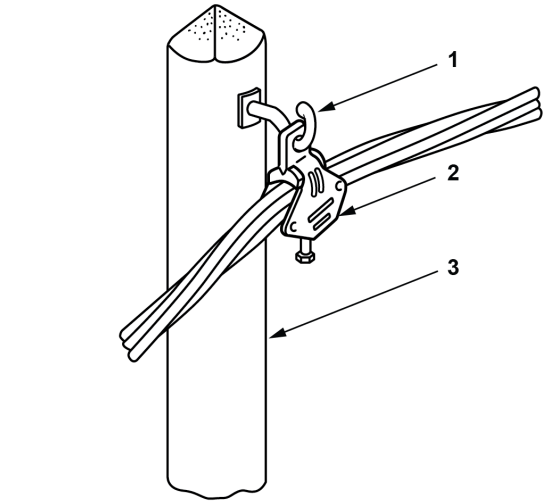
LV ABC Earthing

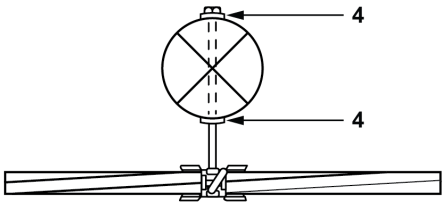
Earthing Arrangement at Intermediate Support **Error! Reference source not found.**

Earth Electrode Connections **Error! Reference source not found.**

LV ABC 3-Wire and 5-Wire Variations

5-wire ABC Connection at Section Pole **Error! Reference source not found.**





UNSTAYED INTERMEDIATE SUPPORT	Change information for this issue N/A	Appears in ES400O4	electricity north west I-400O4-GA-001 Iss 1 sht 1 of 1 Scale: nts Auth: DMT Date: 27/10/2011

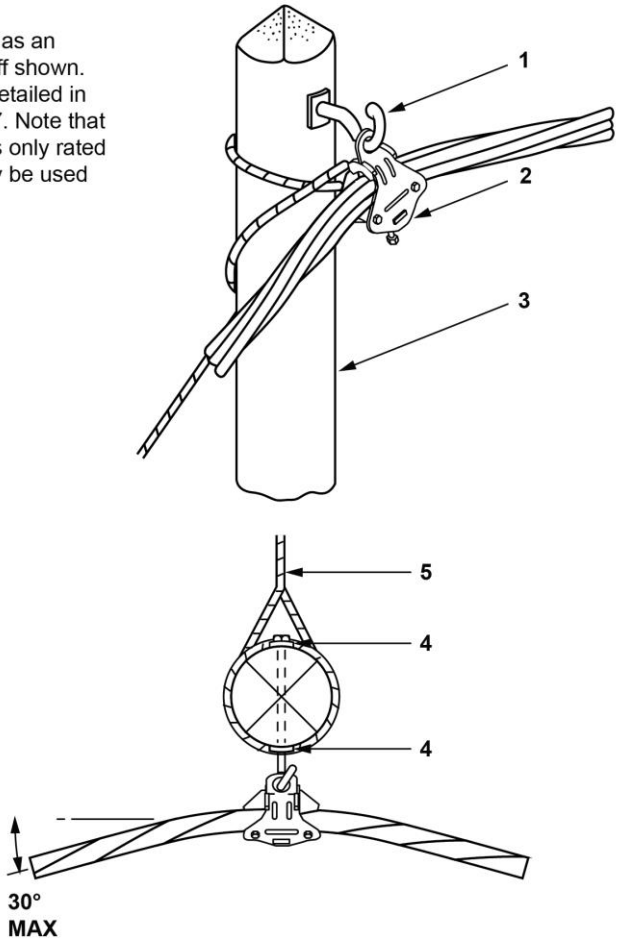
Unstayed Intermediate Support

Materials for Drawing Error! Reference source not found.

Conductor							
ABC, 2x35mm^2							
ABC, 4x35mm^2							
ABC, 2x95mm^2							
ABC, 4x95mm^2							
No	**Item**	**ES Ref**	**CC No**				
1	Bolt, M20, pigtail hook, ABC, galvanized (ENA TS 43-14)	400F1	*	1	1	1	1
2	Conductor fitting, clamp, suspension, ABC,2x35-120mm^2/4x25-120mm^2, up to 60° angle	400C29	110744	1	1	1	1
3	Wood pole	400W2	*	1	1	1	1
4	Washer, square, curved, 60x60x6mm, 22mm hole, galvanized	400F1	139203	2	2	2	2
Additional items that are required, but are not shown on the drawing **							
-	Notice, danger of death (wood poles) (Dwg I-400N1-NOTE-006)	400N1	195251	2	2	2	2
-	Notice, pole number (wood poles) (Dwg I-400N1-NOTE-020)	400N1	*	1	1	1	1
Additional items that may be required, but are not shown on the drawing **							
-	Notices	400N1	*	As required			
-	ACD	400A2	*	As required			
-	Conductor fitting, clamp, weak link suspension, ABC	400C29	234893	As required			

* Select appropriate item (size, type, etc...) from the specification in the adjacent “ES Ref” column.
** See the main body text for details.

Note
A stay plate can be used as an alternative to the make off shown. Stay arrangements are detailed in CP420 Part 1 Chapter 07. Note that the light duty stay plate is only rated up to 28kN and shall only be used accordingly.



INTERMEDIATE SUPPORT UP TO 60° LINE DEVIATION	Change information for this issue N/A	Appears in ES400O4	I-400O4-GA-002 Iss 1 sht 1 of 1 Scale: nts Auth: DMT Date: 27/10/2011

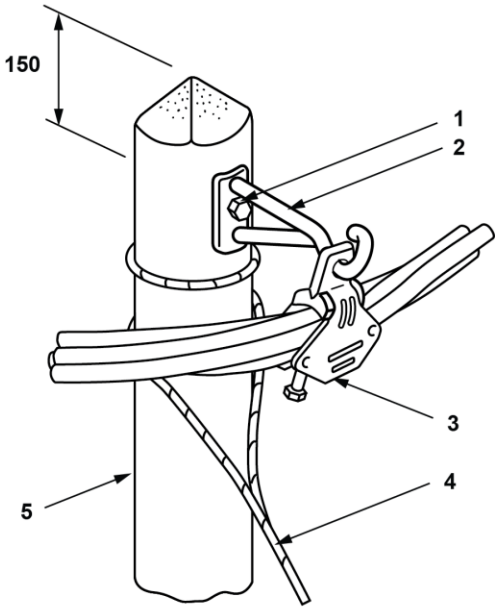
Intermediate Support up to 60˚ Line Deviation

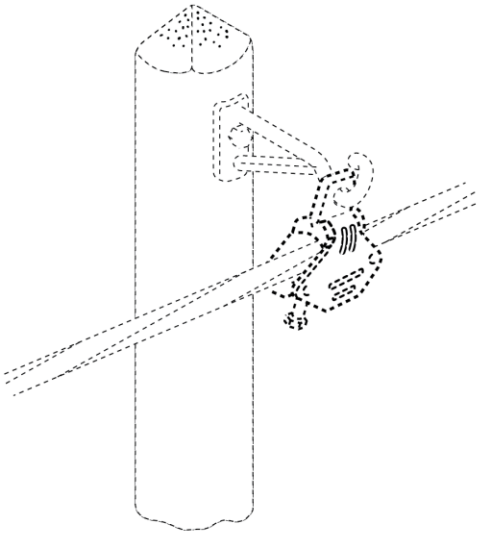
Materials for Drawing Error! Reference source not found.

Conductor							
ABC, 2x35mm^2							
ABC, 4x35mm^2							
ABC, 2x95mm^2							
ABC, 4x95mm^2							
No	**Item**	**ES Ref**	**CC No**				
1	Bolt, M20, pigtail hook, ABC, galvanized (ENA TS 43-14)	400F1	*	1	1	1	1
2	Conductor fitting, clamp, suspension, ABC,2x35-120mm^2/4x25-120mm^2, up to 60° angle	400C29	110744	1	1	1	1
3	Wood pole	400W2	*	1	1	1	1
4	Washer, square, curved, 60x60x6mm, 22mm hole, galvanized	400F1	139203	2	2	2	2
5	Stay arrangement as per CP420 Part 1 Chapter 07	-	-	As required			
Additional items that are required, but are not shown on the drawing **							
-	Notice, danger of death (wood poles) (Dwg I-400N1-NOTE-006)	400N1	195251	2	2	2	2
-	Notice, pole number (wood poles) (Dwg I-400N1-NOTE-020)	400N1	*	1	1	1	1
Additional items that may be required, but are not shown on the drawing **							
-	Notices	400N1	*	As required			
-	ACD	400A2	*	As required			
-	Conductor fitting, clamp, weak link suspension, ABC	400C29	234893	As required			

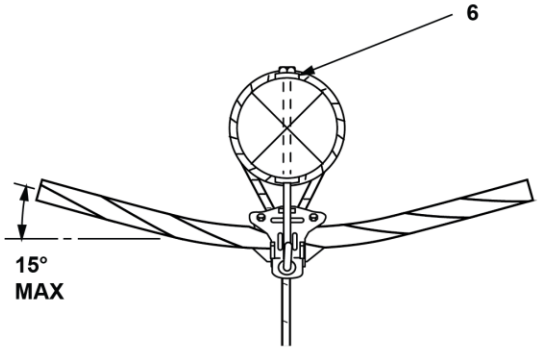
* Select appropriate item (size, type, etc...) from the specification in the adjacent “ES Ref” column.
** See the main body text for details.

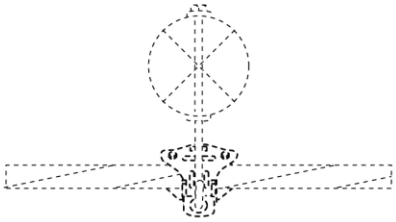
Note
A stay plate can be used as an alternative to the make off shown. Stay arrangements are detailed in CP420 Part 1 Chapter 07. Note that the light duty stay plate is only rated up to 28kN and shall only be used accordingly.





This arrangement can be used to remove a potential angle.





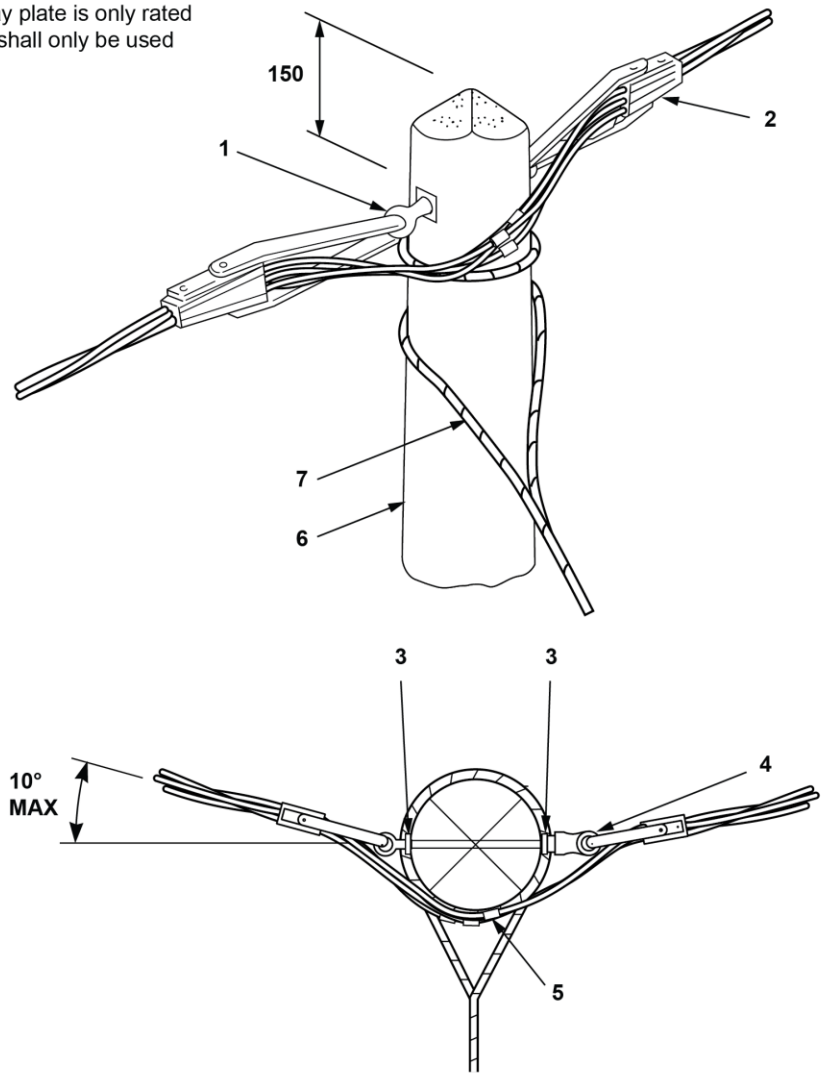
INTERMEDIATE INSIDE ANGLE SUPPORT UP TO 30° LINE DEVIATION	Change information for this issue: N/A	Appears in: ES400O4	I-400O4-GA-003 Iss 1 sht 1 of 1 Scale: nts Auth: DMT Date: 27/10/2011

Intermediate Inside Angle Support up to 30° Line Deviation	**Materials for Drawing** Error! Reference source not found.

Conductor							
ABC, 2x35mm^2							
ABC, 4x35mm^2							
ABC, 2x95mm^2							
ABC, 4x95mm^2							
No	**Item**	**ES Ref**	**CC No**				
1	Bolt, M20	400F1	*	1	1	1	1
2	Steelwork, outrigger hook, 22mm hole, pole, ABC	400S11	110221	1	1	1	1
3	Conductor fitting, clamp, suspension, ABC,2x35-120mm^2/4x25-120mm^2, up to 60° angle	400C29	110744	1	1	1	1
4	Stay arrangement as per CP420 Part 1 Chapter 07	-	-	As required			
5	Wood pole	400W2	*	1	1	1	1
6	Washer, square, curved, 60x60x6mm, 22mm hole, galvanized	400F1	139203	1	1	1	1
Additional items that are required, but are not shown on the drawing **							
-	Notice, danger of death (wood poles) (Dwg I-400N1-NOTE-006)	400N1	195251	2	2	2	2
-	Notice, pole number (wood poles) (Dwg I-400N1-NOTE-020)	400N1	*	1	1	1	1
Additional items that may be required, but are not shown on the drawing **							
-	Notices	400N1	*	As required			
-	ACD	400A2	*	As required			
-	Conductor fitting, clamp, weak link suspension, ABC	400C29	234893	As required			

* Select appropriate item (size, type, etc...) from the specification in the adjacent “ES Ref” column.
** See the main body text for details.

Note
A stay plate can be used as an alternative to the make off shown. Stay arrangements are detailed in CP420 Part 1 Chapter 07. Note that the light duty stay plate is only rated up to 28kN and shall only be used accordingly.



SECTION SUPPORT FOR ANGLES 0° – 20° LINE DEVIATION	Change information for this issue: N/A	Appears in: ES400O4	I-400O4-GA-004 Iss 1 sht 1 of 1 Scale: nts Auth: DMT Date: 27/10/2011

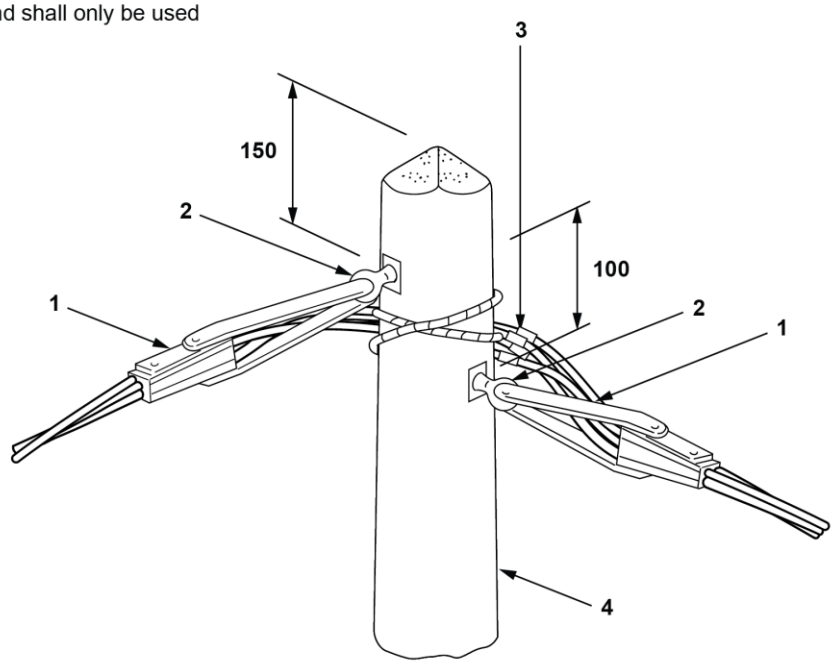
Section Support for Angles 0° – 20˚ Line Deviation

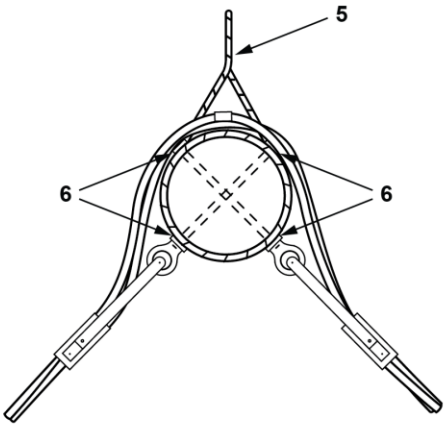
Materials for Drawing Error! Reference source not found.

Conductor							
ABC, 2x35mm^2							
ABC, 4x35mm^2							
ABC, 2x95mm^2							
ABC, 4x95mm^2							
No	**Item**	**ES Ref**	**CC No**				
1	Bolt, eye, M20	400F1	*	1	1	1	1
2	Conductor fitting, anchor clamp, ABC, 2 x 35mm^2	400C29	110418	-	-	-	1
	Conductor fitting, anchor clamp, ABC, 4 x 25-50mm^2	400C29	110175	-	-	1	-
	Conductor fitting, anchor clamp, ABC, 2 x 95mm^2	400C29	110426	-	1	-	-
	Conductor fitting, anchor clamp, ABC, 4 x 70-95mm^2	400C29	110177	1	-	-	-
3	Washer, square, curved, 60x60x6mm, 22mm hole, galvanized	400F1	139203	2	2	2	2
4	Nut, eye, M20, galvanized	400F1	122106	1	1	1	1
5 ***	Conductor fitting, compression full tension, ABC, 35mm^2	400C29	139112	-	-	4	2
	Conductor fitting, compression full tension, ABC, 95mm^2	400C29	118524	4	2	-	-
6	Wood pole	400W2	*	1	1	1	1
7	Stay arrangement as per CP420 Part 1 Chapter 07	-	-	As required			
Additional items that are required, but are not shown on the drawing **							
-	Notice, danger of death (wood poles) (Dwg I-400N1-NOTE-006)	400N1	195251	2	2	2	2
-	Notice, pole number (wood poles) (Dwg I-400N1-NOTE-020)	400N1	*	1	1	1	1
-	Wood block, foundation	400W2	*	As required			
Additional items that may be required, but are not shown on the drawing **							
-	Notices	400N1	*	As required			
-	ACD	400A2	*	As required			

* Select appropriate item (size, type, etc...) from the specification in the adjacent “ES Ref” column.
** See the main body text for details.
*** Only to be used where necessary. Note that IPCCs (CC 127275) may be used as an alternative to these items.

Note
A stay plate can be used as an alternative to the make off shown. Stay arrangements are detailed in CP420 Part 1 Chapter 07. Note that the light duty stay plate is only rated up to 28kN and shall only be used accordingly.





SECTION SUPPORT FOR ANGLES 20° – 90° LINE DEVIATION	Change information for this issue: N/A	Appears in: ES400O4	electricity north west I-400O4-GA-005 Iss 1 sht 1 of 1 Scale: nts Auth: DMT Date: 27/10/2011

Section Support for Angles 20° – 90° Line Deviation

Materials for Drawing Error! Reference source not found.

Conductor

ABC, 2x35mm^2

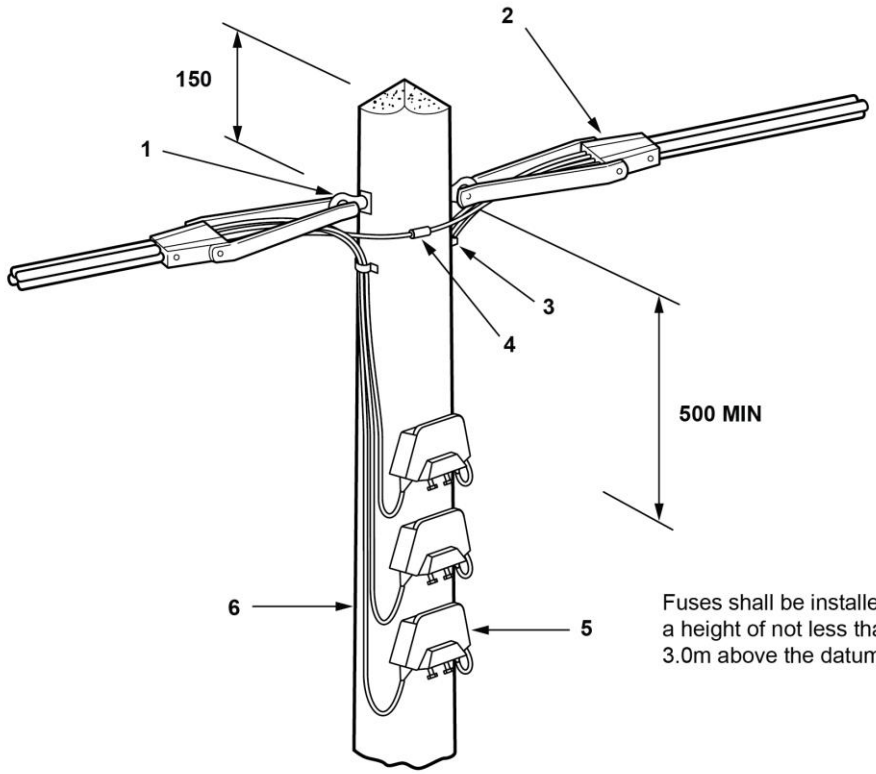
ABC, 4x35mm^2

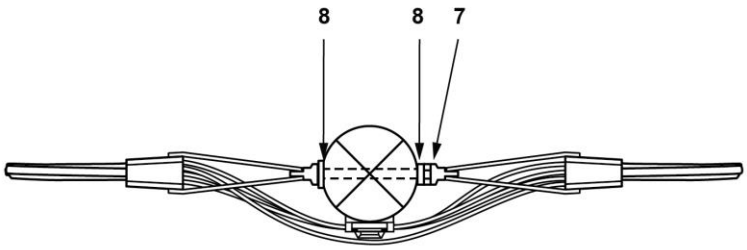
ABC, 2x95mm^2

ABC, 4x95mm^2

No	Item	ES Ref	CC No				
1	Conductor fitting, anchor clamp, ABC, 2 x 35mm^2	400C29	110418	-	-	-	2
	Conductor fitting, anchor clamp, ABC, 4 x 25-50mm^2	400C29	110175	-	-	2	-
	Conductor fitting, anchor clamp, ABC, 2 x 95mm^2	400C29	110426	-	2	-	-
	Conductor fitting, anchor clamp, ABC, 4 x 70-95mm^2	400C29	110177	2	-	-	-
2	Bolt, eye, M20	400F1	*	2	2	2	2
3 ***	Conductor fitting, compression full tension, ABC, 35mm^2	400C29	139112	-	-	4	2
	Conductor fitting, compression full tension, ABC, 95mm^2	400C29	118524	4	2	-	-
4	Wood pole	400W2	*	1	1	1	1
5	Stay arrangement as per CP420 Part 1 Chapter 07	-	-	As required			
6	Washer, square, curved, 60x60x6mm, 22mm hole, galvanized	400F1	139203	4	4	4	4
Additional items that are required, but are not shown on the drawing **							
-	Notice, danger of death (wood poles) (Dwg I-400N1-NOTE-006)	400N1	195251	2	2	2	2
-	Notice, pole number (wood poles) (Dwg I-400N1-NOTE-020)	400N1	*	1	1	1	1
-	Wood block, foundation	400W2	*	As required			
Additional items that may be required, but are not shown on the drawing **							
-	Notices	400N1	*	As required			
-	ACD	400A2	*	As required			

* Select appropriate item (size, type, etc...) from the specification in the adjacent “ES Ref” column.
** See the main body text for details.
*** Only to be used where necessary. Note that IPCCs (CC 127275) may be used as an alternative to these items.





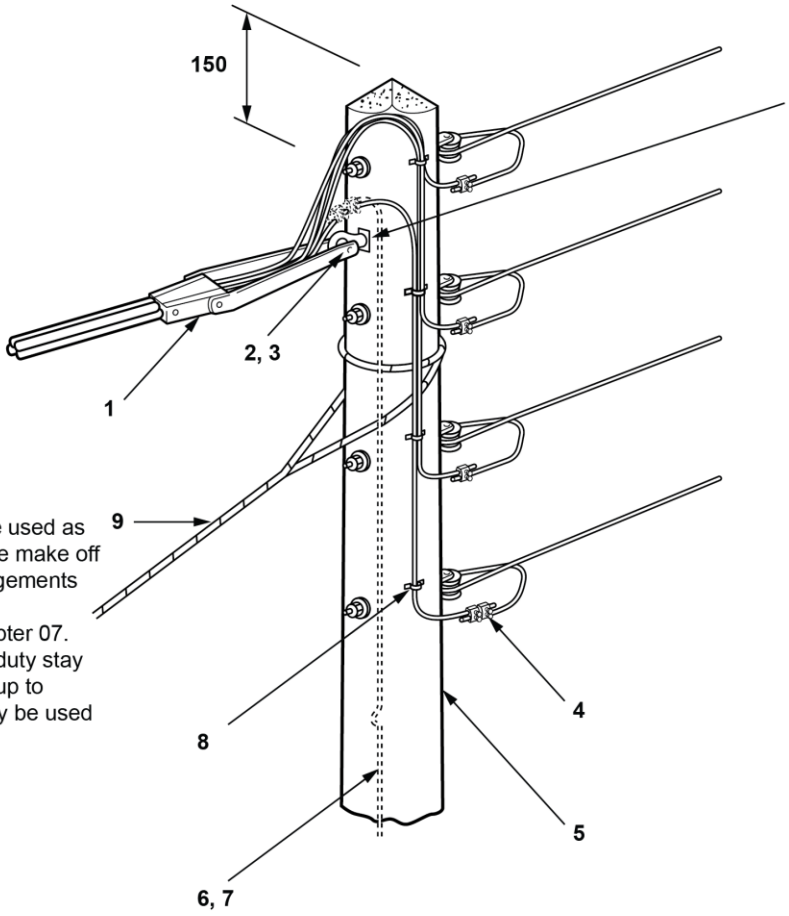
SECTION SUPPORT WITH LV FUSES	Change information for this issue	Appears in	electricity north west
	"ES400L6" added to "Appears in" box	ES400O4 ES400L6	I-400O4-GA-006 Iss 2 sht 1 of 1 Scale: nts Auth: DMT Date: 8/1/2016

Section Support with LV Fuses

Materials for Drawing Error! Reference source not found.

Conductor							
ABC, 2x35mm^2	Not applicable						
ABC, 4x35mm^2							
ABC, 2x95mm^2	Not applicable						
ABC, 4x95mm^2							
No	**Item**	**ES Ref**	**CC No**				
1	Bolt, eye, M20	400F1	*	1	-	1	-
2	Conductor fitting, anchor clamp, ABC, 4 x 25-50mm^2	400C29	110175	-	-	2	-
	Conductor fitting, anchor clamp, ABC, 4 x 70-95mm^2	400C29	110177	2	-	-	-
3	Cable cleat	400C20	*	As required			
4 ***	Conductor fitting, compression full tension, ABC, 35mm^2	400C29	139112	-	-	1	-
	Conductor fitting, compression full tension, ABC, 95mm^2	400C29	118524	1	-	-	-
5	Fuse carrier, pole mounted	400L6	122433	3	-	3	-
6	Wood pole	400W2	*	1	-	1	-
7	Nut, eye, M20, galvanized	400F1	122106	1	-	1	-
8	Washer, square, curved, 60x60x6mm, 22mm hole, galvanized	400F1	139203	2	-	2	-
Additional items that are required, but are not shown on the drawing **							
-	Notice, danger of death (wood poles) (Dwg I-400N1-NOTE-006)	400N1	195251	2	-	2	-
-	Notice, pole number (wood poles) (Dwg I-400N1-NOTE-020)	400N1	*	1	-	1	-
-	Tie, security, length 200mm, width 4.8mm, plastic	400F1	299758 †	As required			
-	Wood block, foundation	400W2	*	As required			
Additional items that may be required, but are not shown on the drawing **							
-	Notices	400N1	*	As required			
-	ACD	400A2	*	As required			

* Select appropriate item (size, type, etc...) from the specification in the adjacent “ES Ref” column.
** See the main body text for details.
*** IPCCs (CC 127275) may be used as an alternative to these items.



Note
A stay plate can be used as an alternative to the make off shown. Stay arrangements are detailed in CP420 Part 1 Chapter 07. Note that the light duty stay plate is only rated up to 28kN and shall only be used accordingly.

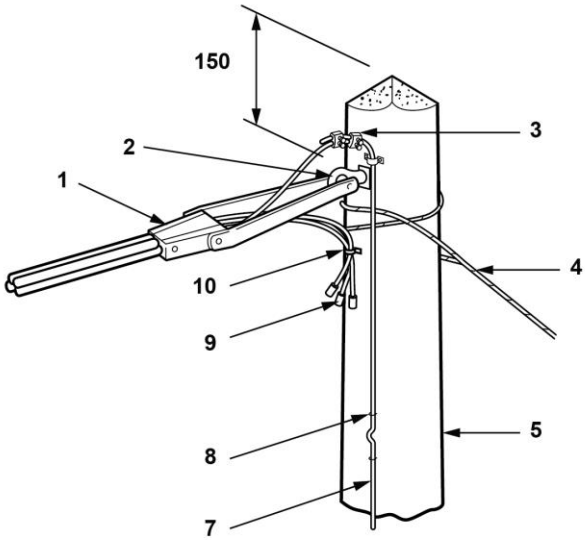
Note
The IPCCs are shown prior to shrouding for clarity.

TRANSITION SUPPORT FOR ABC TO OPEN WIRE SYSTEM	Change information for this issue: N/A	Appears in: ES400O4	electricity north west
			I-400O4-GA-007 Iss 1 sht 1 of 1
			Scale: nts Auth: DMT Date: 27/10/2011

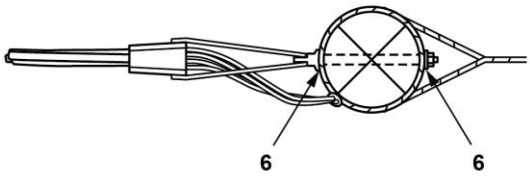
Transition Support for ABC to Open Wire System | **Materials for Drawing** Error! Reference source not found.

Conductor								
ABC, 2x35mm^2	Not applicable							
ABC, 4x35mm^2								
ABC, 2x95mm^2	Not applicable							
ABC, 4x95mm^2								
No	**Item**	**ES Ref**	**CC No**					
1	Conductor fitting, anchor clamp, ABC, 4 x 25-50mm^2	400C29	110175	-	-	1	-	
	Conductor fitting, anchor clamp, ABC, 4 x 70-95mm^2	400C29	110177	1	-	-	-	
2	Bolt, eye, M20	400F1	*	1	-	1	-	
3	Washer, square, curved, 60x60x6mm, 22mm hole, galvanized	400F1	139203	2	-	2	-	
4	Conductor fitting, insulation piercing compression connector, ABC, 25-95mm^2/bare 30/10-100mm^2, double bolt	400C29	116548	5	-	5	-	
5	Wood pole	400W2	*	1	-	1	-	
6***	Conductor, HDCu, 70mm^2 (green/yellow covered) Connected at the pole top via:	400C3	357243	As required				
7***	Conductor fitting, insulation piercing compression connector, ABC, 25-95mm^2/bare 30/10-100mm^2, double bolt (See Drawing **Error! Reference source not found.** for continuation of the earth below ground.)	400C29	116548	2	-	2	-	
8	Cable cleat	400C20	*	As required				
9	Stay arrangement as per CP420 Part 1 Chapter 07	-	-	As required				
Additional items that are required, but are not shown on the drawing **								
-	Notice, danger of death (wood poles) (Dwg I-400N1-NOTE-006)	400N1	195251	2	-	2	-	
-	Notice, pole number (wood poles) (Dwg I-400N1-NOTE-020)	400N1	*	1	-	1	-	
-	Tie, security, length 200mm, width 4.8mm, plastic	400F1	299758 †	As required				
-	Wood block, foundation	400W2	*	As required				
Additional items that may be required, but are not shown on the drawing **								
-	Cable guard	400G1	*	As required				8/12/16
-	Staples (for securing earth wire to pole)	400F1	*	As required				
-	Notices	400N1	*	As required				
-	ACD	400A2	*	As required				

* Select appropriate item (size, type, etc...) from the specification in the adjacent “ES Ref” column.
** See the main body text for details.
*** Only needed where an earth is required down the pole.
† It is not necessary to order these items for every pole: these CC numbers cover multiple items or coiled lengths.



Note
A stay plate can be used as an alternative to the make off shown. Stay arrangements are detailed in CP420 Part 1 Chapter 07. Note that the light duty stay plate is only rated up to 28kN and shall only be used accordingly.



TERMINAL SUPPORT	Change information for this issue N/A	Appears in ES400O4	electricity north west I-400O4-GA-008 Iss 1 sht 1 of 1 Scale: nts Auth: DMT Date: 27/10/2011

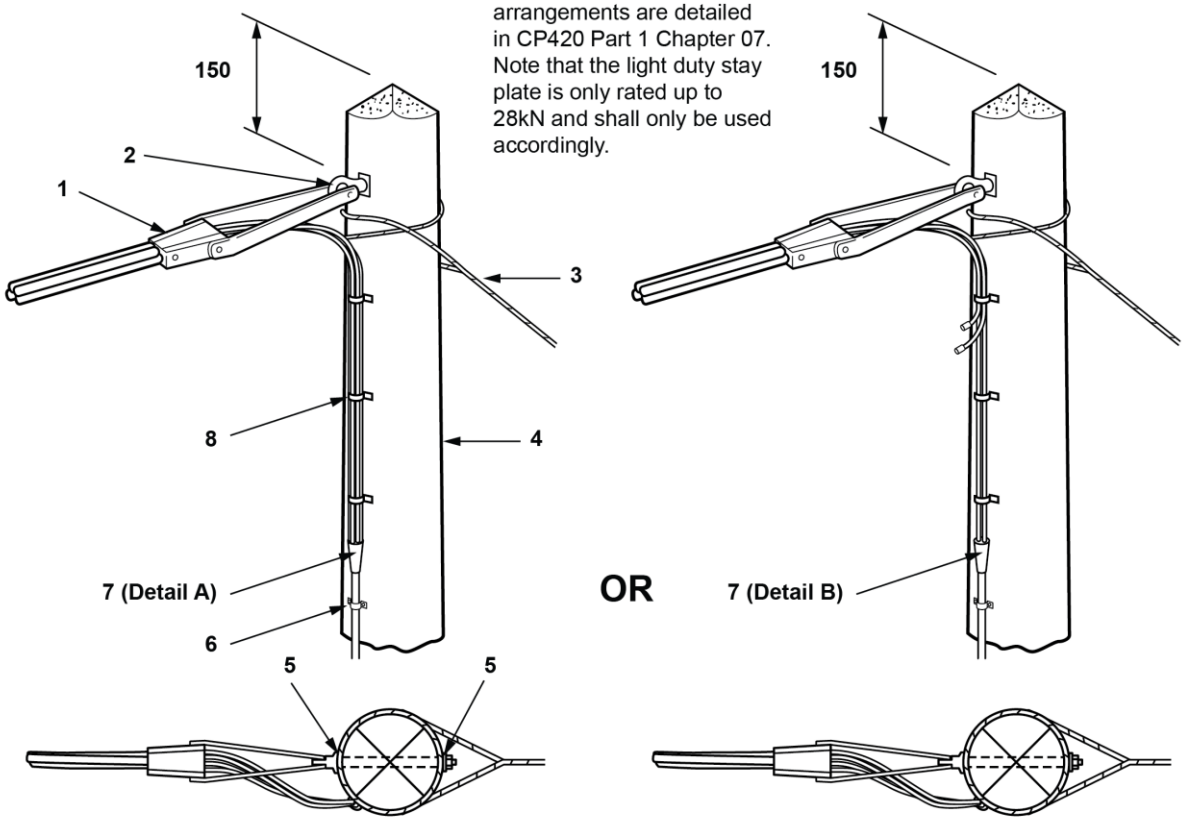
Terminal Support

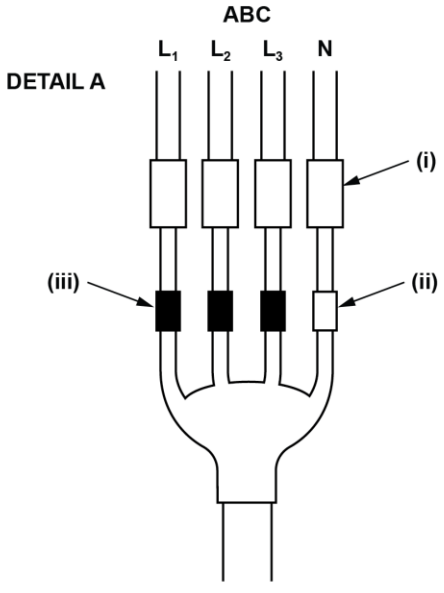
Materials for Drawing Error! Reference source not found.

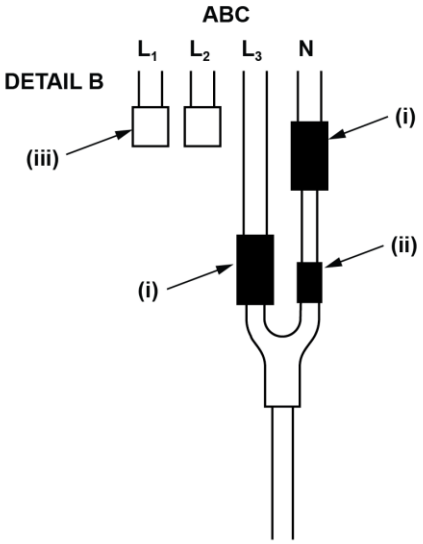
Conductor							
ABC, 2x35mm^2							
ABC, 4x35mm^2							
ABC, 2x95mm^2							
ABC, 4x95mm^2							
No	**Item**	**ES Ref**	**CC No**				
1	Conductor fitting, anchor clamp, ABC, 2 x 35mm^2	400C29	110418	-	-	-	1
	Conductor fitting, anchor clamp, ABC, 4 x 25-50mm^2	400C29	110175	-	-	1	-
	Conductor fitting, anchor clamp, ABC, 2 x 95mm^2	400C29	110426	-	1	-	-
	Conductor fitting, anchor clamp, ABC, 4 x 70-95mm^2	400C29	110177	1	-	-	-
2	Bolt, eye, M20	400F1	*	1	1	1	1
3	Conductor fitting, insulation piercing compression connector, ABC, 25-95mm^2/bare 30/10-100mm^2, double bolt	400C29	116548	2	2	2	2
4	Stay arrangement as per CP420 Part 1 Chapter 07	-	-	As required			
5	Wood pole	400W2	*	1	1	1	1
6	Washer, square, curved, 60x60x6mm, 22mm hole, galvanized	400F1	139203	2	2	2	2
7	Conductor, HDCu, 70mm^2 (green/yellow covered) (See Drawing **Error! Reference source not found.** for continuation of the earth below ground.)	400C3	357243	As required			
8	Staple	400F1	*	As required			
9	Conductor fitting, end cap, ABC, 35mm^2	400C29	261469	-	-	3	1
	Conductor fitting, end cap, ABC, 95mm^2	400C29	261470	3	1	-	-
10	Cable cleat	400C20	*	As required			
Additional items that are required, but are not shown on the drawing **							
-	Cable guard	400G1	*	As required			
-	Notice, danger of death (wood poles) (Dwg I-400N1-NOTE-006)	400N1	195251	2	2	2	2
-	Notice, pole number (wood poles) (Dwg I-400N1-NOTE-020)	400N1	*	1	1	1	1
-	Tie, security, length 200mm, width 4.8mm, plastic	400F1	299758 †	As required			
-	Wood block, foundation	400W2	*	As required			
Additional items that may be required, but are not shown on the drawing **							
-	Notices	400N1	*	As required			
-	ACD	400A2	*	As required			

* Select appropriate item (size, type, etc...) from the specification in the adjacent “ES Ref” column.
** See the main body text for details.
† It is not necessary to order these items for every pole: these CC numbers cover multiple items or coiled lengths.

Note
A stay plate can be used as an alternative to the make off shown. Stay arrangements are detailed in CP420 Part 1 Chapter 07. Note that the light duty stay plate is only rated up to 28kN and shall only be used accordingly.







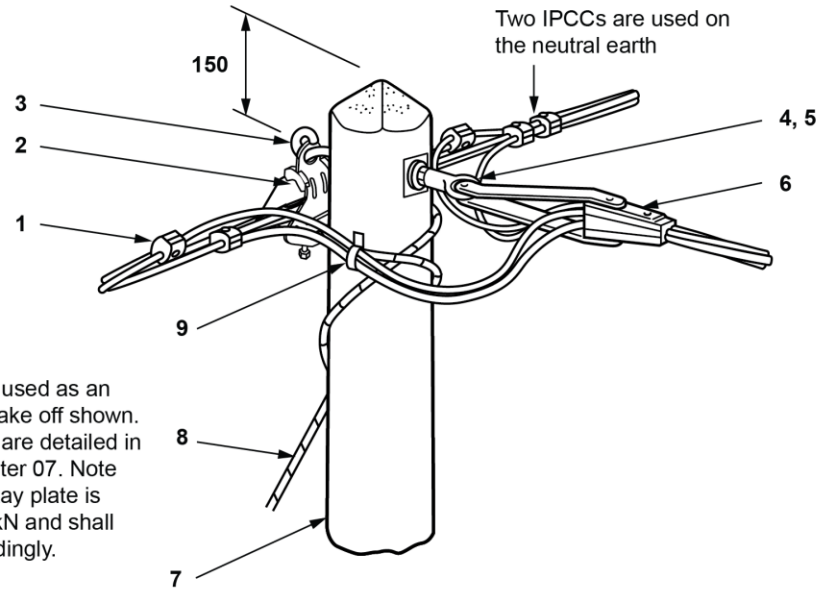
TERMINAL SUPPORT FOR ABC TO UNDERGROUND CABLE	Change information for this issue: N/A	Appears in: ES400O4	electricity north west
			I-400O4-GA-009 Iss 1 sht 1 of 1
			Scale: nts Auth: DMT Date: 27/10/2011

Terminal Support for ABC to Underground Cable

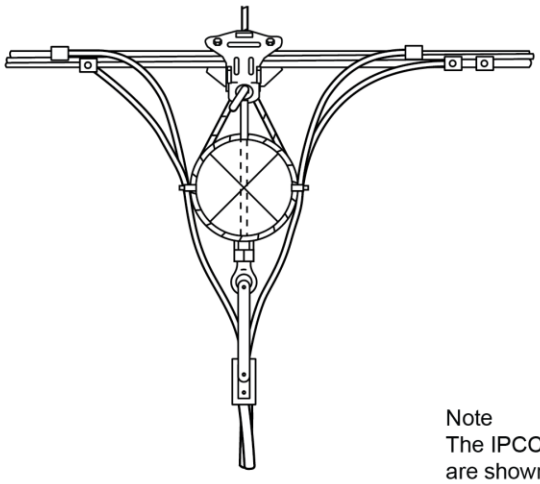
Materials for Drawing Error! Reference source not found.

Conductor							
ABC, 2x35mm^2	Not applicable						
ABC, 4x35mm^2	Not applicable						
ABC, 2x95mm^2							
ABC, 4x95mm^2							
No	**Item**	**ES Ref**	**CC No**				
1	Conductor fitting, anchor clamp, ABC, 2 x 95mm^2	400C29	110426	-	1	-	-
	Conductor fitting, anchor clamp, ABC, 4 x 70-95mm^2	400C29	110177	1	-	-	-
2	Bolt, eye, M20	400F1	*	1	1	-	-
3	Stay arrangement as per CP420 Part 1 Chapter 07	-	-	As required			
4	Wood pole	400W2	*	1	1	-	-
5	Washer, square, curved, 60x60x6mm, 22mm hole, galvanized	400F1	139203	2	2	-	-
6	Cable cleat	400C20	*	As required			
7A††	3-phase cable termination as CP411LV:	-	-	-	-	-	-
(i)	Conductor fitting, compression non tension, ABC, 95-35mm^2	400C29	110752	4	-	-	-
(ii)	Conductor fitting, non tension, ABC 35mm^2 – tail 400mm long transformed – Cu 25mm^2	400C29	127027	1	-	-	-
(iii)	Conductor fitting, non tension, ABC 35mm^2 – tail 400mm long transformed – Al 25mm^2	400C29	127329	3	-	-	-
7B††	1-phase cable termination as CP411LV:	-	-	-	-	-	-
(i)	Conductor fitting, compression non tension, ABC, 95-35mm^2	400C29	110752	2	2	-	-
(ii)	Conductor fitting, non tension, ABC 35mm^2 – tail 400mm long transformed – Cu 25mm^2	400C29	127027	1	1	-	-
(iii)	Conductor fitting, end cap, ABC, 95mm^2	400C29	261470	2	-	-	-
8	Cable cleat	400C20	*	As required			
Additional items that are required, but are not shown on the drawing **							
-	Cable guard	400G1	*	As required			
-	Notice, danger of death (wood poles) (Dwg I-400N1-NOTE-006)	400N1	195251	2	2	-	-
-	Notice, pole number (wood poles) (Dwg I-400N1-NOTE-020)	400N1	*	1	1	-	-
-	Tie, security, length 200mm, width 4.8mm, plastic	400F1	299758 †	As required			
-	Wood block, foundation	400W2	*	As required			
Additional items that may be required, but are not shown on the drawing **							
-	Notices	400N1	*	As required			
-	ACD	400A2	*	As required			

* Select appropriate item (size, type, etc...) from the specification in the adjacent “ES Ref” column.
** See the main body text for details.
† It is not necessary to order these items for every pole: these CC numbers cover multiple items or coiled lengths.
†† 7A and 7B are alternatives.



Note
A stay plate can be used as an alternative to the make off shown. Stay arrangements are detailed in CP420 Part 1 Chapter 07. Note that the light duty stay plate is only rated up to 28kN and shall only be used accordingly.



Note
The IPCCs are shown prior to shrouding for clarity.

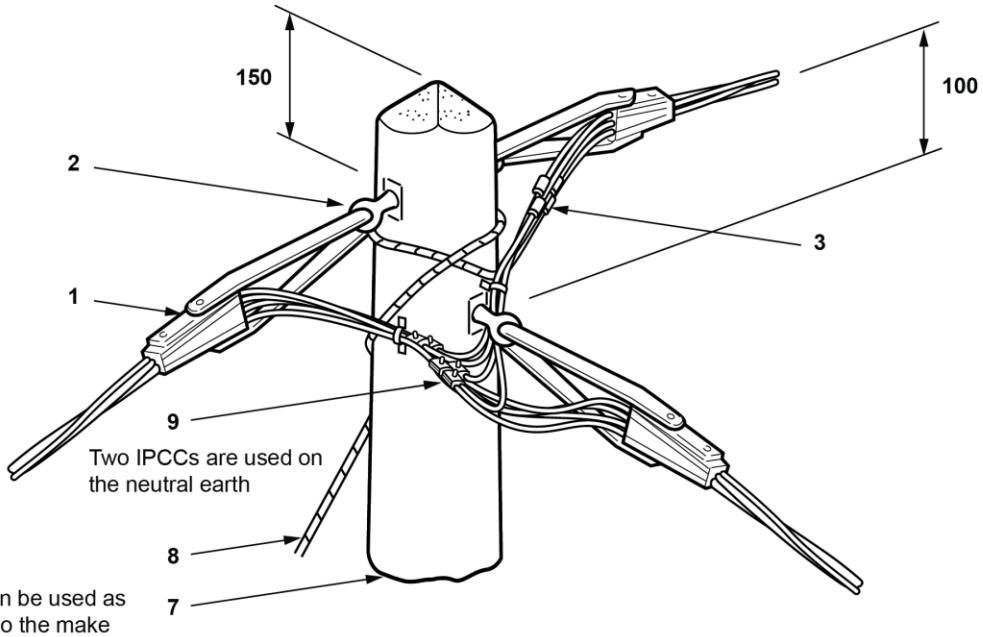
TEE-OFF FROM INTERMEDIATE	Change information for this issue N/A	Appears in ES400O4	electricity north west I-400O4-GA-010 Iss 1 sht 1 of 1 Scale: nts Auth: DMT Date: 27/10/2011

Tee-off from Intermediate

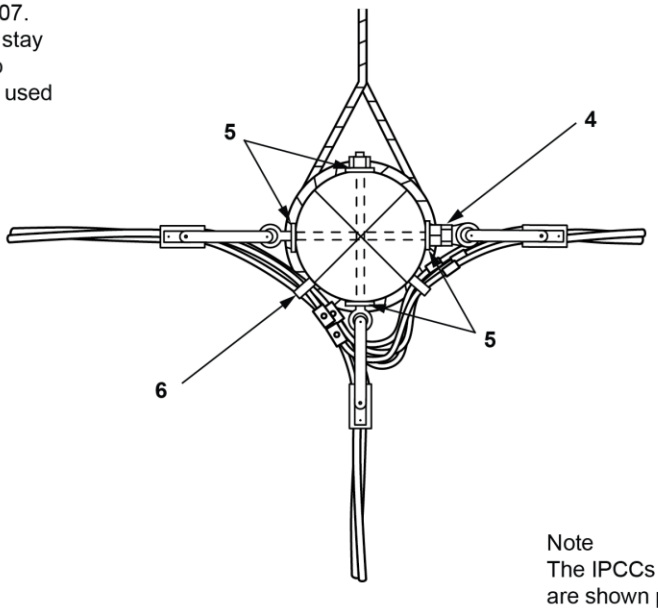
Materials for Drawing Error! Reference source not found.

Conductor							
ABC, 2x35mm^2							
ABC, 4x35mm^2							
ABC, 2x95mm^2							
ABC, 4x95mm^2							
No	**Item**	**ES Ref**	**CC No**				
1	Conductor fitting, insulation piercing compression connector, ABC main 25-95mm^2, ABC tap 25-95mm^2, single bolt	400C29	127275	5	3	5	2
2	Conductor fitting, clamp, suspension, ABC,2x35-120mm^2/4x25-120mm^2, up to 60° angle	400C29	110744	1	1	1	1
3	Bolt, M20, pigtail hook, ABC, galvanized (ENA TS 43-14)	400F1	*	1	1	1	1
4	Washer, square, curved, 60x60x6mm, 22mm hole, galvanized	400F1	139203	2	2	2	2
5	Nut, eye, M20, galvanized	400F1	122106	1	1	1	1
6	Conductor fitting, anchor clamp, ABC, 2 x 35mm^2	400C29	110418	-	-	-	1
	Conductor fitting, anchor clamp, ABC, 4 x 25-50mm^2	400C29	110175	-	-	1	-
	Conductor fitting, anchor clamp, ABC, 2 x 95mm^2	400C29	110426	-	1	-	-
	Conductor fitting, anchor clamp, ABC, 4 x 70-95mm^2	400C29	110177	1	-	-	-
7	Wood pole	400W2	*	1	1	1	1
8	Stay arrangement as per CP420 Part 1 Chapter 07	-	-	As required			
9	Cable cleat	400C20	*	As required			
Additional items that are required, but are not shown on the drawing **							
-	Notice, danger of death (wood poles) (Dwg I-400N1-NOTE-006)	400N1	195251	2	2	2	2
-	Notice, pole number (wood poles) (Dwg I-400N1-NOTE-020)	400N1	*	1	1	1	1
-	Tie, security, length 200mm, width 4.8mm, plastic	400F1	299758 †	As required			
-	Wood block, foundation	400W2	*	As required			
Additional items that may be required, but are not shown on the drawing **							
-	Notices	400N1	*	As required			
-	ACD	400A2	*	As required			

* Select appropriate item (size, type, etc...) from the specification in the adjacent “ES Ref” column.
** See the main body text for details.
† It is not necessary to order these items for every pole: these CC numbers cover multiple items or coiled lengths.



Note
A stay plate can be used as an alternative to the make off shown. Stay arrangements are detailed in CP420 Part 1 Chapter 07. Note that the light duty stay plate is only rated up to 28kN and shall only be used accordingly.



Note
The IPCCs are shown prior to shrouding for clarity.

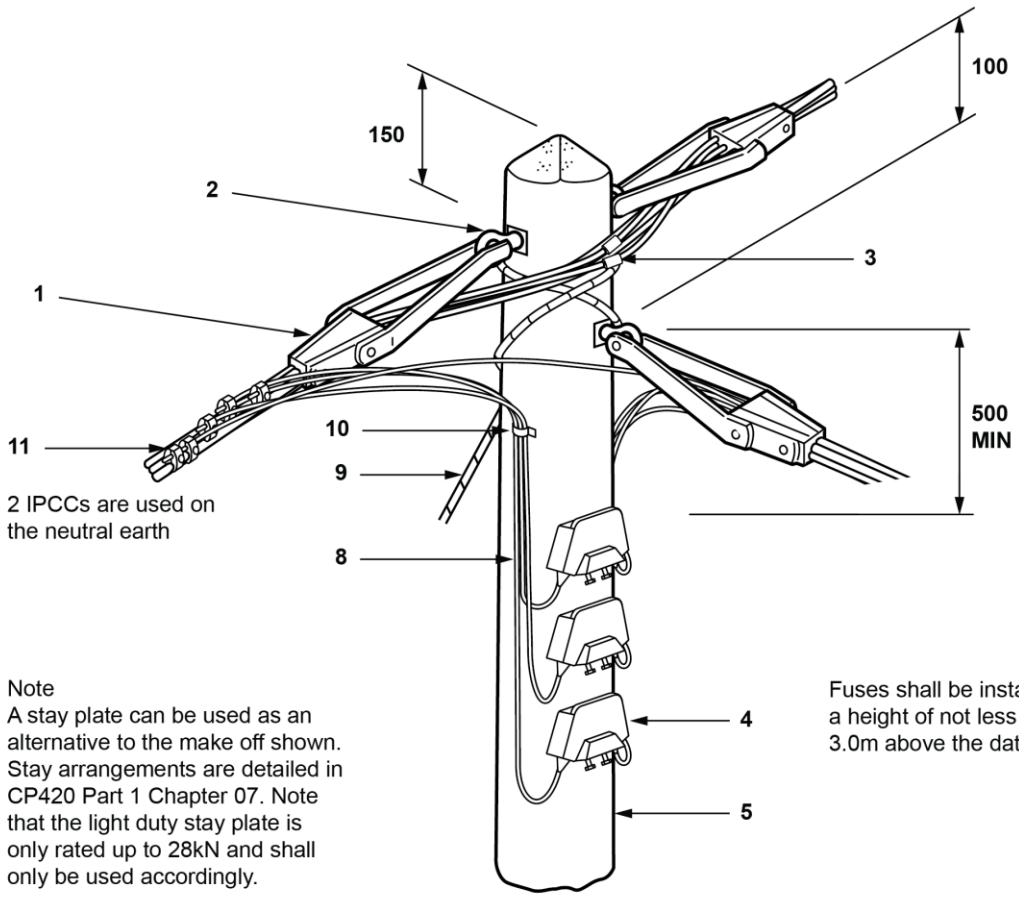
TEE-OFF FROM SECTION SUPPORT	Change information for this issue N/A	Appears in ES400O4	electricity north west I-400O4-GA-011 Iss 1 sht 1 of 1 Scale: nts Auth: DMT Date: 27/10/2011

Tee-off from Section Support

Materials for Drawing Error! Reference source not found.

Conductor							
ABC, 2x35mm^2							
ABC, 4x35mm^2							
ABC, 2x95mm^2							
ABC, 4x95mm^2							
No	**Item**	**ES Ref**	**CC No**				
1	Conductor fitting, anchor clamp, ABC, 2 x 35mm^2	400C29	110418	-	-	-	3
	Conductor fitting, anchor clamp, ABC, 4 x 25-50mm^2	400C29	110175	-	-	3	-
	Conductor fitting, anchor clamp, ABC, 2 x 95mm^2	400C29	110426	-	3	-	-
	Conductor fitting, anchor clamp, ABC, 4 x 70-95mm^2	400C29	110177	3	-	-	-
2	Bolt, eye, M20	400F1	*	2	2	2	2
3 ***	Conductor fitting, compression full tension, ABC, 35mm^2	400C29	139112	-	-	4	2
	Conductor fitting, compression full tension, ABC, 95mm^2	400C29	118524	4	2	-	-
4	Nut, eye, M20, galvanized	400F1	122106	1	1	1	1
5	Washer, square, curved, 60x60x6mm, 22mm hole, galvanized	400F1	139203	4	4	4	4
6	Cable cleat	400C20	*	As required			
7	Wood pole	400W2	*	1	1	1	1
8	Stay arrangement as per CP420 Part 1 Chapter 07	-	-	As required			
9	Conductor fitting, insulation piercing compression connector, ABC main 25-95mm^2, ABC tap 25-95mm^2, single bolt	400C29	127275	5	3	5	2
Additional items that are required, but are not shown on the drawing **							
-	Notice, danger of death (wood poles) (Dwg I-400N1-NOTE-006)	400N1	195251	2	2	2	2
-	Notice, pole number (wood poles) (Dwg I-400N1-NOTE-020)	400N1	*	1	1	1	1
-	Tie, security, length 200mm, width 4.8mm, plastic	400F1	299758 †	As required			
-	Wood block, foundation	400W2	*	As required			
Additional items that may be required, but are not shown on the drawing **							
-	Notices	400N1	*	As required			
-	ACD	400A2	*	As required			

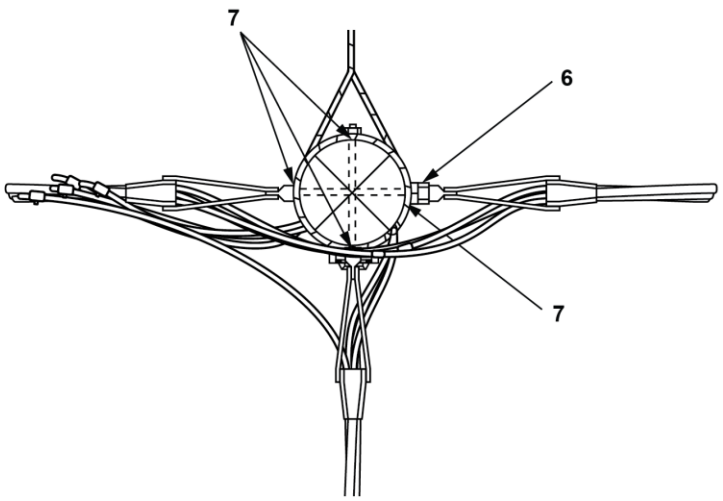
* Select appropriate item (size, type, etc...) from the specification in the adjacent “ES Ref” column.
** See the main body text for details.
*** Only to be used where necessary. Note that IPCCs (CC 127275) may be used as an alternative to these items.
† It is not necessary to order these items for every pole: these CC numbers cover multiple items or coiled lengths.



2 IPCCs are used on the neutral earth

Note
A stay plate can be used as an alternative to the make off shown. Stay arrangements are detailed in CP420 Part 1 Chapter 07. Note that the light duty stay plate is only rated up to 28kN and shall only be used accordingly.

Fuses shall be installed at a height of not less than 3.0m above the datum



Note
The IPCCs are shown prior to shrouding for clarity.

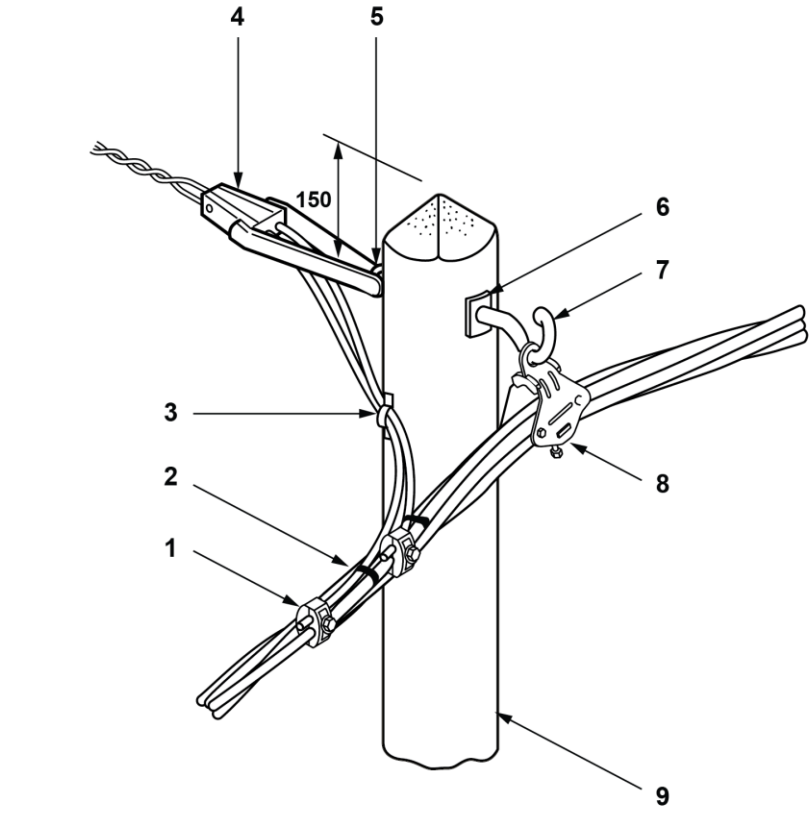
TEE-OFF FROM SECTION SUPPORT WITH LV FUSES	Change information for this issue N/A	Appears in ES400O4	electricity north west I-400O4-GA-012 Iss 1 sht 1 of 1 Scale: nts Auth: DMT Date: 27/10/2011

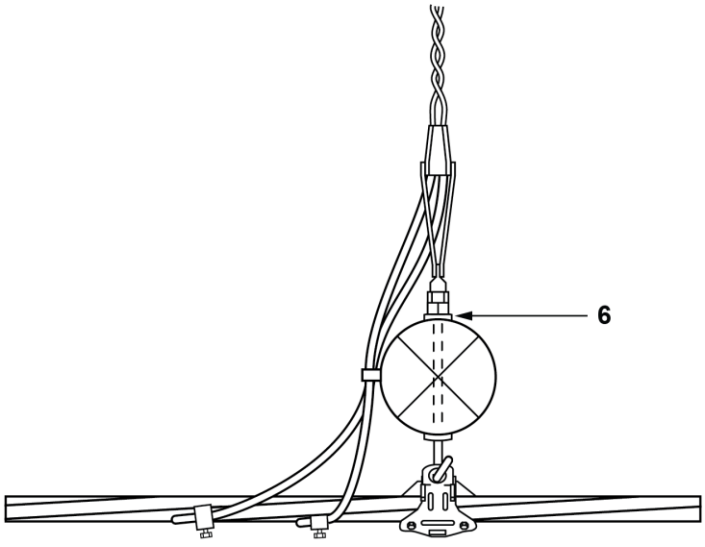
Tee-off from Section Support with LV Fuses

Materials for Drawing Error! Reference source not found.

Conductor							
ABC, 2x35mm^2							
ABC, 4x35mm^2							
ABC, 2x95mm^2							
ABC, 4x95mm^2							
No	**Item**	**ES Ref**	**CC No**				
1	Conductor fitting, anchor clamp, ABC, 2 x 35mm^2	400C29	110418	-	-	-	3
	Conductor fitting, anchor clamp, ABC, 4 x 25-50mm^2	400C29	110175	-	-	3	-
	Conductor fitting, anchor clamp, ABC, 2 x 95mm^2	400C29	110426	-	3	-	-
	Conductor fitting, anchor clamp, ABC, 4 x 70-95mm^2	400C29	110177	3	-	-	-
2	Bolt, eye, M20	400F1	*	2	2	2	2
3 ***	Conductor fitting, compression full tension, ABC, 35mm^2	400C29	139112	-	-	4	2
	Conductor fitting, compression full tension, ABC, 95mm^2	400C29	118524	4	2	-	-
4	Fuse carrier, pole mounted	400L6	122433	3	1	3	1
5	Wood pole	400W2	*	1	1	1	1
6	Nut, eye, M20, galvanized	400F1	122106	1	1	1	1
7	Washer, square, curved, 60x60x6mm, 22mm hole, galvanized	400F1	139203	4	4	4	4
8	Conductor, ABC (length as required; taken from spare length of conductor):						
	Conductor, ABC, 2x35mm^2	400C3	012092 †	-	-	-	1
	Conductor, ABC, 4x35mm^2	400C3	012106 †	-	-	1	-
	Conductor, ABC, 2x95mm^2	400C3	012122 †	-	1	-	-
	Conductor, ABC, 4x95mm^2	400C3	012076 †	1	-	-	-
9	Stay arrangement as per CP420 Part 1 Chapter 07	-	-	As required			
10	Cable cleat	400C20	*	As required			
11	Conductor fitting, insulation piercing compression connector, ABC main 25-95mm^2, ABC tap 25-95mm^2, single bolt	400C29	127275	5	3	5	2
Additional items that are required, but are not shown on the drawing **							
-	Notice, danger of death (wood poles) (Dwg I-400N1-NOTE-006)	400N1	195251	2	2	2	2
-	Notice, pole number (wood poles) (Dwg I-400N1-NOTE-020)	400N1	*	1	1	1	1
-	Tie, security, length 200mm, width 4.8mm, plastic	400F1	299758 †	As required			
-	Wood block, foundation	400W2	*	As required			
Additional items that may be required, but are not shown on the drawing **							
-	Notices	400N1	*	As required			
-	ACD	400A2	*	As required			

* Select appropriate item (size, type, etc...) from the specification in the adjacent "ES Ref" column.
** See the main body text for details.
*** Only to be used where necessary. Note that IPCCs (CC 127275) may be used as an alternative to these items.
† It is not necessary to order these items for every pole: these CC numbers cover multiple items or coiled lengths.





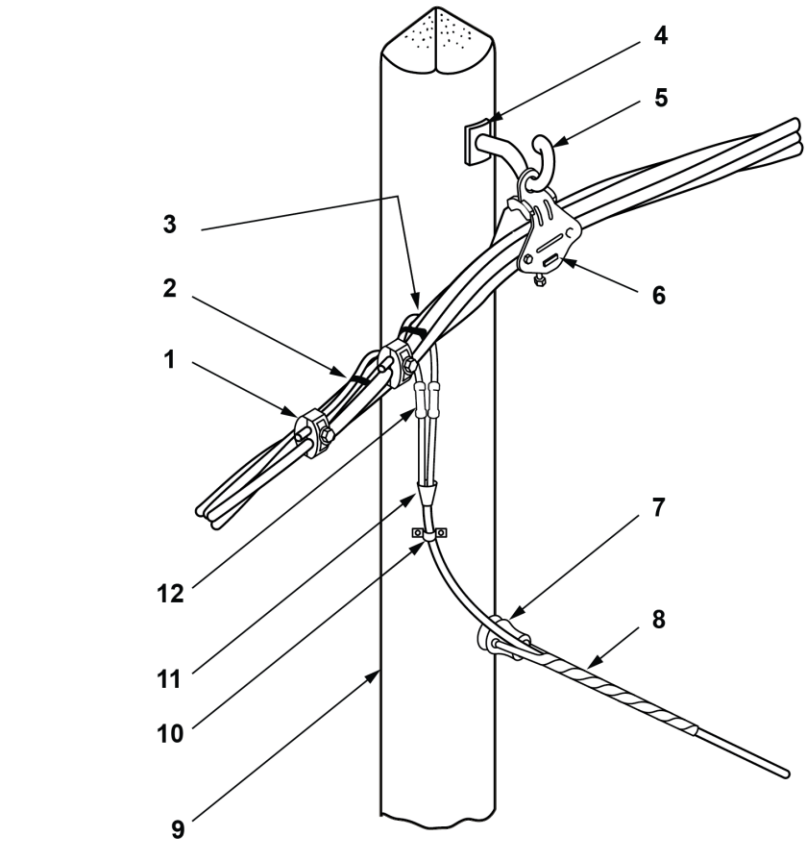
Note
The IPCCs are shown prior to shrouding for clarity.

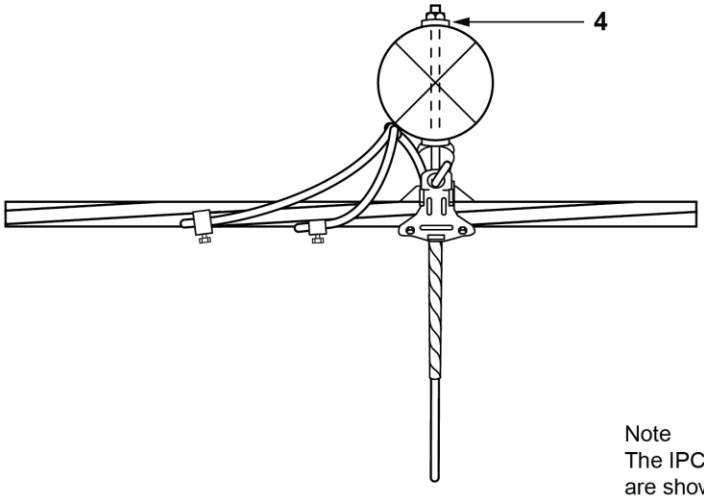
SINGLE PHASE ABC OVERHEAD SERVICE FROM SUPPORT	Change information for this issue: N/A	Appears in: ES400O4	electricity north west
			I-400O4-GA-013 Iss 1 sht 1 of 1 Scale: nts Auth: DMT Date: 27/10/2011

Single Phase ABC Overhead Service from Support | **Materials for Drawing** Error! Reference source not found.

Conductor							
ABC, 2x35mm^2							
ABC, 4x35mm^2							
ABC, 2x95mm^2							
ABC, 4x95mm^2							
No	**Item**	**ES Ref**	**CC No**				
1	Conductor fitting, insulation piercing compression connector, ABC, main 25-95mm^2, ABC service 4-35mm^2, single bolt	400C29	110264	2	2	2	2
2	Tie, security, length 200mm, width 4.8mm, plastic	400F1	299758 †	As required			
3	Cable cleat	400C20	*	As required			
4	Conductor fitting, anchor clamp, ABC, 2 x 35mm^2	400C29	110418	-	-	1	1
	Conductor fitting, anchor clamp, ABC, 2 x 95mm^2	400C29	110426	1	1	-	-
5	Nut, eye, M20, galvanized	400F1	122106	1	1	1	1
6	Washer, square, curved, 60x60x6mm, 22mm hole, galvanized	400F1	139203	2	2	2	2
7	Bolt, M20, pigtail hook, ABC, galvanized (ENA TS 43-14)	400F1	*	1	1	1	1
8	Conductor fitting, clamp, suspension, ABC, 2x35-120mm^2/4x25-120mm^2, up to 60° angle	400C29	110744	1	1	1	1
9	Wood pole	400W2	*	1	1	1	1
Additional items that are required, but are not shown on the drawing **							
-	Notice, danger of death (wood poles) (Dwg I-400N1-NOTE-006)	400N1	195251	2	2	2	2
-	Notice, pole number (wood poles) (Dwg I-400N1-NOTE-020)	400N1	*	1	1	1	1
Additional items that may be required, but are not shown on the drawing **							
-	Notices	400N1	*	As required			
-	ACD	400A2	*	As required			

* Select appropriate item (size, type, etc...) from the specification in the adjacent “ES Ref” column.
** See the main body text for details.
† It is not necessary to order these items for every pole: these CC numbers cover multiple items or coiled lengths.





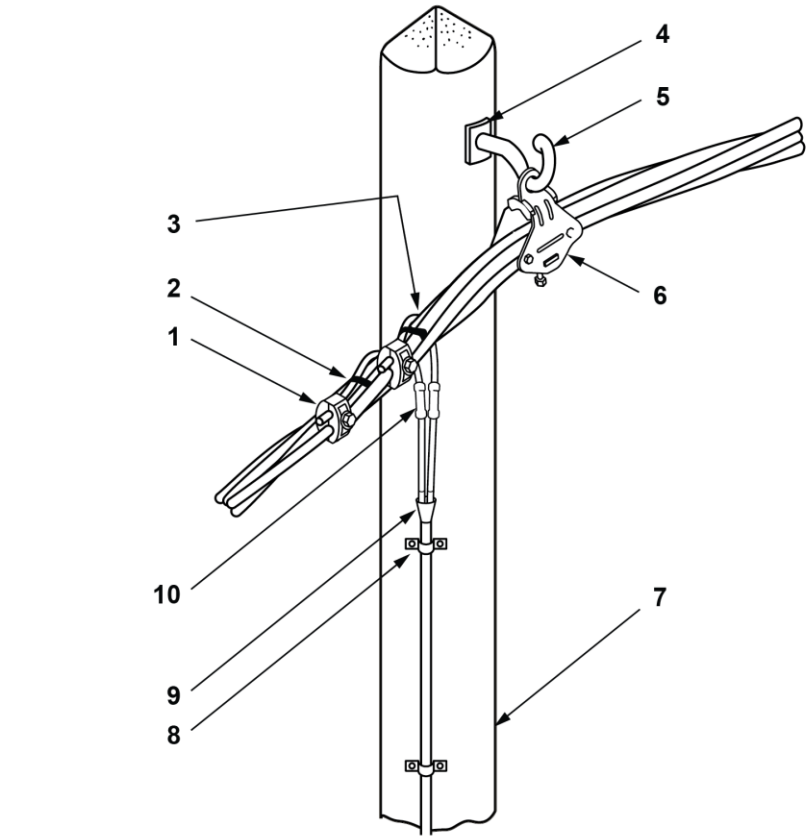
Note
The IPCCs
are shown prior
to shrouding
for clarity.

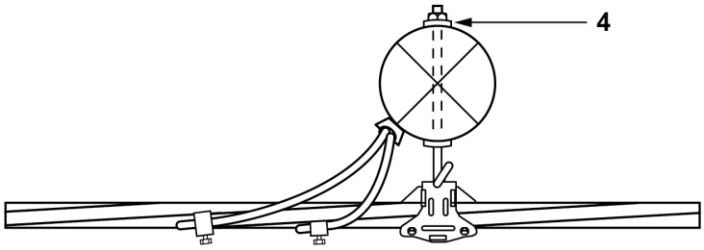
SINGLE PHASE CNE/SCNE OVERHEAD SERVICE FROM SUPPORT	Change information for this issue	Appears in	electricity north west
	N/A	ES400O4	I-400O4-GA-014 Iss 1 sht 1 of 1 Scale: nts Auth: DMT Date: 27/10/2011

Single Phase CNE/SCNE Overhead Service from Support	**Materials for Drawing** Error! Reference source not found.

Conductor							
ABC, 2x35mm^2							
ABC, 4x35mm^2							
ABC, 2x95mm^2							
ABC, 4x95mm^2							
No	**Item**	**ES Ref**	**CC No**				
1	Conductor fitting, insulation piercing compression connector, ABC main 25-95mm^2, ABC service 4-35mm^2, single bolt	400C29	110264	2	2	2	2
2	Tie, security, length 200mm, width 4.8mm, plastic	400F1	299758 †	As required			
3	Cable cleat	400C20	*	As required			
4	Washer, square, curved, 60x60x6mm, 22mm hole, galvanized	400F1	139203	2	2	2	2
5	Bolt, M20, pigtail hook, ABC, galvanized (ENA TS 43-14)	400F1	*	1	1	1	1
6	Conductor fitting, clamp, suspension, ABC,2x35-120mm^2/4x25-120mm^2, up to 60° angle	400C29	110744	1	1	1	1
7	Insulator, coach screw, service type, 10kN MFL (Dwg I-400I4-INS-005)	400I4	125205	1	1	1	1
8	Conductor fitting, helical dead end to match CNE/SCNE	400H2	*	1	1	1	1
9	Wood pole	400W2	*	1	1	1	1
10	Cable cleat	400C20	*	As required			
11	Cable termination, break-out kit	TBA	*	1	1	1	1
12	Conductor fitting, non tension, compression, CNE/SCNE with ABC, 35mm^2 tail	400C29	*	2	2	2	2
Additional items that are required, but are not shown on the drawing **							
-	Notice, danger of death (wood poles) (Dwg I-400N1-NOTE-006)	400N1	195251	2	2	2	2
-	Notice, pole number (wood poles) (Dwg I-400N1-NOTE-020)	400N1	*	1	1	1	1
Additional items that may be required, but are not shown on the drawing **							
-	Notices	400N1	*	As required			
-	ACD	400A2	*	As required			

* Select appropriate item (size, type, etc...) from the specification in the adjacent “ES Ref” column.
** See the main body text for details.
† It is not necessary to order these items for every pole: these CC numbers cover multiple items or coiled lengths.





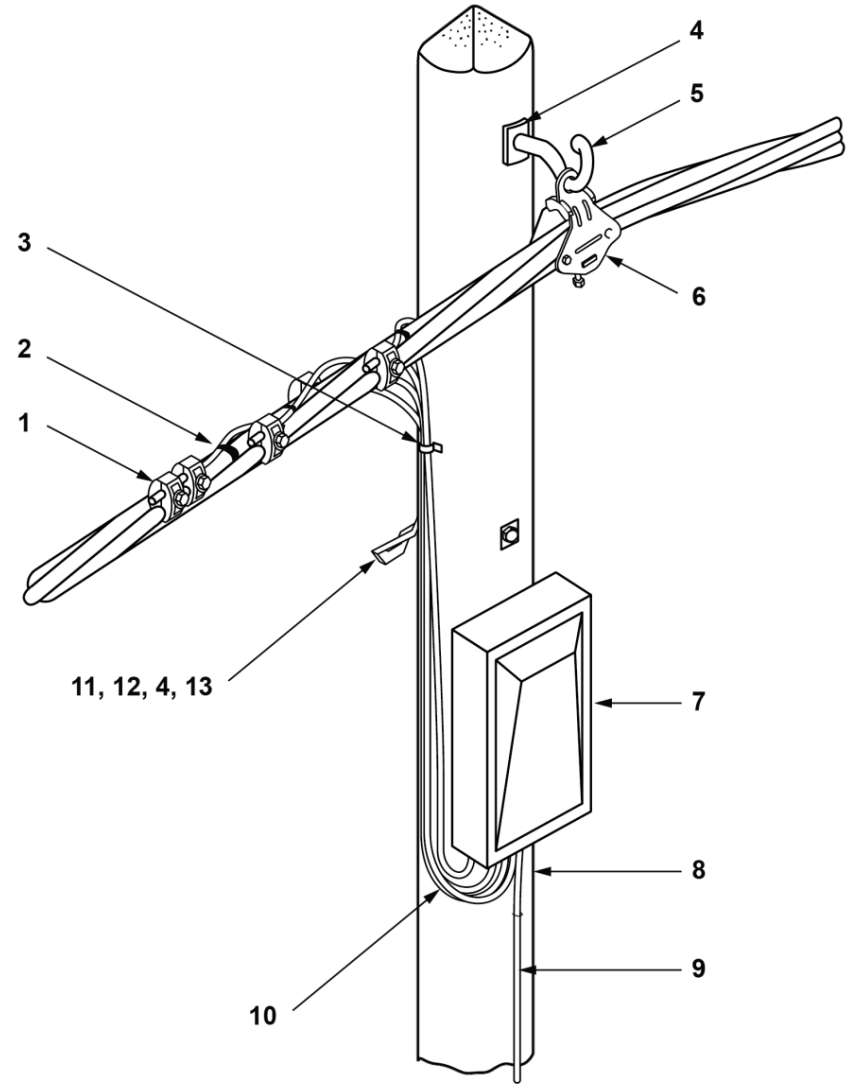
Note
The IPCCs
are shown prior
to shrouding
for clarity.

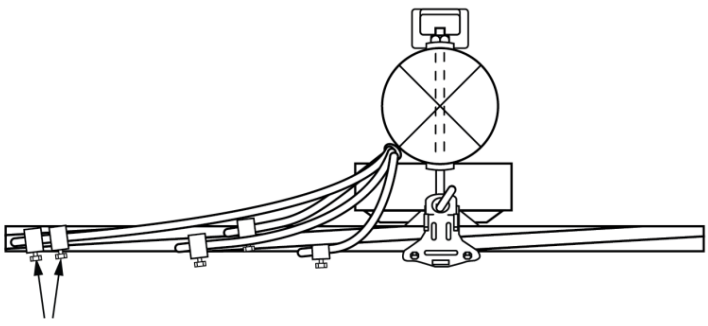
SINGLE PHASE CNE/SCNE UNDERGROUND SERVICE FROM SUPPORT	Change information for this issue: N/A	Appears in: ES400O4	electricity north west
			I-400O4-GA-015 Iss 1 sht 1 of 1 Scale: nts Auth: DMT Date: 27/10/2011

Single Phase CNE/SCNE Underground Service from Support	**Materials for Drawing** Error! Reference source not found.

Conductor							
ABC, 2x35mm^2							
ABC, 4x35mm^2							
ABC, 2x95mm^2							
ABC, 4x95mm^2							
No	**Item**	**ES Ref**	**CC No**				
1	Conductor fitting, insulation piercing compression connector, ABC main 25-95mm^2, ABC service 4-35mm^2, single bolt	400C29	110264	2	2	2	2
2	Tie, security, length 200mm, width 4.8mm, plastic	400F1	299758 †	As required			
3	Cable cleat	400C20	*	As required			
4	Washer, square, curved, 60x60x6mm, 22mm hole, galvanized	400F1	139203	2	2	2	2
5	Bolt, M20, pigtail hook, ABC, galvanized (ENA TS 43-14)	400F1	*	1	1	1	1
6	Conductor fitting, clamp, suspension, ABC,2x35-120mm^2/4x25-120mm^2, up to 60° angle	400C29	110744	1	1	1	1
7	Wood pole	400W2	*	1	1	1	1
8	Cable cleat	400C20	*	As required			
9	Cable termination, break-out kit	TBA	*	1	1	1	1
10	Conductor fitting, non tension, compression, CNE/SCNE with ABC, 35mm^2 tail	400C29	*	2	2	2	2
Additional items that are required, but are not shown on the drawing **							
-	Cable guard	400G1	*	As required			
-	Notice, danger of death (wood poles) (Dwg I-400N1-NOTE-006)	400N1	195251	2	2	2	2
-	Notice, pole number (wood poles) (Dwg I-400N1-NOTE-020)	400N1	*	1	1	1	1
Additional items that may be required, but are not shown on the drawing **							
-	Notices	400N1	*	As required			
-	ACD	400A2	*	As required			

* Select appropriate item (size, type, etc...) from the specification in the adjacent “ES Ref” column.
** See the main body text for details.
† It is not necessary to order these items for every pole: these CC numbers cover multiple items or coiled lengths.





Two IPCCs are used on the neutral earth

Note
The IPCCs are shown prior to shrouding for clarity.

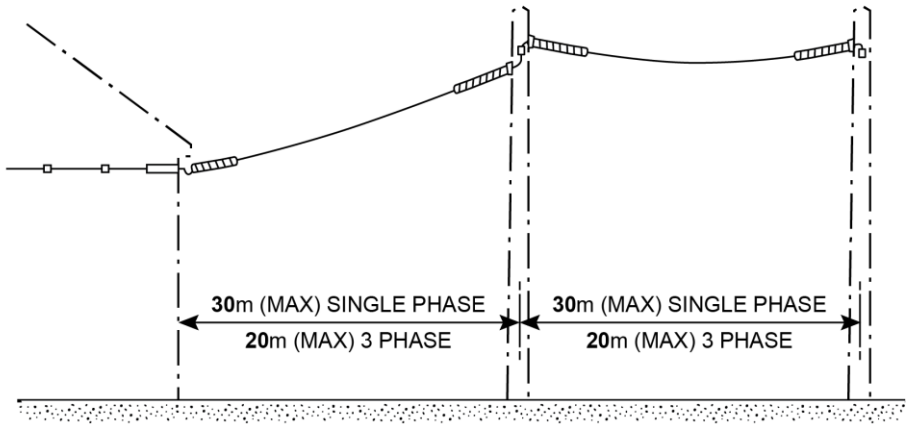
MULTIPLE SERVICE DISTRIBUTION BOX (FUSED)	Change information for this issue "ES400L6" added to "Appears in" box	Appears in ES400O4 ES400L6	I-400O4-GA-016 Iss 2 sht 1 of 1 Scale: nts Auth: DMT Date: 8/1/2016

Multiple Service Distribution Box (Fused)

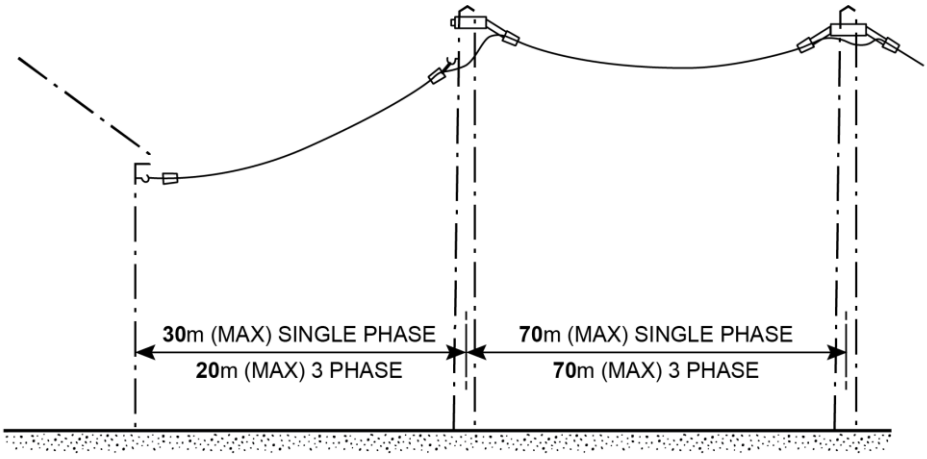
Materials for Drawing Error! Reference source not found.

Conductor							
ABC, 2x35mm^2	Not applicable						
ABC, 4x35mm^2	Not applicable						
ABC, 2x95mm^2	Not applicable						
ABC, 4x95mm^2							
No	**Item**	**ES Ref**	**CC No**				
1	Conductor fitting, insulation piercing compression connector, ABC main 25-95mm^2, ABC tap 25-95mm^2, single bolt	400C29	127275	5	-	-	-
2	Tie, security, length 200mm, width 4.8mm, plastic	400F1	299758 †	As required			
3	Cable cleat	400C20	*	As required			
4	Washer, square, curved, 60x60x6mm, 22mm hole, galvanized	400F1	139203	3	-	-	-
5	Bolt, M20, pigtail hook, ABC, galvanized (ENA TS 43-14)	400F1	*	1	-	-	-
6	Conductor fitting, clamp, suspension, ABC,2x35-120mm^2/4x25-120mm^2, up to 60° angle	400C29	110744	1	-	-	-
7	Distribution box, overhead, three-phase, fused	400L6	111414	1	-	-	-
	Support bracket		111422	1	-	-	-
	Screw, coach, 10x75mm, galvanized	400F1	126810	2	-	-	-
8	Wood pole	400W2	*	1	-	-	-
9	Conductor, HDCu, 70mm^2 (green/yellow covered) (See Drawing **Error! Reference source not found.** for continuation of the earth below ground.)	400C3	357243	As required			
10	Conductor, ABC, 4x95mm^2 (length as required; taken from spare length of conductor)	400C3	012076 †	As required			
11	Steelwork, fall-arrest anchor point, pole (Dwg I-400S11-SWK-026)	400S11	260820	1	-	-	-
12	Bolt, M20	400F1	*	1	-	-	-
13	Screw, coach, 10x75mm, galvanized	400F1	126810	1	-	-	-
Additional items that are required, but are not shown on the drawing **							
-	Cable guard	400G1	*	As required			
-	Notice, danger of death (wood poles) (Dwg I-400N1-NOTE-006)	400N1	195251	2	-	-	-
-	Notice, pole number (wood poles) (Dwg I-400N1-NOTE-020)	400N1	*	1	-	-	-
Additional items that may be required, but are not shown on the drawing **							
-	Notices	400N1	*	As required			
-	ACD	400A2	*	As required			

* Select appropriate item (size, type, etc...) from the specification in the adjacent “ES Ref” column.
** See the main body text for details.
† It is not necessary to order these items for every pole: these CC numbers cover multiple items or coiled lengths.

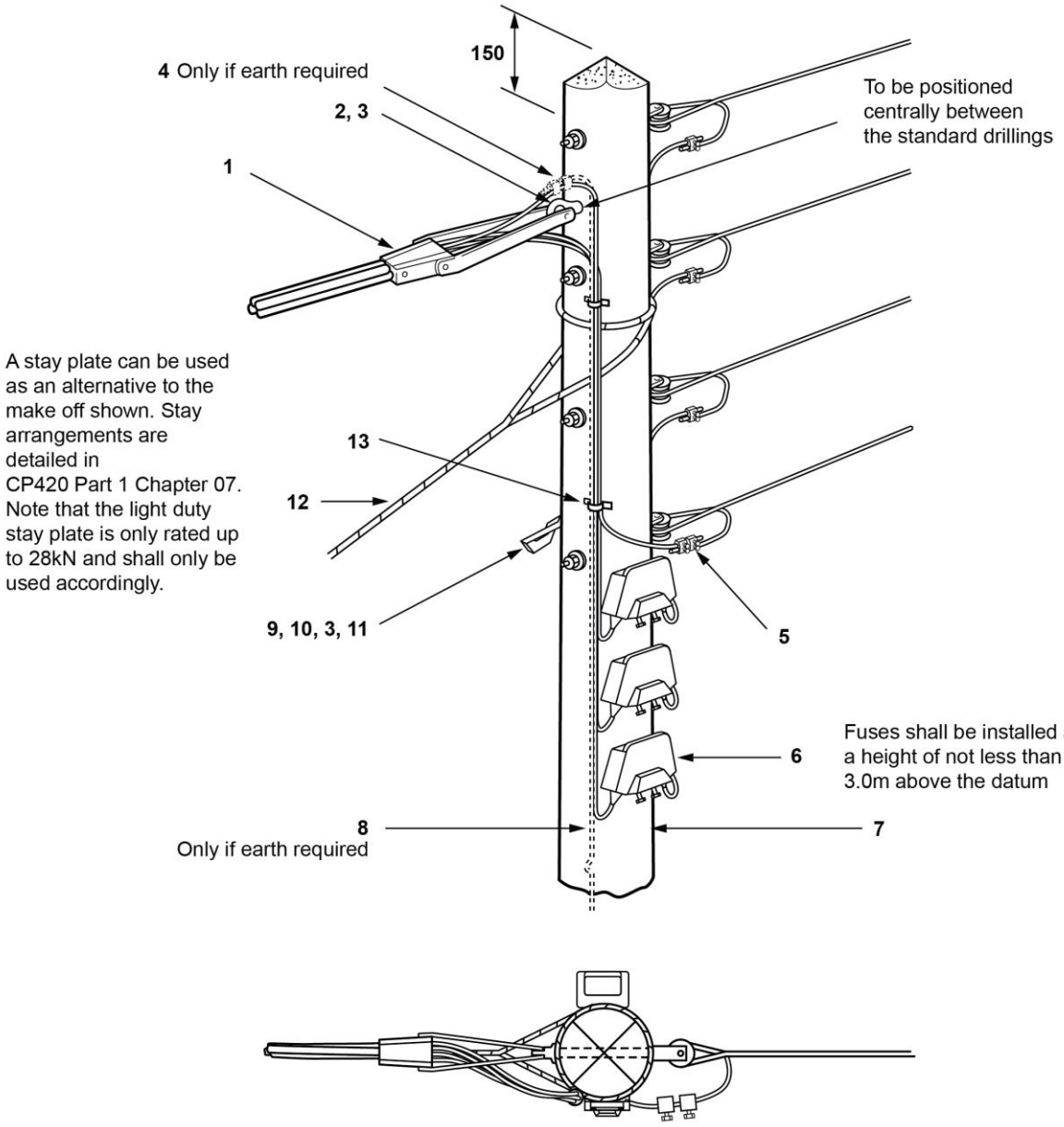


(a) CNE/SCNE SERVICE SPANS



(B) ABC SERVICE SPANS

CNE/SCNE AND ABC SERVICE LINES/SPANS	Change information for this issue	Appears in	electricity north west
	Title changed	ES400O4 CP430 Pt 1	I-400O4-GA-017 Iss 3 sht 1 of 1 Scale: nts Auth: DMT Date: 23/11/2016



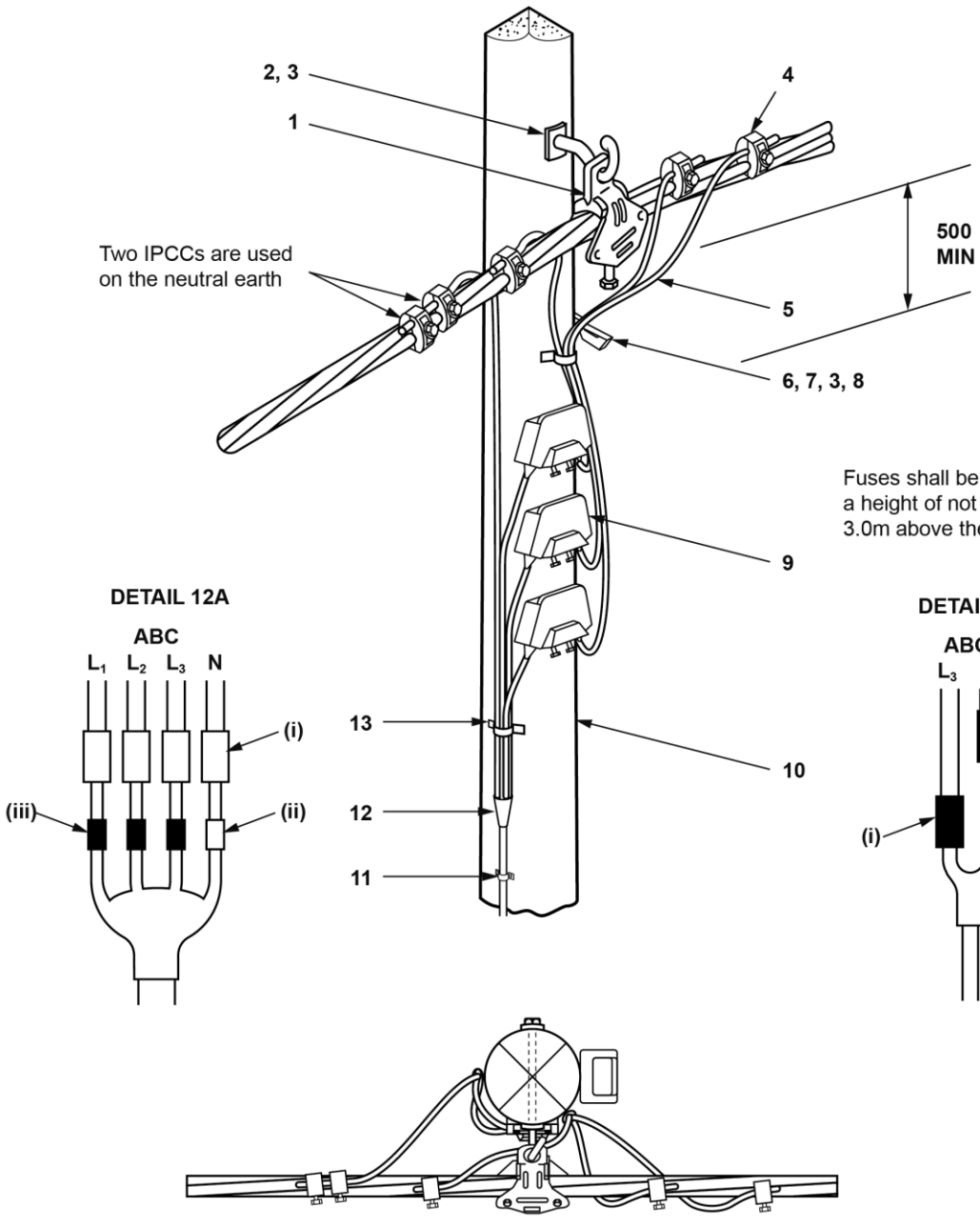
TRANSITION SUPPORT FOR ABC TO OPEN WIRE SYSTEM VIA LV FUSES	Change information for this issue: N/A	Appears in: ES400O4	electricity north west
			I-400O4-GA-018 Iss 1 sht 1 of 1 Scale: nts Auth: DMT Date: 27/10/2011

Transition Support for ABC to Open Wire System via LV Fuses	**Materials for Drawing** Error! Reference source not found.

Conductor							
ABC, 2x35mm^2	Not applicable						
ABC, 4x35mm^2							
ABC, 2x95mm^2	Not applicable						
ABC, 4x95mm^2							

No	**Item**	**ES Ref**	**CC No**				
1	Conductor fitting, anchor clamp, ABC, 4 x 25-50mm^2 Conductor fitting, anchor clamp, ABC, 4 x 70-95mm^2	400C29 400C29	110175 110177	- 2	- -	2 -	- -
2	Bolt, eye, M20	400F1	*	1	-	1	-
3	Washer, square, curved, 60x60x6mm, 22mm hole, galvanized	400F1	139203	3	-	3	-
4***	Conductor fitting, insulation piercing compression connector, ABC, 25-95mm^2/bare 30/10-100mm^2, double bolt	400C29	116548	2	-	2	-
5	Conductor fitting, insulation piercing compression connector, ABC, 25-95mm^2/bare 30/10-100mm^2, double bolt	400C29	116548	5	-	5	-
6	Fuse carrier, pole mounted	400L6	122433	3	-	3	-
7	Wood pole	400W2	*	1	-	1	-
8***	Conductor, HDCu, 70mm^2 (green/yellow covered) (See Drawing **Error! Reference source not found.** for continuation of the earth below ground.)	400C3	357243	As required			
9	Steelwork, fall-arrest anchor point, pole (Dwg I-400S11-SWK-026)	400S11	260820	1	-	1	-
10	Bolt, M20	400F1	*	1	-	1	-
11	Screw, coach, 10x75mm, galvanized	400F1	126810	1	-	1	-
12	Stay arrangement as per CP420 Part 1 Chapter 07	-	-	As required			
13	Cable cleat	400C20	*	As required			
Additional items that are required, but are not shown on the drawing **							
-	Spare length of ABC for connection between IPCC and fuse Conductor, ABC, 4x35mm^2 Conductor, ABC, 4x95mm^2	 400C3 400C3	 012106 012076	 - 3	 - -	 3 -	 - -
-	Notice, danger of death (wood poles) (Dwg I-400N1-NOTE-006)	400N1	195251	2	-	2	-
-	Notice, pole number (wood poles) (Dwg I-400N1-NOTE-020)	400N1	*	1	-	1	-
-	Tie, security, length 200mm, width 4.8mm, plastic	400F1	299758 †	As required			
-	Wood block, foundation	400W2	*	As required			
Additional items that may be required, but are not shown on the drawing **							
-	Cable guard	400G1	*	As required			
-	Notices	400N1	*	As required			
-	ACD	400A2	*	As required			

* Select appropriate item (size, type, etc...) from the specification in the adjacent “ES Ref” column.
** See the main body text for details.
*** Only needed where an earth is required down the pole.
† It is not necessary to order these items for every pole: these CC numbers cover multiple items or coiled lengths.



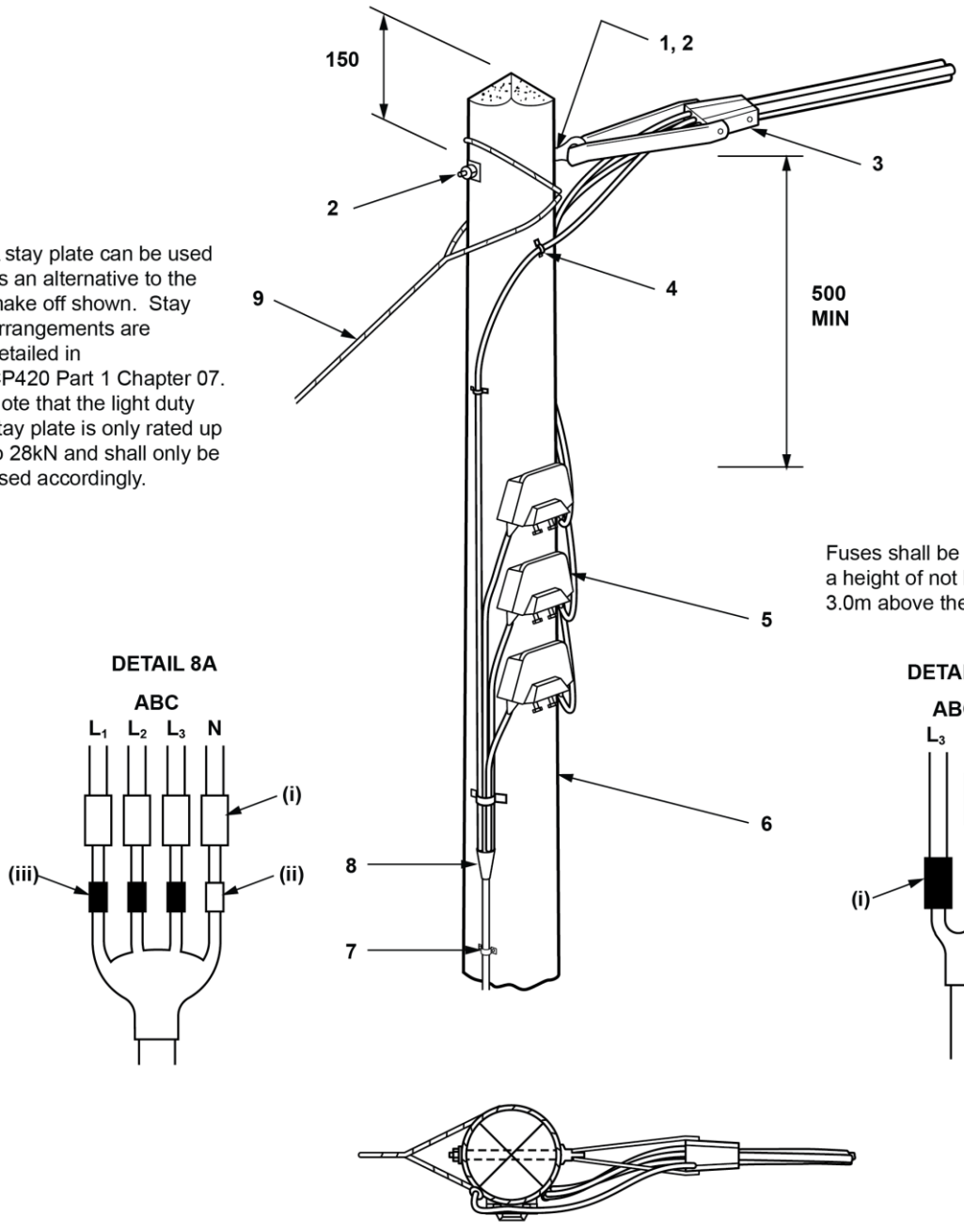
Note
The IPCCs are shown prior to shrouding for clarity.

INTERMEDIATE SUPPORT WITH CABLE TERMINATION AND LV FUSES	Change information for this issue 500 MIN dimension added	Appears in ES400O4	electricity north west I-400O4-GA-019 Iss 2 sht 1 of 1 Scale: nts Auth: DMT Date: 8/10/2013

Intermediate Support with Cable Termination and LV Fuses	**Materials for Drawing** Error! Reference source not found.

Conductor							
ABC, 2x35mm^2	Not applicable						
ABC, 4x35mm^2	Not applicable						
ABC, 2x95mm^2							
ABC, 4x95mm^2							
No	**Item**	**ES Ref**	**CC No**				
1	Conductor fitting, clamp, suspension, ABC,2x35-120mm^2/4x25-120mm^2, up to 60° angle	400C29	110744	1	1	-	-
2	Bolt, M20, pigtail hook, ABC, galvanized (ENA TS 43-14)	400F1	*	1	1	-	-
3	Washer, square, curved, 60x60x6mm, 22mm hole, galvanized	400F1	139203	3	3	-	-
4	Conductor fitting, insulation piercing compression connector, ABC main 25-95mm^2, ABC tap 25-95mm^2, single bolt	400C29	127275	5	3	-	-
5	Conductor, ABC (length as required; taken from spare length of conductor):						
	Conductor, ABC, 2x95mm^2	400C3	012122 †	-	1	-	-
	Conductor, ABC, 4x95mm^2	400C3	012076 †	1	-	-	-
6	Steelwork, fall-arrest anchor point, pole (Dwg I-400S11-SWK-026)	400S11	260820	1	1	-	-
7	Bolt, M20	400F1	*	1	1	-	-
8	Screw, coach, 10x75mm, galvanized	400F1	126810	1	1	-	-
9	Fuse carrier, pole mounted	400L6	122433	3	1	-	-
10	Wood pole	400W2	*	1	1	-	-
11	Cable cleat	400C20	*	As required			
12	Select 12A or 12B below.	-	-	-			
12A	3-phase cable termination as CP411LV:	-	-	-	-	-	-
(i)	Conductor fitting, compression non tension, ABC, 95-35mm^2	400C29	110752	4	-	-	-
(ii)	Conductor fitting, non tension, ABC 35mm^2 – tail 400mm long transformed – Cu 25mm^2	400C29	127027	1	-	-	-
(iii)	Conductor fitting, non tension, ABC 35mm^2 – tail 400mm long transformed – Al 25mm^2	400C29	127329	3	-	-	-
12B	1-phase cable termination as CP411LV:	-	-	-	-	-	-
(i)	Conductor fitting, compression non tension, ABC, 95-35mm^2	400C29	110752	-	2	-	-
(ii)	Conductor fitting, non tension, ABC 35mm^2 – tail 400mm long transformed – Cu 25mm^2	400C29	127027	-	1	-	-
13	Cable cleat	400C20	*	1	1	-	-
Additional items that are required, but are not shown on the drawing **							
-	Cable guard	400G1	*	As required			
-	Notice, danger of death (wood poles) (Dwg I-400N1-NOTE-006)	400N1	195251	2	2	-	-
-	Notice, pole number (wood poles) (Dwg I-400N1-NOTE-020)	400N1	*	1	1	-	-
-	Tie, security, length 200mm, width 4.8mm, plastic	400F1	299758 †	As required			
Additional items that may be required, but are not shown on the drawing **							
-	Notices	400N1	*	As required			
-	ACD	400A2	*	As required			

* Select appropriate item (size, type, etc...) from the specification in the adjacent "ES Ref" column.
** See the main body text for details.
† It is not necessary to order these items for every pole: these CC numbers cover multiple items or coiled lengths.

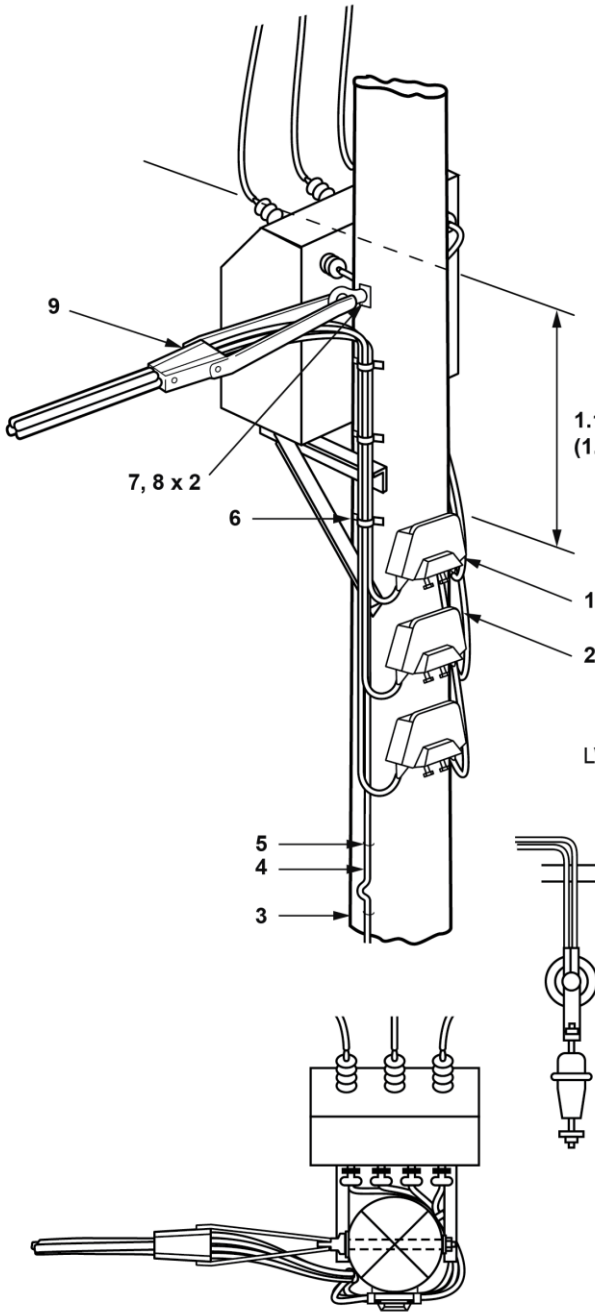


TERMINAL SUPPORT WITH CABLE TERMINATION AND LV FUSES	Change information for this issue: N/A	Appears in: ES400O4	electricity north west
			I-400O4-GA-020 Iss 1 sht 1 of 1
			Scale: nts Auth: DMT Date: 27/10/2011

Terminal Support with Cable Termination and LV Fuses	**Materials for Drawing** Error! Reference source not found.

Conductor							
ABC, 2x35mm^2	Not applicable						
ABC, 4x35mm^2	Not applicable						
ABC, 2x95mm^2							
ABC, 4x95mm^2							
No	**Item**	**ES Ref**	**CC No**				
1	Bolt, eye, M20	400F1	*	1	1	-	-
2	Washer, square, curved, 60x60x6mm, 22mm hole, galvanized	400F1	139203	2	2	-	-
3	Conductor fitting, anchor clamp, ABC, 2 x 95mm^2	400C29	110426	-	1	-	-
	Conductor fitting, anchor clamp, ABC, 4 x 70-95mm^2	400C29	110177	1	-	-	-
4	Cable cleat	400C20	*	As required			
5	Fuse carrier, pole mounted	400L6	122433	3	1	-	-
6	Wood pole	400W2	*	1	1	-	-
7	Cable cleat	400C20	*	As required			
8	Select *A or *B below.						
8A	3-phase cable termination as CP411LV:	-	-	-	-	-	-
(i)	Conductor fitting, compression non tension, ABC, 95-35mm^2	400C29	110752	4	-	-	-
(ii)	Conductor fitting, non tension, ABC 35mm^2 – tail 400mm long transformed – Cu 25mm^2	400C29	127027	1	-	-	-
(iii)	Conductor fitting, non tension, ABC 35mm^2 – tail 400mm long transformed – Al 25mm^2	400C29	127329	3	-	-	-
8B	1-phase cable termination as CP411LV:	-	-	-	-	-	-
(i)	Conductor fitting, compression non tension, ABC, 95-35mm^2	400C29	110752	-	2	-	-
(ii)	Conductor fitting, non tension, ABC 35mm^2 – tail 400mm long transformed – Cu 25mm^2	400C29	127027	-	1	-	-
9	Stay arrangement as per CP420 Part 1 Chapter 07	-	-	As required			
Additional items that are required, but are not shown on the drawing **							
-	Cable guard	400G1	*	As required			
-	Notice, danger of death (wood poles) (Dwg I-400N1-NOTE-006)	400N1	195251	2	2	-	-
-	Notice, pole number (wood poles) (Dwg I-400N1-NOTE-020)	400N1	*	1	1	-	-
-	Tie, security, length 200mm, width 4.8mm, plastic	400F1	299758 †	As required			
-	Wood block, foundation	400W2	*	As required			
Additional items that may be required, but are not shown on the drawing **							
-	Notices	400N1	*	As required			
-	ACD	400A2	*	As required			

* Select appropriate item (size, type, etc...) from the specification in the adjacent “ES Ref” column.
** See the main body text for details.
† It is not necessary to order these items for every pole: these CC numbers cover multiple items or coiled lengths.



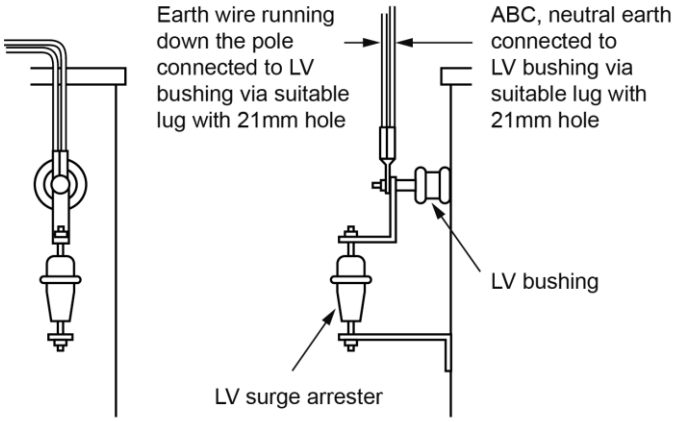
Refer to ES400O2 or O3 for the HV general arrangement, which includes pole-top fittings, FARAP, transformer and fixings, droppers, and HV earthing.

Refer to CP420 Part 1 Chapter 08 for more information on transformer pole clearances and HV/LV earth separation.

Refer to CP420 Part 1 Chapter 21 for more information on HV/LV earthing.

Fuses shall be installed at a height of not less than 3.0m above the datum

LV Earth Connections at back of Transformer



TRANSFORMER POLE	Change information for this issue: LV fuse to HV clearance changed	Appears in: ES400O4	I-400O4-GA-021 Iss 2 sht 1 of 1

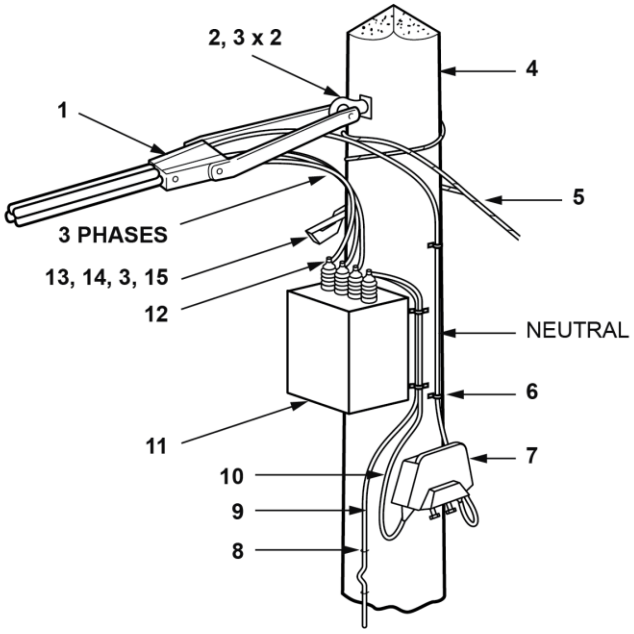
Scale: nts Auth: DMT Date: 8/10/2013

Transformer Pole

Materials for Drawing Error! Reference source not found.

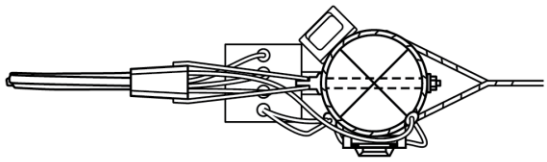
Conductor							
ABC, 2x35mm^2							
ABC, 4x35mm^2							
ABC, 2x95mm^2							
ABC, 4x95mm^2							
No	**Item**	**ES Ref**	**CC No**				
1	Fuse carrier, pole mounted	400L6	122433	3	1	3	1
2	Conductor, ABC, tails, 35mm^2, double insulated	400C3	012107†	-	-	3	1
	Conductor, ABC, tails, 95mm^2, double insulated	400C3	TBA	3	1	-	-
3	Wood pole (as specified in ES400O2 or O3)	-	-	-	-	-	-
4	Conductor, HDCu, 70mm^2 (green/yellow covered) terminated at the transformer LV earth by	400C3	357243	As required			
	Conductor fitting, lug, 1-hole (21mm), straight, HDCu, 70mm^2 (See Drawing **Error! Reference source not found.** for continuation of the earth below ground.)	400C29	124648	1	1	1	1
5	Staple	400F1	*	As required			
6	Cable cleat	400C20	*	As required			
7	Bolt, eye, M20	400F1	*	1	1	1	1
8	Washer, square, curved, 60x60x6mm, 22mm hole, galvanized	400F1	139203	2	2	2	2
9	Conductor fitting, anchor clamp, ABC, 2 x 35mm^2	400C29	110418	-	-	-	1
	Conductor fitting, anchor clamp, ABC, 4 x 25-50mm^2	400C29	110175	-	-	1	-
	Conductor fitting, anchor clamp, ABC, 2 x 95mm^2	400C29	110426	-	1	-	-
	Conductor fitting, anchor clamp, ABC, 4 x 70-95mm^2	400C29	110177	1	-	-	-
Additional items that are required, but are not shown on the drawing **							
-	Cable guard	400G1	*	As required			
-	Tie, security, length 200mm, width 4.8mm, plastic	400F1	299758 †	As required			
Additional items that may be required, but are not shown on the drawing **							
-	Stay arrangement as per CP420 Part 1 Chapter 07	-	-	As required			
-	Notices	400N1	*	As required			
-	ACD	400A2	*	As required			

* Select appropriate item (size, type, etc...) from the specification in the adjacent “ES Ref” column.
** See the main body text for details.
† It is not necessary to order these items for every pole: these CC numbers cover multiple items or coiled lengths.



Note
A stay plate can be used as an alternative to the make off shown. Stay arrangements are detailed in CP420 Part 1 Chapter 07. Note that the light duty stay plate is only rated up to 28kN and shall only be used accordingly.

The fuse shall be installed at a height of not less than 3.0m above the datum



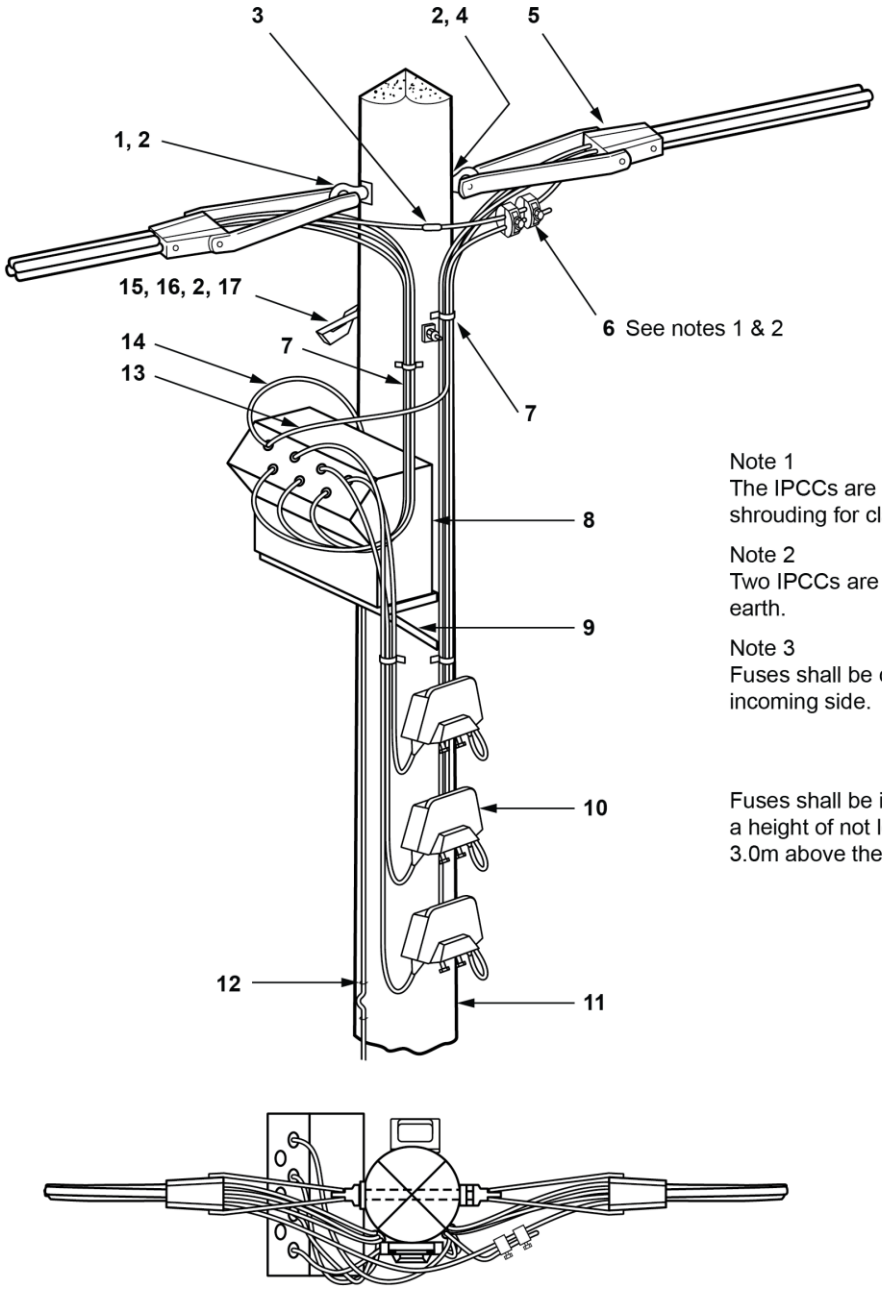
SUPPORT WITH BALANCER	Change information for this issue 1.1m clearance to fuse removed	Appears in ES400O4	electricity north west I-400O4-GA-022 Iss 2 sht 1 of 1 Scale: nts Auth: DMT Date: 8/10/2013

Support with Balancer

Materials for Drawing Error! Reference source not found.

Conductor							
ABC, 2x35mm^2	Not applicable						
ABC, 4x35mm^2							
ABC, 2x95mm^2	Not applicable						
ABC, 4x95mm^2							
No	**Item**	**ES Ref**	**CC No**				
1	Conductor fitting, anchor clamp, ABC, 4 x 25-50mm^2	400C29	110175	-	-	1	-
	Conductor fitting, anchor clamp, ABC, 4 x 70-95mm^2	400C29	110177	1	-	-	-
2	Bolt, eye, M20	400F1	*	1	-	1	-
3	Washer, square, curved, 60x60x6mm, 22mm hole, galvanized	400F1	139203	3	-	3	-
4	Wood pole	400W2	*	1	-	1	-
5	Stay arrangement as per CP420 Part 1 Chapter 07	-	-	As required			
6	Cable cleat	400C20	*	As required			
7	Fuse carrier, pole mounted	400L6	122433	1	-	1	-
8	Staple	400F1	*	As required			
9	Conductor, HDCu, 70mm^2 (green/yellow covered) Terminating at bushing in a suitable lug	400C3	357243	As required			
	Conductor fitting, lug, 1-hole (13mm), straight, HDCu, 70mm^2	400C29	124532	1	-	1	-
	(See Drawing **Error! Reference source not found.** for continuation of the earth below ground.)						
10	Conductor, ABC (length as required; taken from spare length of conductor):						
	Conductor, ABC, 4x35mm^2	400C3	012106 †	-	-	1	-
	Conductor, ABC, 4x95mm^2	400C3	012076 †	1	-	-	-
11	Balancer, phase, LV	††	††	1	-	1	-
12	Suitable bimetal lug	400C29	*	4	-	4	-
13	Steelwork, fall-arrest anchor point, pole (Dwg I-400S11-SWK-026)	400S11	260820	1	-	1	-
14	Bolt, M20	400F1	*	1	-	1	-
15	Screw, coach, 10x75mm, galvanized	400F1	126810	1	-	1	-
Additional items that are required, but are not shown on the drawing **							
-	Cable guard	400G1	*	As required			
-	Notice, danger of death (wood poles) (Dwg I-400N1-NOTE-006)	400N1	195251	2	-	2	-
-	Notice, pole number (wood poles) (Dwg I-400N1-NOTE-020)	400N1	*	1	-	1	-
-	Tie, security, length 200mm, width 4.8mm, plastic	400F1	299758 †	As required			
-	Wood block, foundation	400W2	*	As required			
Additional items that may be required, but are not shown on the drawing **							
-	Notices	400N1	*	As required			
-	ACD	400A2	*	As required			

* Select appropriate item (size, type, etc...) from the specification in the adjacent “ES Ref” column.
** See the main body text for details.
† It is not necessary to order these items for every pole: these CC numbers cover multiple items or coiled lengths.
†† Not a stock item: it does not have a CC number; nor is it covered by an Electricity North West Specification.



Note 1
The IPCCs are shown prior to shrouding for clarity.

Note 2
Two IPCCs are used on the neutral earth.

Note 3
Fuses shall be connected on the incoming side.

Fuses shall be installed at a height of not less than 3.0m above the datum

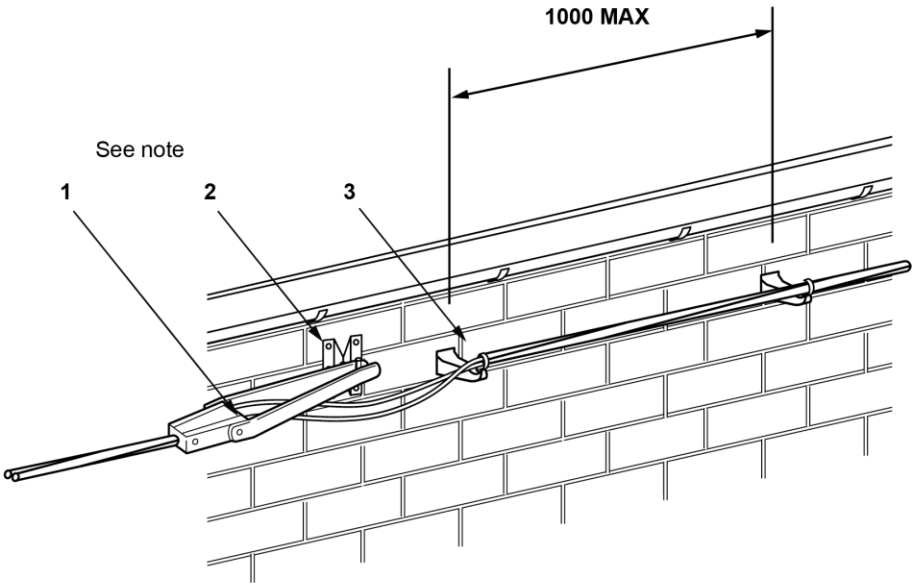
SUPPORT WITH REGULATOR	Change information for this issue N/A	Appears in ES400O4	electricity north west I-400O4-GA-023 Iss 1 sht 1 of 1 Scale: nts Auth: DMT Date: 27/10/2011

Support with Regulator

Materials for Drawing Error! Reference source not found.

Conductor							
ABC, 2x35mm^2							
ABC, 4x35mm^2							
ABC, 2x95mm^2							
ABC, 4x95mm^2							
No	**Item**	**ES Ref**	**CC No**				
1	Bolt, eye, M20	400F1	*	1	1	1	1
2	Washer, square, curved, 60x60x6mm, 22mm hole, galvanized	400F1	139203	3	3	3	3
3	Conductor fitting, compression full tension, ABC, 35mm^2	400C29	139112	-	-	1	1
	Conductor fitting, compression full tension, ABC, 95mm^2	400C29	118524	1	1	-	-
4	Nut, eye, M20, galvanized	400F1	122106	1	1	1	1
5	Conductor fitting, anchor clamp, ABC, 2 x 35mm^2	400C29	110418	-	-	-	1
	Conductor fitting, anchor clamp, ABC, 4 x 25-50mm^2	400C29	110175	-	-	1	-
	Conductor fitting, anchor clamp, ABC, 2 x 95mm^2	400C29	110426	-	1	-	-
	Conductor fitting, anchor clamp, ABC, 4 x 70-95mm^2	400C29	110177	1	-	-	-
6	Conductor fitting, insulation piercing compression connector, ABC main 25-95mm^2, ABC/Cu tap 25-95mm^2, single bolt	400C29	127275	2	2	2	2
7	Cable cleat	400C20	*	As required			
8	Regulator, LV, 1000kVA rating	325	*	1	1	1	1
9	Steelwork, transformer platform kit, single pole	400S11	133396	1	1	1	1
10	Fuse carrier, pole mounted	400L6	122433	3	1	3	1
11	Wood pole	400W2	*	1	1	1	1
12	Staple	400F1	*	As required			
13	Conductor, ABC (length as required; taken from spare length of conductor):						
	Conductor, ABC, 2x35mm^2	400C3	012092 †	-	-	-	1
	Conductor, ABC, 4x35mm^2	400C3	012106 †	-	-	1	-
	Conductor, ABC, 2x95mm^2	400C3	012122 †	-	1	-	-
	Conductor, ABC, 4x95mm^2	400C3	012076 †	1	-	-	-
14	Conductor, HDCu, 70mm^2 (green/yellow covered) (See Drawing **Error! Reference source not found.** for continuation of the earth below ground.)	400C3	357243	As required			
15	Steelwork, fall-arrest anchor point, pole (Dwg I-400S11-SWK-026)	400S11	260820	1	1	1	1
16	Bolt, M20	400F1	*	1	1	1	1
17	Screw, coach, 10x75mm, galvanized	400F1	126810	1	1	1	1
Additional items that are required, but are not shown on the drawing **							
-	Notice, danger of death (wood poles) (Dwg I-400N1-NOTE-006)	400N1	195251	2	-	2	-
-	Notice, pole number (wood poles) (Dwg I-400N1-NOTE-020)	400N1	*	1	-	1	-
-	Cable guard	400G1	*	As required			
-	Tie, security, length 200mm, width 4.8mm, plastic	400F1	299758 †	As required			
-	Wood block, foundation	400W2	*	As required			
Additional items that may be required, but are not shown on the drawing **							
-	Notices	400N1	*	As required			
-	ACD	400A2	*	As required			

* Select appropriate item (size, type, etc...) from the specification in the adjacent “ES Ref” column.
** See the main body text for details.
† It is not necessary to order these items for every pole: these CC numbers cover multiple items or coiled lengths.



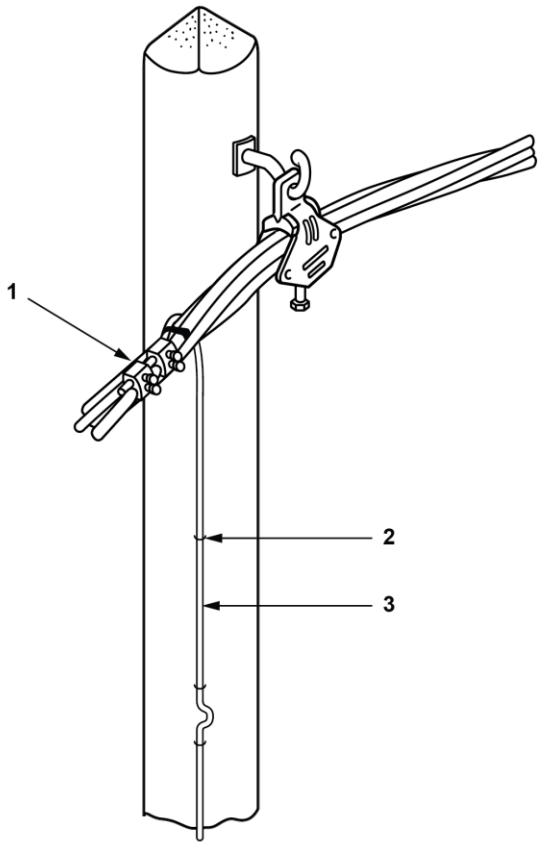
Note
The bracket shown is only suitable for use with ABC service clamps. For alternative, see list of materials.

TYPICAL ARRANGEMENT TO BUILDINGS	Change information for this issue	Appears in	electricity north west
	N/A	ES400O4	I-400O4-GA-024 Iss 1 sht 1 of 1 Scale: nts Auth: DMT Date: 27/10/2011

Typical Arrangements to Buildings

Materials for Drawing Error! Reference source not found.

Conductor							
ABC, 2x35mm^2							
ABC, 4x35mm^2							
ABC, 2x95mm^2							
ABC, 4x95mm^2							
No	**Item**	**ES Ref**	**CC No**				
1	Conductor fitting, anchor clamp, ABC, 2 x 35mm^2	400C29	110418	-	-	-	1
	Conductor fitting, anchor clamp, ABC, 4 x 25-50mm^2	400C29	110175	-	-	1	-
	Conductor fitting, anchor clamp, ABC, 2 x 95mm^2	400C29	110426	-	1	-	-
	Conductor fitting, anchor clamp, ABC, 4 x 70-95mm^2	400C29	110177	1	-	-	-
2 *	Steelwork, wall mounting, hook plate (LV ABC service clamps)	400S11	110389	1	1	1	1
OR	OR						
2	Steelwork, wall bracket, 3 legs (Dwg I-400S11-SWK-077)	400S11	110396	1	1	1	1
3	LV Mural wiring systems (including wall fittings) are fully specified in ES400O4a						
* Only to be used with the service clamp (CC TBA).							

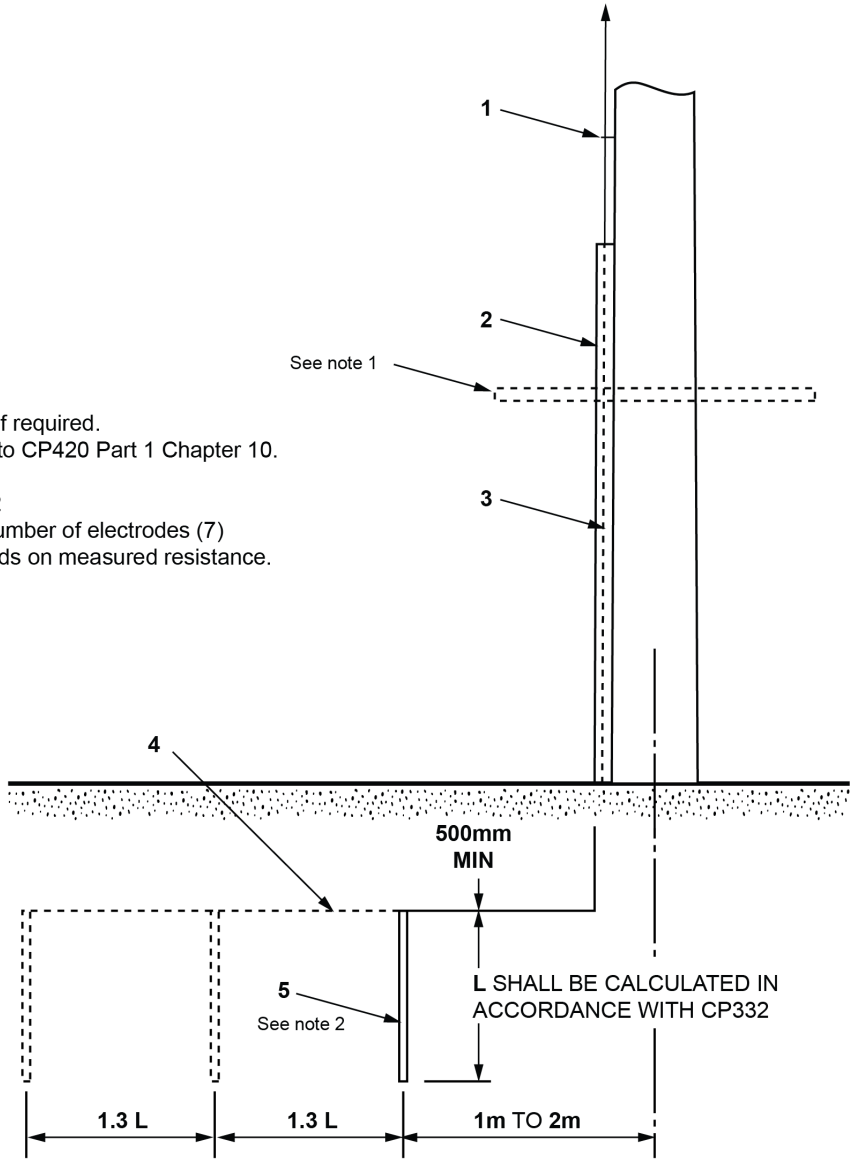


EARTHING ARRANGEMENT AT INTERMEDIATE SUPPORT	Change information for this issue N/A	Appears in ES400O4	electricity north west I-400O4-GA-026 Iss 1 sht 1 of 1 Scale: nts Auth: DMT Date: 27/10/2011

Earthing Arrangement at Intermediate Support	**Materials for Drawing** Error! Reference source not found.

Conductor							
ABC, 2x35mm^2							
ABC, 4x35mm^2							
ABC, 2x95mm^2							
ABC, 4x95mm^2							
No	**Item**	**ES Ref**	**CC No**				
1	Conductor fitting, insulation piercing compression connector, ABC, 25-95mm^2/bare 30/10-100mm^2, double bolt	400C29	116548	2	2	2	2
2	Staple	400F1	*	As required			
3	Conductor, HDCu, 70mm^2 (green/yellow covered) (See Drawing **Error! Reference source not found.** for continuation of the earth below ground.)	400C3	357243	As required			
Additional items that are required, but are not shown on the drawing **							
-	Tie, security, length 200mm, width 4.8mm, plastic	400F1	299758 †	As required			

* Select appropriate item (size, type, etc...) from the specification in the adjacent “ES Ref” column.
** See the main body text for details.
† It is not necessary to order these items for every pole: these CC numbers cover multiple items or coiled lengths.



Note 1
ACD, if required.
Refer to CP420 Part 1 Chapter 10.

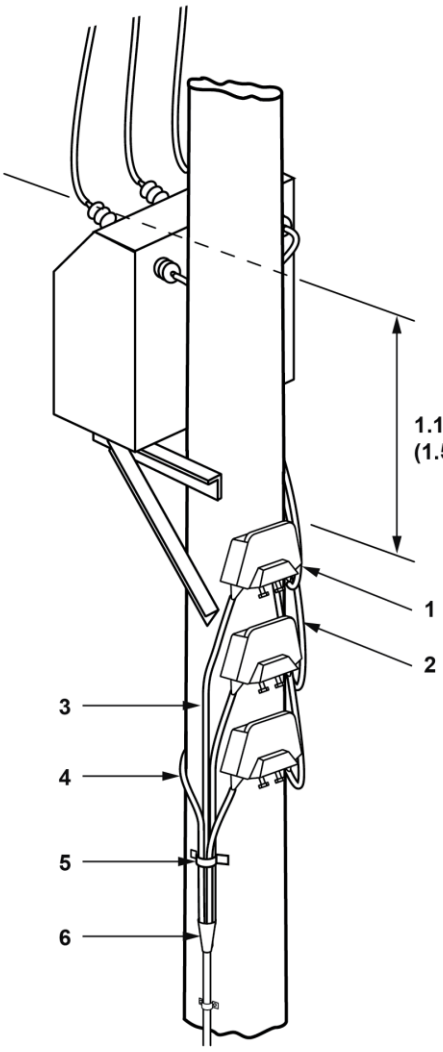
Note 2
The number of electrodes (7)
depends on measured resistance.

EARTH ELECTRODE CONNECTIONS	Change information for this issue N/A	Appears in ES400O4	electricity north west I-400O4-GA-027 Iss 1 sht 1 of 1 Scale: nts Auth: DMT Date: 27/10/2011

Earth Electrode Connections

Materials for Drawing Error! Reference source not found.

Conductor				
ABC, 2x35mm^2				
ABC, 4x35mm^2				
ABC, 2x95mm^2				
ABC, 4x95mm^2				
No	**Item**	**ES Ref**	**CC No**	
1	Staple	400F1	*	As required
2	Cable guard	400G1	*	As required
3	Conductor, HDCu, 70mm^2 (green/yellow covered)	400C3	357243	As required
4	Conductor, HDCu, 70mm^2 (7/3.55)	400C3	013196	As required
5	Earth electrode	400E8	129879	As required
	And the following ancillary items depending upon resistance measurements:			
	Earth electrode, coupling	400E8	118842	As required
	Earth electrode, clamp	400E8	113565	As required
* Select appropriate item (size, type, etc...) from the specification in the adjacent “ES Ref” column.				



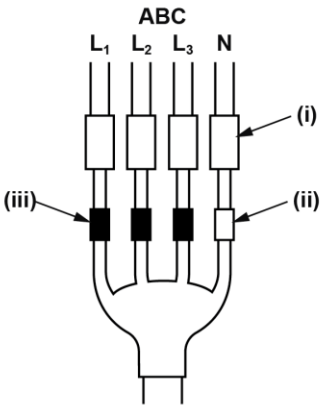
Refer to ES400O2 or O3 for the HV general arrangement, which includes pole-top fittings, FARAP, transformer and fixings, droppers, and HV earthing.

Refer to CP420 Part 1 Chapter 08 for more information on transformer pole clearances and HV/LV earth separation.

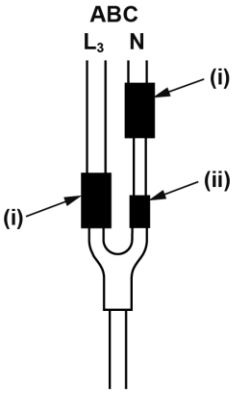
Refer to CP420 Part 1 Chapter 21 for more information on HV/LV earthing.

Fuses shall be installed at a height of not less than 3.0m above the datum

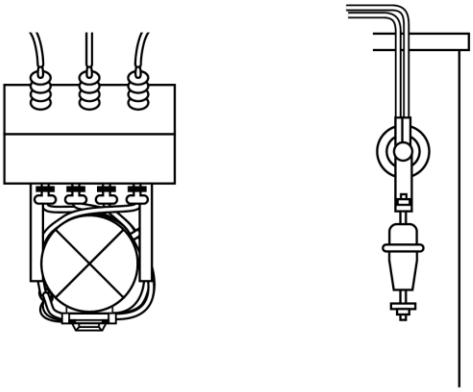
DETAIL 6A



DETAIL 6B



LV Earth Connections at back of Transformer



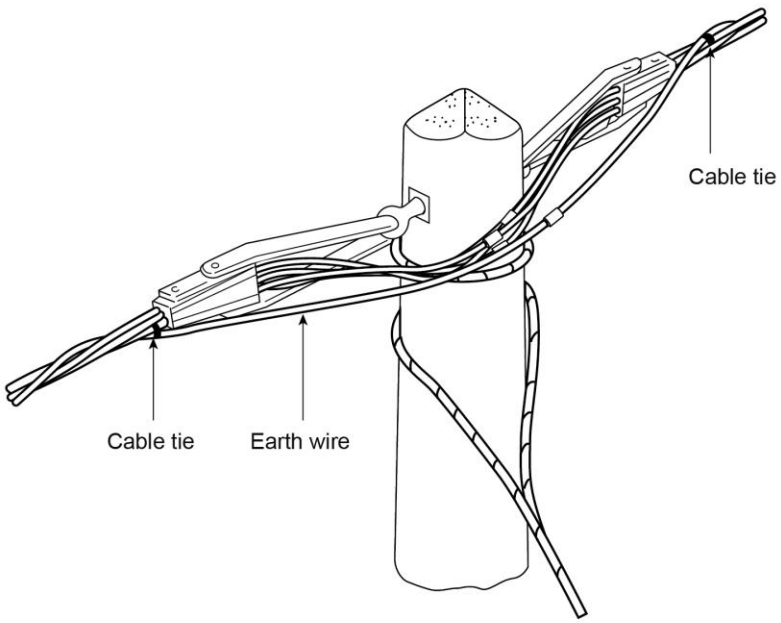
TRANSFORMER TO UNDERGROUND CABLE	Change information for this issue: N/A	Appears in: ES400O4	electricity north west
			I-400O4-GA-028 Iss 1 sht 1 of 1
			Scale: nts Auth: DMT Date: 8/10/2013

Transformer to Underground Cable

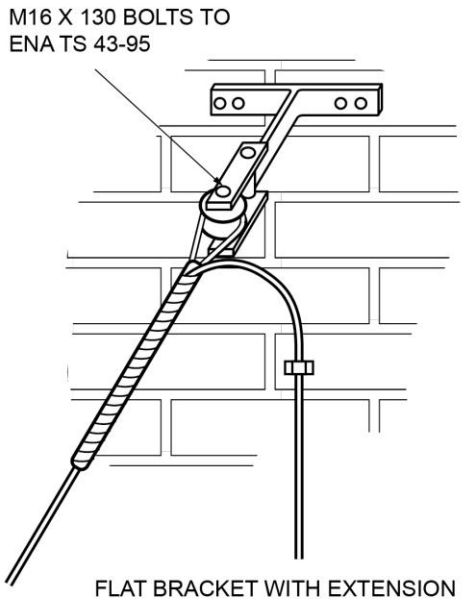
Materials for Drawing Error! Reference source not found.

Conductor							
ABC, 2x35mm^2	Not applicable						
ABC, 4x35mm^2	Not applicable						
ABC, 2x95mm^2							
ABC, 4x95mm^2							
No	**Item**	**ES Ref**	**CC No**				
1	Fuse carrier, pole mounted	400L6	122433	3	1	-	-
2	Conductor, ABC, tails, 95mm^2, double insulated	400C3	TBA	3	1	-	-
3/4	Conductor, ABC, 2x95mm^2 Conductor, ABC, 4x95mm^2	400C3 400C3	012122 † 012076 †	As required			
5	Cable cleat	400C20	*	As required			
6	Select *A or *B below.						
6A	3-phase cable termination as CP411LV:	-	-	-	-	-	-
(i)	Conductor fitting, compression non tension, ABC, 95-35mm^2	400C29	110752	4	-	-	-
(ii)	Conductor fitting, non tension, ABC 35mm^2 – tail 400mm long transformed – Cu 25mm^2	400C29	127027	1	-	-	-
(iii)	Conductor fitting, non tension, ABC 35mm^2 – tail 400mm long transformed – Al 25mm^2	400C29	127329	3	-	-	-
6B	1-phase cable termination as CP411LV:	-	-	-	-	-	-
(i)	Conductor fitting, compression non tension, ABC, 95-35mm^2	400C29	110752	-	2	-	-
(ii)	Conductor fitting, non tension, ABC 35mm^2 – tail 400mm long transformed – Cu 25mm^2	400C29	127027	-	1	-	-
Additional items that are required, but are not shown on the drawing **							
-	Cable guard	400G1	*	As required			
-	Tie, security, length 200mm, width 4.8mm, plastic	400F1	299758 †	As required			
Additional items that may be required, but are not shown on the drawing **							
-	Stay arrangement as per CP420 Part 1 Chapter 07	-	-	As required			
-	Notices	400N1	*	As required			
-	ACD	400A2	*	As required			

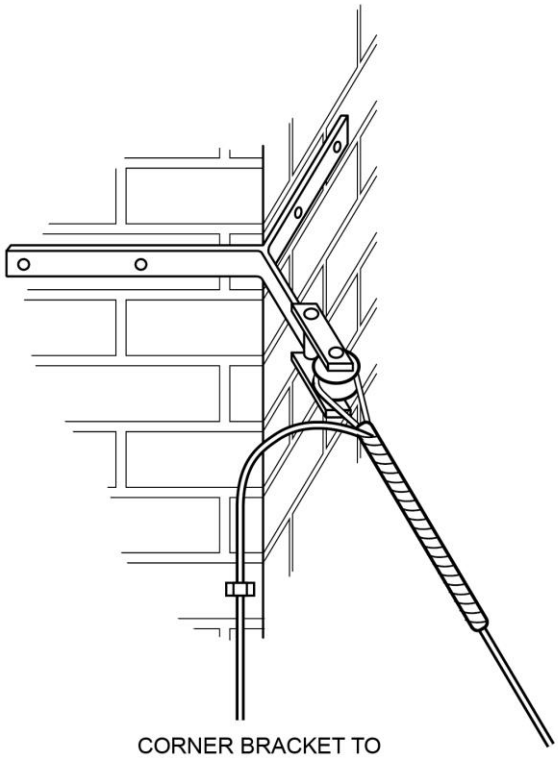
* Select appropriate item (size, type, etc...) from the specification in the adjacent “ES Ref” column.
** See the main body text for details.
† It is not necessary to order these items for every pole: these CC numbers cover multiple items or coiled lengths.



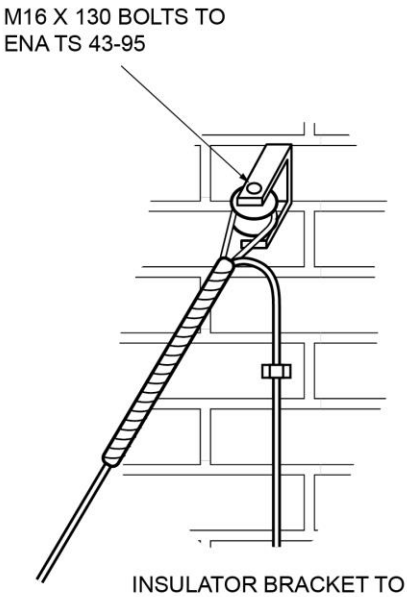
5-WIRE ABC CONNECTION AT SECTION POLE	Change information for this issue N/A	Appears in ES400O4, CP430 Pt 1	electricity north west I-400O4-GA-029 Iss 1 sht 1 of 1 Scale: nts Auth: DMT Date: 8/10/2013



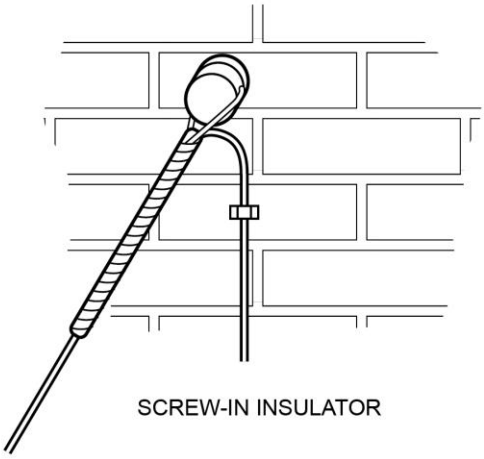
FLAT BRACKET WITH EXTENSION STRAPS TO ENA TS 43-95



CORNER BRACKET TO ENA TS 43-95



INSULATOR BRACKET TO ENA TS 43-95



SCREW-IN INSULATOR

TYPICAL CONCENTRIC SERVICE CABLE ATTACHMENTS TO BUILDINGS (POLE TO HOUSE)	Change information for this issue Document added to appears in	Appears in CP430 Pt 1 ES400O4	electricity north west I-430P1-M520-001 Iss 2 sht 1 of 1 Scale: nts Auth: DMT Date: 25/11/2016

Typical Concentric Service Cable Attachments to Buildings (Pole to House)	**Materials for Drawing** Error! Reference source not found.

Conductor

SNE (SCNE) to ES400C8

CNE to ES400C8

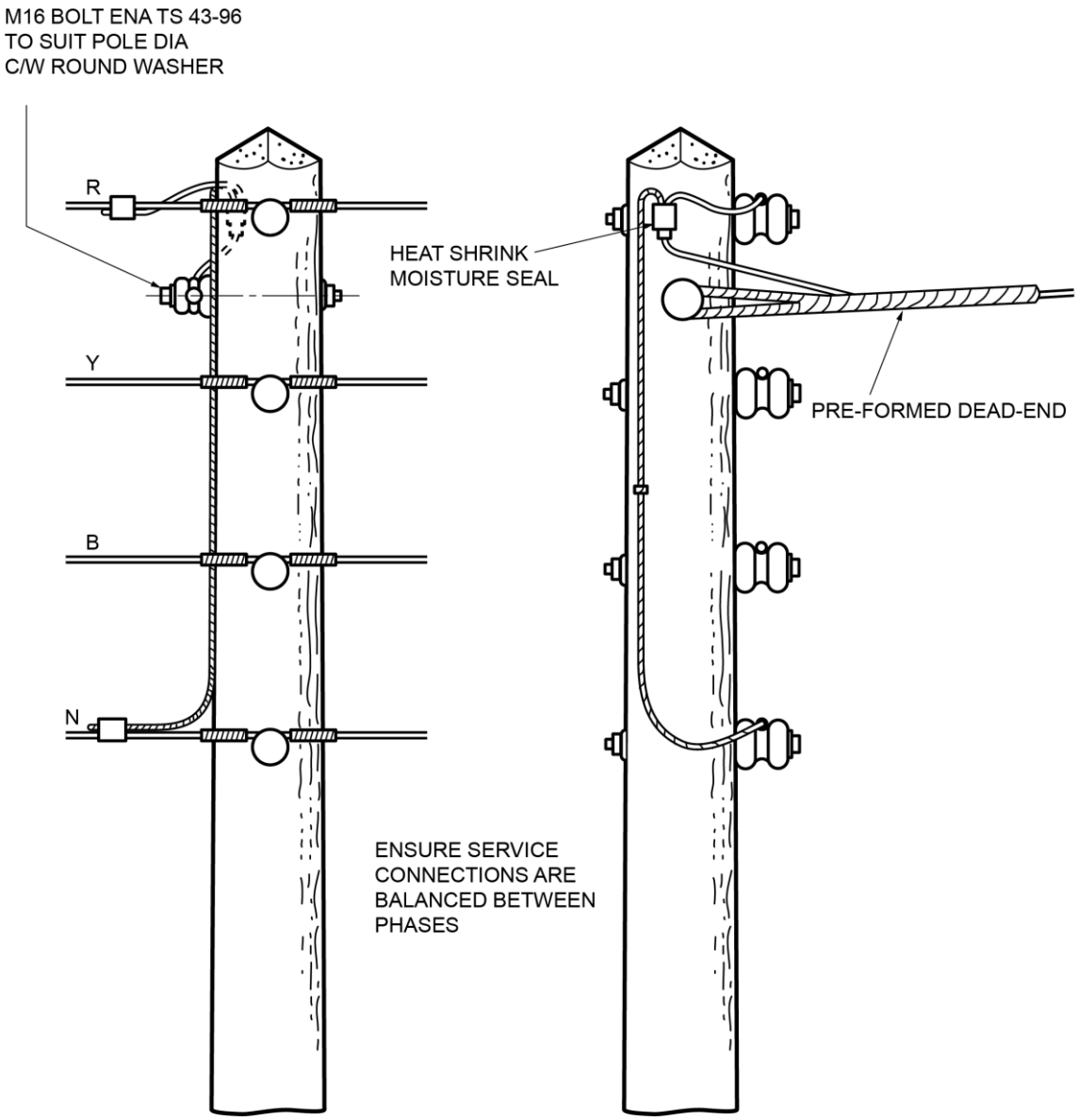
Item	ES Ref	CC No	
Steelwork, wall bracket (to ENA TS 43-95)	400S11	*	As required
Steelwork, LV D-iron	400S11	111244	As required
Insulator, coach screw, service type	400I4	125205	As required
Insulator, reel type, LV, 15kN MFL	400I4	125204	As required
Conductor fitting, helical, dead end	400H2	*	As required
Bolts, washers, etc	400F1	*	As required
Cleats	400C20	*	As required
Tie, security, length 200mm, width 4.8mm, plastic	400F1	**	As required

General

Approved PVC binder may be used as required.

Notes

***** Select appropriate item (size, type, etc...) from the specification in the adjacent “ES Ref” column.
** It is not necessary to order these items for every pole: these CC numbers cover multiple items or coiled lengths.



TYPICAL CONCENTRIC SERVICE CABLE ATTACHMENT TO WOOD POLE AND OPEN WIRE LINE	Change information for this issue Document added to appears in	Appears in CP430 Pt 1 ES400O4	electricity north west I-430P1-M520-002 Iss 2 sht 1 of 1 Scale: nts Auth: DMT Date: 25/11/2016

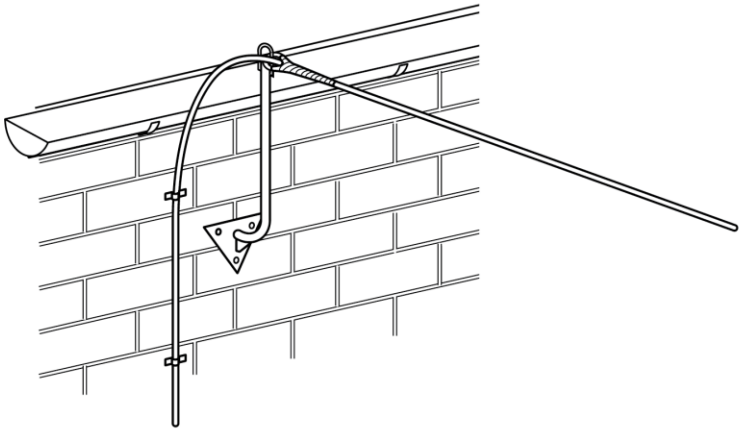
Typical Concentric Service Cable Attachment to Wood Pole and Open Wire Line	**Materials for Drawing** Error! Reference source not found.

Conductor			
SNE (SCNE) to ES400C8			
CNE to ES400C8			
Item	**ES Ref**	**CC No**	
Conductor fitting, compression (for connecting main to service)	400C29	*	As required
Pole fitting can be one of the following:			
Insulator, reel type, LV, 15kN MFL, and	400I4	125204	As required
M16 bolt and round washers	400F1	*	As required
Or			
Steelwork, LV D-iron (not shown on drawing), and	400S11	111244	As required
Insulator, reel type, LV, 15kN MFL, and			
Bolts, washers, etc	400F1	*	As required
Or			
Insulator, coach screw, service type (not shown on drawing)	400I4	125205	As required
Conductor fitting, helical, dead end	400H2	*	As required
Cleats	400C20	*	As required

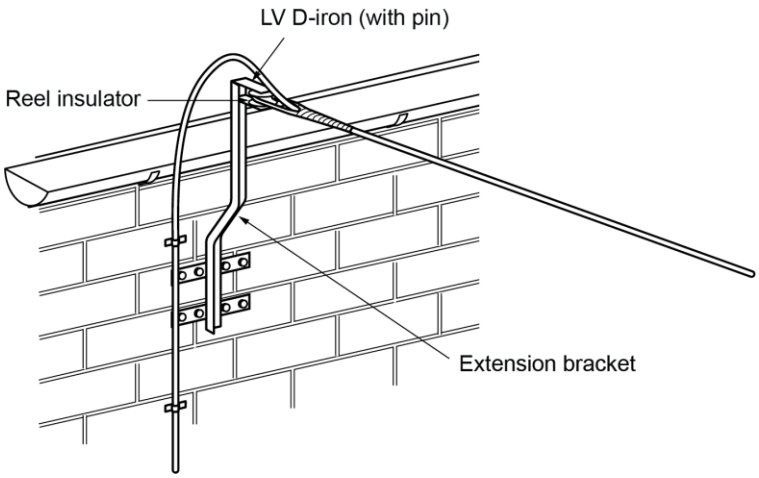
Notes

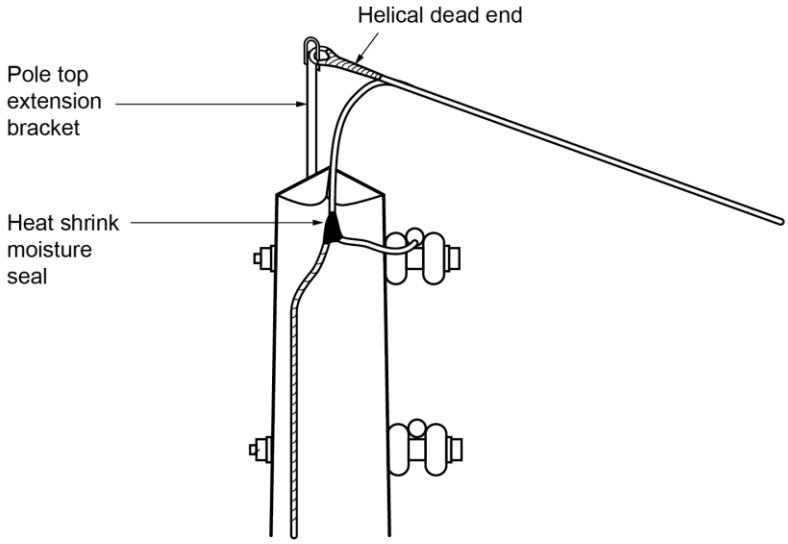
***** Select appropriate item (size, type, etc...) from the specification in the adjacent “ES Ref” column.

UNDER EAVES
EXTENSION BRACKET
CC 122844 or 122845



ALTERNATIVE
UNDER EAVES
EXTENSION BRACKET
CC 122851





USING EXTENSION BRACKETS FOR ADDITIONAL CLEARANCE	Change information for this issue: Document added to appears in	Appears in: CP430 Pt 1 ES400O4	electricity north west
			I-430P1-M520-004 Iss 3 sht 1 of 1
			Scale: nts Auth: DMT Date: 23/11/2016

Using Extension Brackets for Additional Clearance

Materials for Drawing Error! Reference source not found.

Conductor

SNE (SCNE) to ES400C8 – see Rules for Use below

CNE to ES400C8 – see Rules for Use below

Item	ES Ref	CC No	
Conductor fitting (for connecting main to service)	400C29	*	As required
Extension brackets	400S11	*	As required
Steelwork, LV D-iron	400S11	111244	As required
Insulator, reel type, LV, 15kN MFL	400I4	125204	As required
Bolts, washers, etc	400F1	*	As required
Conductor fitting, helical, dead end	400H2	*	As required
Cleats	400C20	*	As required

Rules for Use

1. The pole top extension can also be used on poles carrying ABC.
2. No more than two extension brackets shall be fitted per pole.
3. There shall be no more than one service per extension bracket.
4. These brackets are only to be used for single phase concentric cables – either CNE or SNE.
5. The use of these brackets does not change the maximum span.

Notes

***** Select appropriate item (size, type, etc...) from the specification in the adjacent “ES Ref” column.

Appendix B – Index to Materials

Index to Materials			
Item	**ES Ref**	**CC No**	**GA Drawing**
ACD	400A2	*	**Error! Reference source not found.**
	400A2	*	**Error! Reference source not found.**
	400A2	*	**Error! Reference source not found.**
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	400A2	*	**Error! Reference source not found.**
	400A2	*	**Error! Reference source not found.**
Balancer, phase, LV	400O4	*	**Error! Reference source not found.**
Bolt, eye, M20	400F1	*	**Error! Reference source not found.**
	400F1	*	**Error! Reference source not found.**
	400F1	*	**Error! Reference source not found.**
	400F1	*	**Error! Reference source not found.**
	400F1	*	**Error! Reference source not found.**

Index to Materials			
Item	**ES Ref**	**CC No**	**GA Drawing**
	400F1	*	**Error! Reference source not found.**
	400F1	*	**Error! Reference source not found.**
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	400F1	*	**Error! Reference source not found.**
	400F1	*	**Error! Reference source not found.**
	400F1	*	**Error! Reference source not found.**
Bolt, M20	400F1	*	**Error! Reference source not found.**
	400F1	*	**Error! Reference source not found.**
	400F1	*	**Error! Reference source not found.**
	400F1	*	**Error! Reference source not found.**
	400F1	*	**Error! Reference source not found.**
	400F1	*	**Error! Reference source not found.**
Bolt, M20, pigtail hook, ABC, galvanized (ENA TS 43-14)	400F1	*	**Error! Reference source not found.**
	400F1	*	**Error! Reference source not found.**
	400F1	*	**Error! Reference source not found.**
	400F1	*	**Error! Reference source not found.**
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	400F1	*	**Error! Reference source not found.**
Cable cleat	400C20	*	**Error! Reference source not found.**
	400C20	*	**Error! Reference source not found.**
	400C20	*	**Error! Reference source not found.**
	400C20	*	**Error! Reference source not found.**
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Index to Materials			
Item	**ES Ref**	**CC No**	**GA Drawing**
	400C20	*	**Error! Reference source not found.**
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	400C20	*	**Error! Reference source not found.**
	400C20	*	**Error! Reference source not found.**
	400C20	*	**Error! Reference source not found.**
Cable cleat, wall, stand-off, polypropylene, ABC, 100x72x43	400C20	110651	**Error! Reference source not found.**
Cable cleat, wall, stand-off, polypropylene, ABC, 125x80x48	400C20	110652	**Error! Reference source not found.**
Cable cleat, wall, stand-off, polypropylene, ABC, 50x59x37	400C20	110650	**Error! Reference source not found.**
Cable guard	400G1	*	**Error! Reference source not found.**
	400G1	*	**Error! Reference source not found.**
	400G1	*	**Error! Reference source not found.**
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	400G1	*	**Error! Reference source not found.**
	400G1	*	**Error! Reference source not found.**
Cable termination, break-out kit	TBA	*	**Error! Reference source not found.**
	TBA	*	**Error! Reference source not found.**
Conductor fitting, anchor clamp, ABC, 2 x 35mm^2	400C29	110418	**Error! Reference source not found.**
	400C29	110418	**Error! Reference source not found.**

Index to Materials			
Item	**ES Ref**	**CC No**	**GA Drawing**
	400C29	110418	**Error! Reference source not found.**
	400C29	110418	**Error! Reference source not found.**
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	400C29	110418	**Error! Reference source not found.**
	400C29	110418	**Error! Reference source not found.**
	400C29	110418	**Error! Reference source not found.**
Conductor fitting, anchor clamp, ABC, 2 x 95mm^2	400C29	110426	**Error! Reference source not found.**
	400C29	110426	**Error! Reference source not found.**
	400C29	110426	**Error! Reference source not found.**
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	400C29	110426	**Error! Reference source not found.**
	400C29	110426	**Error! Reference source not found.**
Conductor fitting, anchor clamp, ABC, 4 x 25-50mm^2	400C29	110175	**Error! Reference source not found.**
	400C29	110175	**Error! Reference source not found.**
	400C29	110175	**Error! Reference source not found.**
	400C29	110175	**Error! Reference source not found.**
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Index to Materials			
Item	**ES Ref**	**CC No**	**GA Drawing**
	400C29	110175	**Error! Reference source not found.**
	400C29	110175	**Error! Reference source not found.**
	400C29	110175	**Error! Reference source not found.**
Conductor fitting, anchor clamp, ABC, 4 x 70-95mm^2	400C29	110177	**Error! Reference source not found.**
	400C29	110177	**Error! Reference source not found.**
	400C29	110177	**Error! Reference source not found.**
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	400C29	110177	**Error! Reference source not found.**
	400C29	110177	**Error! Reference source not found.**
Conductor fitting, clamp, suspension, ABC,2x35-120mm^2/4x25-120mm^2, up to 60° angle	400C29	110744	**Error! Reference source not found.**
	400C29	110744	**Error! Reference source not found.**
	400C29	110744	**Error! Reference source not found.**
	400C29	110744	**Error! Reference source not found.**
	400C29	110744	**Error! Reference source not found.**
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	400C29	110744	**Error! Reference source not found.**
	400C29	110744	**Error! Reference source not found.**
	400C29	110744	**Error! Reference source not found.**
Conductor fitting, clamp, weak link suspension, ABC	400C29	234893	**Error! Reference source not found.**
	400C29	234893	**Error! Reference source not found.**
	400C29	234893	**Error! Reference source not found.**

Index to Materials			
Item	**ES Ref**	**CC No**	**GA Drawing**
Conductor fitting, compression full tension, ABC, 35mm^2	400C29	139112	**Error! Reference source not found.**
	400C29	139112	**Error! Reference source not found.**
	400C29	139112	**Error! Reference source not found.**
	400C29	139112	**Error! Reference source not found.**
	400C29	139112	**Error! Reference source not found.**
	400C29	139112	**Error! Reference source not found.**
Conductor fitting, compression full tension, ABC, 95mm^2	400C29	118524	**Error! Reference source not found.**
	400C29	118524	**Error! Reference source not found.**
	400C29	118524	**Error! Reference source not found.**
	400C29	118524	**Error! Reference source not found.**
	400C29	118524	**Error! Reference source not found.**
	400C29	118524	**Error! Reference source not found.**
Conductor fitting, compression non tension, ABC, 95-35mm^2	400C29	110752	**Error! Reference source not found.**
	400C29	110752	**Error! Reference source not found.**
	400C29	110752	**Error! Reference source not found.**
	400C29	110752	**Error! Reference source not found.**
Conductor fitting, end cap, ABC, 35mm^2	400C29	261469	**Error! Reference source not found.**
Conductor fitting, end cap, ABC, 95mm^2	400C29	261470	**Error! Reference source not found.**
	400C29	261470	**Error! Reference source not found.**
Conductor fitting, helical dead end to match CNE/SCNE	400H2	*	**Error! Reference source not found.**
Conductor fitting, insulation piercing compression connector, ABC main 25-95mm^2, ABC tap 25-95mm^2, single bolt	400C29	127275	**Error! Reference source not found.**
	400C29	127275	**Error! Reference source not found.**
	400C29	127275	**Error! Reference source not found.**
	400C29	127275	**Error! Reference source not found.**
	400C29	127275	**Error! Reference source not found.**
	400C29	127275	**Error! Reference source not found.**
	400C29	127275	**Error! Reference source not found.**
Conductor fitting, insulation piercing compression connector, ABC, 25-95mm^2/bare 30/10-100mm^2, double bolt	400C29	116548	**Error! Reference source not found.**
	400C29	116548	**Error! Reference source not found.**
	400C29	116548	**Error! Reference source not found.**

Index to Materials			
Item	**ES Ref**	**CC No**	**GA Drawing**
Conductor fitting, insulation piercing compression connector, ABC, main 25-95mm^2, ABC service 4-35mm^2, single bolt	400C29	110264	**Error! Reference source not found.**
	400C29	110264	**Error! Reference source not found.**
	400C29	110264	**Error! Reference source not found.**
Conductor fitting, lug, 1-hole (21mm), straight, HDCu, 70mm^2	400C29	124648	**Error! Reference source not found.**
Conductor fitting, lug, 1-hole (13mm), straight, HDCu, 70mm^2	400C29	124532	**Error! Reference source not found.**
Conductor fitting, non tension, ABC 35mm^2 – tail 400mm long transformed – Al 25mm^2	400C29	127329	**Error! Reference source not found.**
	400C29	127329	**Error! Reference source not found.**
	400C29	127329	**Error! Reference source not found.**
	400C29	127329	**Error! Reference source not found.**
Conductor fitting, non tension, ABC 35mm^2 – tail 400mm long transformed – Cu 25mm^2	400C29	127027	**Error! Reference source not found.**
	400C29	127027	**Error! Reference source not found.**
	400C29	127027	**Error! Reference source not found.**
	400C29	127027	**Error! Reference source not found.**
Conductor fitting, non tension, compression, CNE/SCNE with ABC, 35mm^2 tail	400C29	*	**Error! Reference source not found.**
	400C29	*	**Error! Reference source not found.**
Conductor, ABC, 2x35mm^2	400C3	012092 †	**Error! Reference source not found.**
	400C3	012092 †	**Error! Reference source not found.**
Conductor, ABC, 2x95mm^2	400C3	012122 †	**Error! Reference source not found.**
	400C3	012122 †	**Error! Reference source not found.**
	400C3	012122 †	**Error! Reference source not found.**
	400C3	012122 †	**Error! Reference source not found.**
Conductor, ABC, 3x35mm^2	400C3	012105	-
Conductor, ABC, 3x95mm^2	400C3	012075	-
Conductor, ABC, 4x35mm^2	400C3	012106 †	**Error! Reference source not found.**
	400C3	012106 †	**Error! Reference source not found.**
	400C3	012106 †	**Error! Reference source not found.**
	400C3	012106 †	**Error! Reference source not found.**
Conductor, ABC, 4x95mm^2	400C3	012076 †	**Error! Reference source not found.**
	400C3	012076 †	**Error! Reference source not found.**
	400C3	012076 †	**Error! Reference source not found.**
	400C3	012076 †	**Error! Reference source not found.**

Index to Materials			
Item	**ES Ref**	**CC No**	**GA Drawing**
	400C3	012076 †	**Error! Reference source not found.**
	400C3	012076 †	**Error! Reference source not found.**
	400C3	012076 †	**Error! Reference source not found.**
Conductor, ABC, 5x35 mm^2	400C3	012108	-
Conductor, ABC, 5x95 mm^2	400C3	012077	-
Conductor, ABC, tails, 35mm^2, double insulated	400C3	012107 †	**Error! Reference source not found.**
Conductor, ABC, tails, 95mm^2, double insulated	400C3	TBA	**Error! Reference source not found.** **Error! Reference source not found.**
Conductor, HDCu, 70mm^2 (7/3.55)	400C3	013196	**Error! Reference source not found.**
Conductor, HDCu, 70mm^2 (green/yellow covered)	400C3	357243	**Error! Reference source not found.** **Error! Reference source not found.** **Error! Reference source not found.** **Error! Reference source not found.** **Error! Reference source not found.** **Error! Reference source not found.** **Error! Reference source not found.** **Error! Reference source not found.** **Error! Reference source not found.**
Distribution box	400L6	111414	**Error! Reference source not found.**
Support bracket		111422	
Earth electrode	400E8	129879	**Error! Reference source not found.**
Earth electrode, clamp	400E8	113565	**Error! Reference source not found.**
Earth electrode, coupling	400E8	118842	**Error! Reference source not found.**
Fuse carrier, pole mounted	400L6	122433	**Error! Reference source not found.**
	400L6	122433	**Error! Reference source not found.**
	400L6	122433	**Error! Reference source not found.**
	400L6	122433	**Error! Reference source not found.**
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	400L6	122433	**Error! Reference source not found.**
	400L6	122433	**Error! Reference source not found.**

8/12/16

Index to Materials			
Item	**ES Ref**	**CC No**	**GA Drawing**
Insulator, coach screw, service type, 10kN MFL (Dwg I-400I4-INS-005)	400I4	125205	**Error! Reference source not found.**
Notice, danger of death (wood poles) (Dwg I-400N1-NOTE-006)	400N1	195251	**Error! Reference source not found.**
	400N1	195251	**Error! Reference source not found.**
	400N1	195251	**Error! Reference source not found.**
	400N1	195251	**Error! Reference source not found.**
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	400N1	195251	**Error! Reference source not found.**
	400N1	195251	**Error! Reference source not found.**
Notice, pole number (wood poles) (Dwg I-400N1-NOTE-020)	400N1	*	**Error! Reference source not found.**
	400N1	*	**Error! Reference source not found.**
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Item	**ES Ref**	**CC No**	**GA Drawing**
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Notices	400N1	*	**Error! Reference source not found.**
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Item	**ES Ref**	**CC No**	**GA Drawing**
	400N1	*	**Error! Reference source not found.**
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	400N1	*	**Error! Reference source not found.**
	400N1	*	**Error! Reference source not found.**
Nut, eye, M20, galvanized	400F1	122106	**Error! Reference source not found.**
	400F1	122106	**Error! Reference source not found.**
	400F1	122106	**Error! Reference source not found.**
	400F1	122106	**Error! Reference source not found.**
	400F1	122106	**Error! Reference source not found.**
	400F1	122106	**Error! Reference source not found.**
	400F1	122106	**Error! Reference source not found.**
Regulator, LV, 1000kVA rating	325	*	**Error! Reference source not found.**
Screw, coach, 10x75mm, galvanized	400F1	126810	**Error! Reference source not found.**
	400F1	126810	**Error! Reference source not found.**
	400F1	126810	**Error! Reference source not found.**
	400F1	126810	**Error! Reference source not found.**
	400F1	126810	**Error! Reference source not found.**
Staple	400F1	*	**Error! Reference source not found.**
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	400F1	*	**Error! Reference source not found.**
	400F1	*	**Error! Reference source not found.**
Stay arrangement as per CP420 Part 1 Chapter 07	-	-	**Error! Reference source not found.**
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Index to Materials			
Item	**ES Ref**	**CC No**	**GA Drawing**
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Steelwork, fall-arrest anchor point, pole (Dwg I-400S11-SWK-026)	400S11	260820	**Error! Reference source not found.**
	400S11	260820	**Error! Reference source not found.**
	400S11	260820	**Error! Reference source not found.**
	400S11	260820	**Error! Reference source not found.**
	400S11	260820	**Error! Reference source not found.**
Steelwork, outrigger hook, 22mm hole, pole, ABC	400S11	110221	**Error! Reference source not found.**
Steelwork, transformer platform kit, single pole	400S11	133396	**Error! Reference source not found.**
Steelwork, wall bracket, 3 legs (Dwg I-400S11-SWK-077)	400S11	110396	**Error! Reference source not found.**
Steelwork, wall mounting, hook plate (LV ABC service clamps)	400S11	110389	**Error! Reference source not found.**
Tie, security, length 200mm, width 4.8mm, plastic	400F1	299758 †	**Error! Reference source not found.**
	400F1	299758 †	**Error! Reference source not found.**
	400F1	299758 †	**Error! Reference source not found.**
	400F1	299758 †	**Error! Reference source not found.**
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	400F1	299758 †	**Error! Reference source not found.**
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	400F1	299758 †	**Error! Reference source not found.**

Index to Materials			
Item	**ES Ref**	**CC No**	**GA Drawing**
	400F1	299758 †	**Error! Reference source not found.**
	400F1	299758 †	**Error! Reference source not found.**
	400F1	299758 †	**Error! Reference source not found.**
	400F1	299758 †	**Error! Reference source not found.**
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	400F1	299758 †	**Error! Reference source not found.**
	400F1	299758 †	**Error! Reference source not found.**
Washer, square, curved, 60x60x6mm, 22mm hole, galvanized	400F1	139203	**Error! Reference source not found.**
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	400F1	139203	**Error! Reference source not found.**
	400F1	139203	**Error! Reference source not found.**
	400F1	139203	**Error! Reference source not found.**
Wood block, foundation	400W2	*	**Error! Reference source not found.**

Index to Materials			
Item	**ES Ref**	**CC No**	**GA Drawing**
	400W2	*	Error! Reference source not found.
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Wood pole	400W2	*	Error! Reference source not found.
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Index to Materials			
Item	**ES Ref**	**CC No**	**GA Drawing**
	400W2	*	**Error! Reference source not found.**
	400W2	*	**Error! Reference source not found.**
	-	-	**Error! Reference source not found.**

* Appropriate item (size, type, etc...) to be selected from the specification in the adjacent "ES Ref" column.
† It is not necessary to order these items for every pole: these CC numbers cover multiple items or coiled lengths.

Appendix C

C1 Design Data for Conductor, ABC, 2x35mm^2

Recommended Span 70m

NOTE:

A FoS value of 2.5 is used on Stays, Windspan, Foundation and Single Pole Strut loading Capabilities.

A maximum Span of 70m is allowed.

Table 1: Conductor, ABC, 2x35mm^2 – In Line Structures

DRAWING NUMBER	SUPPORT TYPE	SUPPORT CLASS	SUPPORT SIZE	MAXIMUM SPAN (m)
Refer to Appendix A	Intermediate or Section	Medium Stout	Any Any	70 70

Table 2: Conductor, ABC, 2x35mm^2 – Angle Structures

DRAWING NUMBER	SUPPORT TYPE	SUPPORT CLASS	SUPPORT SIZE	MAXIMUM LINE DEVIATION	MINIMUM STAY ANGLE	MAXIMUM SPAN (m)
Refer to Appendix A	Intermediate Angle	Medium Stout	Any Any	30° 30°	1x20° 1x20°	70 70
	Intermediate Heavy Angle	Medium Stout	Any Any	60° 60°	1x20° 1x20°	70 70
	Section Angle	Medium Stout Medium Stout	Any Any Any Any	60° 60° 90° 90°	1x20° 1x20° 1x20° 1x20°	70 70 70 70

Table 3: Conductor, ABC, 2x35mm^2 – Terminal Structures

DRAWING NUMBER	SUPPORT TYPE	SUPPORT CLASS	SUPPORT SIZE	MINIMUM STAY ANGLE	MAXIMUM SPAN (m)
Refer to Appendix A	Tee-off or Terminal	Medium Stout	Any Any	1x20° 1x20°	70 70

Table 4: Conductor, ABC, 2x35mm^2 – Design Sag/Tension

TEMP (°C)	TENSION (kgf)	DESIGN/ERECTION SAG (m) FOR SPAN LENGTH (m)						
		10	20	30	40	50	60	70
-5.6	55.4	0.06	0.23	0.53	0.94	1.47	2.11	2.88
0	54.6	0.06	0.24	0.54	0.95	1.49	2.14	2.92
5	53.9	0.06	0.24	0.54	0.96	1.51	2.17	2.95
10	53.3	0.06	0.24	0.55	0.98	1.52	2.2	2.99
15	52.7	0.06	0.25	0.56	0.99	1.54	2.22	3.02
20	52.1	0.06	0.25	0.56	1	1.56	2.25	3.06
25	51.5	0.06	0.25	0.57	1.01	1.58	2.27	3.09
30	51	0.06	0.26	0.57	1.02	1.59	2.3	3.12
35	50.4	0.06	0.26	0.58	1.03	1.61	2.32	3.16
40	49.9	0.07	0.26	0.59	1.04	1.63	2.34	3.19
45	49.4	0.07	0.26	0.59	1.05	1.64	2.37	3.22
50	48.9	0.07	0.27	0.6	1.06	1.66	2.39	3.26
55	48.4	0.07	0.27	0.6	1.07	1.68	2.42	3.29
60	48	0.07	0.27	0.61	1.08	1.69	2.44	3.32
65	47.5	0.07	0.27	0.62	1.09	1.71	2.46	3.35
70	47.1	0.07	0.28	0.62	1.1	1.73	2.48	3.38
75	46.7	0.07	0.28	0.63	1.11	1.74	2.51	3.41
80	46.3	0.07	0.28	0.63	1.12	1.76	2.53	3.44

Table 5: Conductor, ABC, 2x35mm^2 – Pole Data (Ground Good/Average)

LENGTH (M)	GRADE	TOP DIA (MM)	DIA 1.5M FROM BUTT (MM)	PLANTING DEPTH (MM)	SINGLE POLE STRUT STRENGTH (KGF)	MAXIMUM WIND SPAN LENGTH FOR SPECIFIED POLE (M)
9	Medium	150	220	1800	7308	224
10	Medium	150	230	1800	6077	202
11	Medium	150	240	1800	5201	183
12	Medium	150	250	1800	4550	167
13	Medium	160	260	2400	5000	271
14	Medium	160	275	2400	4624	258
15	Medium	165	290	2400	4620	244
16	Medium	170	305	2400	4645	344
17	Medium	180	320	2400	4979	366
18	Medium	180	330	2400	4623	346
20	Medium	180	360	3000	4468	409
22	Medium	190	380	3000	4455	429
9	Stout	190	275	1800	18368	280
10	Stout	190	285	1800	15030	250
11	Stout	190	295	1800	12662	225
12	Stout	190	305	1800	10915	203
13	Stout	195	320	2400	11227	334
14	Stout	195	335	2400	10192	314
15	Stout	195	350	2400	9376	296
16	Stout	200	365	2400	9192	458

17	Stout	200	375	2400	8402	431
18	Stout	200	390	2400	7946	412
20	Stout	200	415	3000	7323	626
22	Stout	200	435	3000	6468	616
24	Stout	200	470	3000	6238	650

Table 6: Conductor, ABC, 2x35mm^2 – Single Pole Stay Capability

MAXIMUM ANGLE OF LINE DEVIATION		
ANGLE OF STAY SLOPE	**GRADE 1150 1X7/4.00**	**GRADE 1150 2X7/4.00**
20º	90º	90º
25º	90º	90º
30º	90º	90º
35º	90º	90º
40º	90º	90º
45º	90º	90º

Table 7: Conductor, ABC, 2x35mm^2 – Single Pole Strut Loading (Level Conditions)

STRUT LOAD IN POLE WITH ONE OR TWO STAYS (KGF)						
LINE ANGLE (DEGREES)	STAY ANGLE (DEGREES)					
	20	25	30	35	40	45
LEVEL CONDITIONS						
0	1204	962	797	675	581	504
5	1367	1089	900	760	651	563
10	1528	1216	1002	844	722	622
15	1689	1341	1103	928	791	681
20	1847	1465	1203	1010	860	738
25	2004	1587	1301	1091	928	795
30	2157	1707	1398	1171	994	851
35	2309	1825	1494	1250	1060	906
40	2457	1940	1587	1327	1124	960
45	2601	2053	1678	1402	1187	1013
50	2743	2163	1767	1475	1248	1064
55	2880	2271	1854	1547	1308	1114
60	3013	2375	1938	1616	1366	1163
65	3142	2475	2019	1683	1422	1210
70	3266	2572	2098	1748	1476	1255
75	3386	2666	2173	1810	1527	1298
80	3500	2755	2245	1869	1577	1340
85	3609	2840	2314	1926	1624	1380
90	3713	2921	2379	1980	1669	1417

Table 8: Conductor, ABC, 2x35mm2 – Single Pole Strut Loading (1:10 Downpull Conditions)

STRUT LOAD IN POLE WITH ONE OR TWO STAYS (KGF)						
LINE ANGLE (DEGREES)	STAY ANGLE (DEGREES)					
	20	25	30	35	40	45
DOWNPULL 1:10						
0	1339	1098	933	811	717	640
5	1502	1225	1036	896	787	699
10	1664	1352	1138	980	857	758
15	1825	1477	1239	1063	927	816
20	1983	1600	1339	1146	996	874
25	2139	1722	1437	1227	1064	931
30	2293	1842	1534	1307	1130	987
35	2444	1960	1629	1386	1196	1042
40	2592	2076	1723	1463	1260	1096
45	2737	2189	1814	1538	1323	1149
50	2878	2299	1903	1611	1384	1200
55	3016	2406	1990	1683	1444	1250
60	3149	2510	2074	1752	1502	1298
65	3278	2611	2155	1819	1557	1345
70	3402	2708	2233	1883	1611	1391
75	3522	2801	2309	1946	1663	1434
80	3636	2891	2381	2005	1713	1476
85	3745	2976	2449	2062	1760	1515
90	3849	3057	2515	2116	1805	1553

C2 Design Data for Conductor, ABC, 4x35mm^2

Recommended Span 70m

NOTE:

A FoS value of 2.5 is used on Stays, Windspan, Foundation and Single Pole Strut loading Capabilities.

A maximum Span of 70m is allowed.

Table 1: Conductor, ABC, 4x35mm^2 – In Line Structures

DRAWING NUMBER	SUPPORT TYPE	SUPPORT CLASS	SUPPORT SIZE	MAXIMUM SPAN (m)
Refer to Appendix A	Intermediate or Section	Medium Stout	Any Any	70 70

Table 2: Conductor, ABC, 4x35mm^2 – Angle Structures

DRAWING NUMBER	SUPPORT TYPE	SUPPORT CLASS	SUPPORT SIZE	MAXIMUM LINE DEVIATION	MINIMUM STAY ANGLE	MAXIMUM SPAN (m)
Refer to Appendix A	Intermediate Angle	Medium Stout	Any Any	30° 30°	1x20° 1x20°	70 70
	Intermediate Heavy Angle	Medium Stout	Any Any	60° 60°	1x20° 1x20°	70 70
	Section Angle	Medium Stout Medium Stout	Any Any Any Any	60° 60° 90° 90°	1x20° 1x20° 1x25° 1x20°	70 70 70 70

Table 3: Conductor, ABC, 4x35mm^2 – Terminal Structures

DRAWING NUMBER	SUPPORT TYPE	SUPPORT CLASS	SUPPORT SIZE	MINIMUM STAY ANGLE	MAXIMUM SPAN (m)
Refer to Appendix A	Tee-off or Terminal	Medium Stout	Any Any	1x20° 1x20°	70 70

Table 4: Conductor, ABC, 4x35mm^2 – Design Sag/Tension

TEMP (°C)	TENSION (kgf)	DESIGN/ERECTION SAG (m) FOR SPAN LENGTH (m)						
		10	20	30	40	50	60	70
-5.6	111.0	0.06	0.23	0.53	0.94	1.46	2.11	2.87
0	109.5	0.06	0.24	0.53	0.95	1.48	2.14	2.91
5	108.1	0.06	0.24	0.54	0.96	1.5	2.16	2.95
10	106.9	0.06	0.24	0.55	0.97	1.52	2.19	2.98
15	105.6	0.06	0.25	0.55	0.98	1.54	2.22	3.02
20	104.4	0.06	0.25	0.56	1	1.56	2.24	3.05
25	103.3	0.06	0.25	0.57	1.01	1.57	2.27	3.08
30	102.2	0.06	0.25	0.57	1.02	1.59	2.29	3.12
35	101.1	0.06	0.26	0.58	1.03	1.61	2.31	3.15
40	100.0	0.06	0.26	0.58	1.04	1.62	2.34	3.18
45	99.0	0.07	0.26	0.59	1.05	1.64	2.36	3.22
50	98.0	0.07	0.27	0.6	1.06	1.66	2.39	3.25
55	97.1	0.07	0.27	0.6	1.07	1.67	2.41	3.28
60	96.1	0.07	0.27	0.61	1.08	1.69	2.43	3.31
65	95.2	0.07	0.27	0.61	1.09	1.71	2.46	3.34
70	94.4	0.07	0.28	0.62	1.1	1.72	2.48	3.38
75	93.5	0.07	0.28	0.63	1.11	1.74	2.5	3.41
80	92.7	0.07	0.28	0.63	1.12	1.75	2.52	3.44

Table 5: Conductor, ABC, 4x35mm^2 – Pole Data (Ground Good/Average)

LENGTH (M)	GRADE	TOP DIA (MM)	DIA 1.5M FROM BUTT (MM)	PLANTING DEPTH (MM)	SINGLE POLE STRUT STRENGTH (KGF)	MAXIMUM WIND SPAN LENGTH FOR SPECIFIED POLE (M)
9	Medium	150	220	1800	7308	163
10	Medium	150	230	1800	6077	147
11	Medium	150	240	1800	5201	133
12	Medium	150	250	1800	4550	121
13	Medium	160	260	2400	5000	197
14	Medium	160	275	2400	4624	187
15	Medium	165	290	2400	4620	177
16	Medium	170	305	2400	4645	250
17	Medium	180	320	2400	4979	265
18	Medium	180	330	2400	4623	251
20	Medium	180	360	3000	4468	297
22	Medium	190	380	3000	4455	311
9	Stout	190	275	1800	18368	203
10	Stout	190	285	1800	15030	181
11	Stout	190	295	1800	12662	163
12	Stout	190	305	1800	10915	147
13	Stout	195	320	2400	11227	242
14	Stout	195	335	2400	10192	228
15	Stout	195	350	2400	9376	215
16	Stout	200	365	2400	9192	332

17	Stout	200	375	2400	8402	313
18	Stout	200	390	2400	7946	299
20	Stout	200	415	3000	7323	454
22	Stout	200	435	3000	6468	447
24	Stout	200	470	3000	6238	472

Table 6: Conductor, ABC, 4x35mm^2 – Single Pole Stay Capability

MAXIMUM ANGLE OF LINE DEVIATION		
ANGLE OF STAY SLOPE	**GRADE 1150 1X7/4.00**	**GRADE 1150 2X7/4.00**
20º	90º	90º
25º	90º	90º
30º	90º	90º
35º	90º	90º
40º	90º	90º
45º	90º	90º

Table 7: Conductor, ABC, 4x35mm^2 – Single Pole Strut Loading (Level Conditions)

STRUT LOAD IN POLE WITH ONE OR TWO STAYS (KGF)						
LINE ANGLE (DEGREES)	STAY ANGLE (DEGREES)					
	20	25	30	35	40	45
LEVEL CONDITIONS						
0	1470	1188	996	854	744	654
5	1686	1357	1132	967	838	733
10	1901	1525	1268	1078	931	811
15	2113	1690	1401	1188	1023	888
20	2323	1854	1534	1298	1114	965
25	2530	2016	1664	1405	1204	1040
30	2734	2175	1793	1511	1292	1114
35	2934	2331	1919	1615	1379	1187
40	3130	2484	2043	1717	1464	1259
45	3322	2634	2163	1817	1547	1328
50	3508	2780	2281	1914	1628	1396
55	3690	2921	2396	2008	1707	1463
60	3866	3059	2507	2100	1783	1527
65	4037	3192	2614	2188	1857	1589
70	4201	3320	2718	2274	1928	1648
75	4359	3443	2817	2356	1997	1706
80	4510	3561	2912	2434	2062	1761
85	4654	3673	3003	2509	2125	1813
90	4790	3780	3089	2580	2184	1863

Table 8: Conductor, ABC, 4x35mm^2 – Single Pole Strut Loading (1:10 Downpull Conditions)

STRUT LOAD IN POLE WITH ONE OR TWO STAYS (KGF)						
LINE ANGLE (DEGREES)	STAY ANGLE (DEGREES)					
	20	25	30	35	40	45
DOWNPULL 1:10						
0	1650	1368	1176	1034	924	834
5	1866	1537	1312	1147	1018	913
10	2081	1705	1448	1258	1111	991
15	2293	1871	1581	1369	1203	1069
20	2503	2034	1714	1478	1294	1145
25	2710	2196	1844	1585	1384	1220
30	2914	2355	1973	1691	1472	1294
35	3114	2511	2099	1795	1559	1367
40	3310	2664	2223	1897	1644	1439
45	3502	2814	2343	1997	1727	1508
50	3688	2960	2461	2094	1808	1576
55	3870	3101	2576	2188	1887	1643
60	4046	3239	2687	2280	1963	1707
65	4217	3372	2794	2368	2037	1769
70	4381	3500	2898	2454	2109	1828
75	4539	3623	2997	2536	2177	1886
80	4690	3741	3092	2614	2242	1941
85	4834	3853	3183	2689	2305	1993
90	4970	3960	3269	2760	2364	2043

C3 Design Data for Conductor, ABC, 2x95mm^2

Recommended Span 50m

NOTE:

A FoS value of 2.5 is used on Stays, Windspan, Foundation and Single Pole Strut loading Capabilities.

A maximum Span of 90m is allowed.

Table 1: Conductor, ABC, 2x95mm^2 – In Line Structures

DRAWING NUMBER	SUPPORT TYPE	SUPPORT CLASS	SUPPORT SIZE	MAXIMUM SPAN (m)
Refer to Appendix A	Intermediate or Section	Medium Stout	Any Any	90 90

Table 2: Conductor, ABC, 2x95mm^2 – Angle Structures

DRAWING NUMBER	SUPPORT TYPE	SUPPORT CLASS	SUPPORT SIZE	MAXIMUM LINE DEVIATION	MINIMUM STAY ANGLE	MAXIMUM SPAN (m)
Refer to Appendix A	Intermediate Angle	Medium Stout	Any Any	30° 30°	1x20° 1x20°	90 90
	Intermediate Heavy Angle	Medium Stout	Any Any	60° 60°	1x25° 1x20°	90 90
	Section Angle	Medium Stout Medium Stout	Any Any Any <22m	60° 60° 90° 90°	1x25° 1x20° 1x35° 1x20°	90 90 90 90

Table 3: Conductor, ABC, 2x95mm^2 – Terminal Structures

DRAWING NUMBER	SUPPORT TYPE	SUPPORT CLASS	SUPPORT SIZE	MINIMUM STAY ANGLE	MAXIMUM SPAN (m)
Refer to Appendix A	Tee-off or Terminal	Medium Stout	Any Any	1x25° 1x20°	90 90

Table 4: Conductor, ABC, 2x95mm^2 – Design Sag/Tension

TEMP (^{O}C)	TENSION (KGF)	DESIGN/ERECTION SAG (M) FOR SPAN LENGTH (M)								
		10	20	30	40	50	60	70	80	90
-5.6	315.2	0.03	0.10	0.23	0.41	0.64	0.93	1.26	1.65	2.09
0	284.6	0.03	0.11	0.26	0.46	0.71	1.03	1.40	1.83	2.31
5	262.6	0.03	0.12	0.28	0.50	0.77	1.11	1.52	1.98	2.51
10	244.5	0.03	0.13	0.30	0.53	0.83	1.20	1.63	2.13	2.69
15	229.2	0.04	0.14	0.32	0.57	0.89	1.28	1.74	2.27	2.87
20	216.3	0.04	0.15	0.34	0.60	0.94	1.35	1.84	2.40	3.04
25	205.2	0.04	0.16	0.36	0.63	0.99	1.43	1.94	2.53	3.21
30	195.5	0.04	0.17	0.37	0.66	1.04	1.50	2.04	2.66	3.37
35	187.0	0.04	0.17	0.39	0.70	1.09	1.56	2.13	2.78	3.52
40	179.5	0.05	0.18	0.41	0.72	1.13	1.63	2.22	2.90	3.67
45	172.7	0.05	0.19	0.42	0.75	1.18	1.69	2.31	3.01	3.81
50	166.6	0.05	0.20	0.44	0.78	1.22	1.76	2.39	3.12	3.95
55	161.1	0.05	0.20	0.45	0.81	1.26	1.82	2.47	3.23	4.08
60	156.1	0.05	0.21	0.47	0.83	1.30	1.87	2.55	3.33	4.21
65	151.6	0.05	0.21	0.48	0.86	1.34	1.93	2.63	3.43	4.34
70	147.4	0.06	0.22	0.50	0.88	1.38	1.99	2.70	3.53	4.47
75	143.5	0.06	0.23	0.51	0.91	1.42	2.04	2.78	3.62	4.59
80	139.9	0.06	0.23	0.52	0.93	1.45	2.09	2.85	3.72	4.71

Table 5: Conductor, ABC, 2x95mm^2 – Pole Data (Ground Good/Average)

LENGTH (M)	GRADE	TOP DIA (MM)	DIA 1.5M FROM BUTT (MM)	PLANTING DEPTH (MM)	SINGLE POLE STRUT STRENGTH (KGF)	MAXIMUM WIND SPAN LENGTH FOR SPECIFIED POLE (M)
9	Medium	150	220	1800	7308	171
10	Medium	150	230	1800	6077	154
11	Medium	150	240	1800	5201	140
12	Medium	150	250	1800	4550	127
13	Medium	160	260	2400	5000	206
14	Medium	160	275	2400	4624	196
15	Medium	165	290	2400	4620	186
16	Medium	170	305	2400	4645	262
17	Medium	180	320	2400	4979	278
18	Medium	180	330	2400	4623	264
20	Medium	180	360	3000	4468	311
22	Medium	190	380	3000	4455	327
9	Stout	190	275	1800	18368	213
10	Stout	190	285	1800	15030	190
11	Stout	190	295	1800	12662	171
12	Stout	190	305	1800	10915	154
13	Stout	195	320	2400	11227	254
14	Stout	195	335	2400	10192	239
15	Stout	195	350	2400	9376	225
16	Stout	200	365	2400	9192	349

17	Stout	200	375	2400	8402	328
18	Stout	200	390	2400	7946	314
20	Stout	200	415	3000	7323	477
22	Stout	200	435	3000	6468	469
24	Stout	200	470	3000	6238	495

Table 6: Conductor, ABC, 2x95mm^2 – Single Pole Stay Capability

MAXIMUM ANGLE OF LINE DEVIATION		
ANGLE OF STAY SLOPE	**GRADE 1150 1X7/4.00**	**GRADE 1150 2X7/4.00**
20º	90º	90º
25º	90º	90º
30º	90º	90º
35º	90º	90º
40º	90º	90º
45º	90º	90º

Table 7: Conductor, ABC, 2x95mm^2 – Single Pole Strut Loading (Level Conditions)

STRUT LOAD IN POLE WITH ONE OR TWO STAYS (KGF)						
LINE ANGLE (DEGREES)	STAY ANGLE (DEGREES)					
	20	25	30	35	40	45
LEVELCONDITIONS						
0	1687	1372	1157	999	876	776
5	1998	1615	1354	1161	1011	889
10	2307	1857	1549	1322	1145	1002
15	2614	2096	1742	1481	1278	1113
20	2917	2333	1933	1639	1410	1224
25	3216	2566	2122	1794	1539	1333
30	3511	2797	2308	1947	1667	1440
35	3801	3023	2490	2098	1793	1545
40	4086	3245	2670	2246	1916	1649
45	4364	3462	2845	2391	2037	1750
50	4635	3674	3016	2532	2155	1849
55	4900	3880	3183	2669	2269	1945
60	5156	4081	3345	2803	2381	2039
65	5405	4275	3501	2932	2489	2129
70	5645	4462	3653	3056	2593	2216
75	5876	4642	3798	3176	2693	2300
80	6097	4815	3938	3291	2789	2381
85	6308	4980	4071	3401	2880	2458
90	6509	5137	4198	3506	2968	2531

Table 8: Conductor, ABC, 2x95mm^2 – Single Pole Strut Loading (1:10 Downpull Conditions)

STRUT LOAD IN POLE WITH ONE OR TWO STAYS (KGF)						
LINE ANGLE (DEGREES)	STAY ANGLE (DEGREES)					
	20	25	30	35	40	45
DOWNPULL 1:10						
0	1946	1632	1417	1258	1135	1035
5	2257	1875	1613	1420	1270	1148
10	2567	2116	1808	1581	1404	1261
15	2873	2355	2001	1740	1537	1373
20	**3176**	**2592**	**2192**	**1898**	**1669**	**1483**
25	**3476**	**2826**	**2381**	**2053**	**1799**	**1592**
30	**3771**	**3056**	**2567**	**2207**	**1927**	**1699**
35	**4060**	**3282**	**2750**	**2357**	**2052**	**1805**
40	**4345**	**3504**	**2929**	**2505**	**2176**	**1908**
45	**4623**	**3721**	**3104**	**2650**	**2296**	**2009**
50	**4894**	**3933**	**3275**	**2791**	**2414**	**2108**
55	**5159**	**4139**	**3442**	**2928**	**2529**	**2204**
60	**5416**	**4340**	**3604**	**3062**	**2640**	**2298**
65	**5664**	**4534**	**3761**	**3191**	**2748**	**2388**
70	**5904**	**4721**	**3912**	**3316**	**2852**	**2476**
75	**6135**	**4901**	**4057**	**3436**	**2952**	**2560**
80	**6356**	**5074**	**4197**	**3551**	**3048**	**2640**
85	**6567**	**5239**	**4330**	**3661**	**3140**	**2717**
90	6768	5396	4457	3765	3227	2790

C4 Design Data for Conductor, ABC, 4x95mm^2

Recommended Span 50m

NOTE:

A FoS value of 2.5 is used on Stays, Windspan, Foundation and Single Pole Strut loading Capabilities.

A maximum Span of 90m is allowed.

Table 1: Conductor, ABC, 4x95mm^2 – In Line Structures

DRAWING NUMBER	SUPPORT TYPE	SUPPORT CLASS	SUPPORT SIZE	MAXIMUM SPAN (M)
Refer to Appendix A	Intermediate or Section	Medium Medium Medium Stout	<12m 12m only >12m Any	90 88 90 90

Table 2: Conductor, ABC, 4x95mm^2 – Angle Structures

DRAWING NUMBER	SUPPORT TYPE	SUPPORT CLASS	SUPPORT SIZE	MAXIMUM LINE DEVIATION	MINIMUM STAY ANGLE	MAXIMUM SPAN (M)
Refer to Appendix A	Intermediate Angle	Medium Stout	Any <22m	30° 30°	1x35° 1x20°	90 90
	Intermediate Heavy Angle	Medium Medium Stout Stout	Any <20m Any <14m	55° 60° 60° 60°	1x45° 1x45° 1x35° 1x20°	90 90 90 90
	Section Angle	Medium Stout Stout Medium Stout Stout	<20m Any <14m <11m Any <11m	60° 60° 60° 90° 90° 90°	1x45° 1x35° 1x20° 1x45° 1x45° 2x20°	90 90 90 90 90 90

Table 3: Conductor, ABC, 4x95mm^2 – Terminal Structures

DRAWING NUMBER	SUPPORT TYPE	SUPPORT CLASS	SUPPORT SIZE	MINIMUM STAY ANGLE	MAXIMUM SPAN (m)
Refer to Appendix A	Tee-off or Terminal	Medium Stout Stout	<20m Any <14m	1x45° 1x35° 1x20°	90 90 90

Table 4: Conductor, ABC, 4x95mm^2 – Design Sag/Tension

TEMP (^{O}C)	TENSION (KGF)	DESIGN/ERECTION SAG (M) FOR SPAN LENGTH (M)								
		10	20	30	40	50	60	70	80	90
-5.6	644.1	0.03	0.10	0.23	0.40	0.63	0.91	1.24	1.61	2.04
0	579.8	0.03	0.11	0.25	0.45	0.70	1.01	1.37	1.79	2.27
5	534.0	0.03	0.12	0.27	0.49	0.76	1.10	1.49	1.95	2.47
10	496.2	0.03	0.13	0.29	0.52	0.82	1.18	1.60	2.10	2.65
15	464.6	0.03	0.14	0.31	0.56	0.87	1.26	1.71	2.24	2.83
20	437.9	0.04	0.15	0.33	0.59	0.93	1.34	1.82	2.38	3.01
25	414.9	0.04	0.16	0.35	0.63	0.98	1.41	1.92	2.51	3.17
30	395.0	0.04	0.16	0.37	0.66	1.03	1.48	2.02	2.63	3.33
35	377.5	0.04	0.17	0.39	0.69	1.08	1.55	2.11	2.75	3.49
40	362.0	0.04	0.18	0.40	0.72	1.12	1.62	2.20	2.87	3.64
45	348.2	0.05	0.19	0.42	0.75	1.17	1.68	2.29	2.99	3.78
50	335.8	0.05	0.19	0.44	0.77	1.21	1.74	2.37	3.10	3.92
55	324.6	0.05	0.20	0.45	0.80	1.25	1.80	2.45	3.20	4.06
60	314.4	0.05	0.21	0.47	0.83	1.29	1.86	2.53	3.31	4.19
65	305.0	0.05	0.21	0.48	0.85	1.33	1.92	2.61	3.41	4.32
70	296.5	0.05	0.22	0.49	0.88	1.37	1.97	2.69	3.51	4.44
75	288.5	0.06	0.23	0.51	0.90	1.41	2.03	2.76	3.60	4.56
80	281.2	0.06	0.23	0.52	0.92	1.44	2.08	2.83	3.7	4.68

Table 5: Conductor, ABC, 4x95mm^2 – Pole Data (Ground Good/Average)

LENGTH (M)	GRADE	TOP DIA (MM)	DIA 1.5M FROM BUTT (MM)	PLANTING DEPTH (MM)	SINGLE POLE STRUT STRENGTH (KGF)	MAXIMUM WIND SPAN LENGTH FOR SPECIFIED POLE (M)
9	Medium	150	220	1800	7308	119
10	Medium	150	230	1800	6077	107
11	Medium	150	240	1800	5201	97
12	Medium	150	250	1800	4550	88
13	Medium	160	260	2400	5000	148
14	Medium	160	275	2400	4624	159
15	Medium	165	290	2400	4620	171
16	Medium	170	305	2400	4645	183
17	Medium	180	320	2400	4979	194
18	Medium	180	330	2400	4623	184
20	Medium	180	360	3000	4468	217
22	Medium	190	380	3000	4455	228
9	Stout	190	275	1800	18368	148
10	Stout	190	285	1800	15030	133
11	Stout	190	295	1800	12662	119
12	Stout	190	305	1800	10915	107
13	Stout	195	320	2400	11227	282
14	Stout	195	335	2400	10192	268
15	Stout	195	350	2400	9376	255
16	Stout	200	365	2400	9192	243

17	Stout	200	375	2400	8402	229
18	Stout	200	390	2400	7946	219
20	Stout	200	415	3000	7323	332
22	Stout	200	435	3000	6468	327
24	Stout	200	470	3000	6238	345

Table 6: Conductor, ABC, 4x95mm^2 – Single Pole Stay Capability

MAXIMUM ANGLE OF LINE DEVIATION		
ANGLE OF STAY SLOPE	GRADE 1150 1X7/4.00	GRADE 1150 2X7/4.00
20º	61º	90º
25º	82º	90º
30º	90º	90º
35º	90º	90º
40º	90º	90º
45º	90º	90º

Table 7: Conductor, ABC, 4x95mm^2 – Single Pole Strut Loading (Level Conditions)

STRUT LOAD IN POLE WITH ONE OR TWO STAYS (KGF)						
LINE ANGLE (DEGREES)	STAY ANGLE (DEGREES)					
	20	25	30	35	40	45
LEVEL CONDITIONS						
0	2280	1888	1620	1422	1269	1144
5	2969	2426	2054	1781	1568	1395
10	3655	2961	2487	2137	1865	1645
15	4336	3493	2916	2491	2161	1892
20	5011	4020	3342	2842	2453	2138
25	5678	4541	3762	3189	2743	2381
30	6337	5055	4178	3531	3029	2621
35	6986	5561	4587	3869	3310	2857
40	7624	6059	4989	4200	3587	3089
45	8249	6547	5383	4525	3858	3317
50	8861	7024	5768	4843	4123	3539
55	9457	7490	6145	5153	4382	3756
60	10038	7944	6511	5455	4634	3968
65	10602	8384	6867	5748	4879	4173
70	11148	8810	7211	6032	5115	4372
75	11675	9221	7543	6306	5344	4564
80	12182	9617	7862	6569	5564	4748
85	12668	9996	8168	6822	5774	4925
90	**13131**	**10358**	**8461**	**7063**	**5976**	**5094**

Table 8: Conductor, ABC, 4x95mm^2 – Single Pole Strut Loading (1:10 Downpull Conditions)

STRUT LOAD IN POLE WITH ONE OR TWO STAYS (KGF)						
LINE ANGLE (DEGREES)	STAY ANGLE (DEGREES)					
	20	25	30	35	40	45
DOWNPULL 1:10						
0	2853	2461	2193	1996	1842	1717
5	3543	2999	2628	2354	2141	1968
10	4228	3535	3060	2710	2439	2218
15	4909	4066	3489	3064	2734	2466
20	5584	4593	3915	3415	3027	2711
25	6252	5114	4336	3762	3316	2954
30	6911	5628	4751	4105	3602	3194
35	7559	6135	5160	4442	3883	3430
40	8197	6632	5562	4773	4160	3662
45	8822	7120	5956	5098	4431	3890
50	9434	7598	6342	5416	4696	4112
55	10031	8064	6718	5727	4955	4330
60	10612	8517	7084	6029	5207	4541
65	11176	8957	7440	6322	5452	4746
70	11722	9383	7784	6606	5689	4945
75	12249	9795	8116	6879	5917	5137
80	12755	10190	8436	7143	6137	5321
85	13241	10569	8742	7395	6348	5498
90	13705	10931	9034	7636	6549	5667

C5 Design Data for Service Spans (ABC and Concentric Cables)

C5.1 ABC Conductors: 2x35mm^2; 4x35mm^2

Table 1: Design Sag/Tension for ABC Conductors: 2x35mm^2; 4x35mm^2

TEMP (^{o}C)	TENSION (KGF)	DESIGN/ERECTION SAG (M) FOR SPAN LENGTH (M)**								
		10	12.5	15	17.5	20	22.5	25	27.5	30
-5.6	*	0.16	0.26	0.37	0.5	0.65	0.83	1.02	1.24	1.47
0	*	0.17	0.26	0.37	0.51	0.66	0.84	1.03	1.25	1.49
5	*	0.17	0.26	0.38	0.51	0.67	0.84	1.04	1.26	1.5
10	*	0.17	0.26	0.38	0.51	0.67	0.85	1.05	1.27	1.51
15	*	0.17	0.26	0.38	0.52	0.68	0.86	1.06	1.28	1.53
20	*	0.17	0.27	0.38	0.52	0.68	0.87	1.07	1.29	1.54
25	*	0.17	0.27	0.39	0.53	0.69	0.87	1.08	1.3	1.55
30	*	0.17	0.27	0.39	0.53	0.69	0.88	1.09	1.31	1.56
35	*	0.18	0.27	0.39	0.54	0.7	0.89	1.09	1.32	1.58
40	*	0.18	0.28	0.4	0.54	0.71	0.89	1.1	1.33	1.59
45	*	0.18	0.28	0.4	0.54	0.71	0.9	1.11	1.34	1.6
50	*	0.18	0.28	0.4	0.55	0.72	0.91	1.12	1.35	1.61
55	*	0.18	0.28	0.41	0.55	0.72	0.91	1.13	1.36	1.62
60	*	0.18	0.28	0.41	0.56	0.73	0.92	1.14	1.37	1.64
65	*	0.18	0.29	0.41	0.56	0.73	0.93	1.14	1.38	1.65
70	*	0.18	0.29	0.41	0.56	0.74	0.93	1.15	1.39	1.66
75	*	0.19	0.29	0.42	0.57	0.74	0.94	1.16	1.4	1.67
80	*	0.19	0.29	0.42	0.57	0.75	0.95	1.17	1.41	1.68

* Tensions are not given in the above table due to the fact that sags are given for both 2 core ABC and 4 core ABC of the same conductor size. It is extremely unlikely that a service span would be sagged by using a dynamometer.

These figures are based on the maximum loading on a building not exceeding 1.3kN per fixing as stated in Section **Error! Reference source not found.**.

** Max span length for single phase = 30m.
Max span length for three phase = 20m.

Table 2: Design Sag/Tension for ABC Conductors: 2x95mm^2; 4x95mm^2

TEMP (^{o}C)	TENSION (KGF)	DESIGN/ERECTION SAG (M) FOR SPAN LENGTH (M) **								
		10	12.5	15	17.5	20	22.5	25	27.5	30
-5.6	*	0.27	0.43	0.61	0.84	1.09	1.38	1.71	2.06	2.46
0	*	0.27	0.43	0.62	0.84	1.1	1.39	1.71	2.07	2.46
5	*	0.27	0.43	0.62	0.84	1.1	1.39	1.72	2.08	2.47
10	*	0.28	0.43	0.62	0.84	1.1	1.4	1.72	2.08	2.48
15	*	0.28	0.43	0.62	0.85	1.11	1.4	1.73	2.09	2.49
20	*	0.28	0.43	0.62	0.85	1.11	1.4	1.73	2.1	2.5
25	*	0.28	0.43	0.63	0.85	1.11	1.41	1.74	2.1	2.5
30	*	0.28	0.44	0.63	0.85	1.12	1.41	1.74	2.11	2.51
35	*	0.28	0.44	0.63	0.86	1.12	1.42	1.75	2.12	2.52
40	*	0.28	0.44	0.63	0.86	1.12	1.42	1.75	2.12	2.53
45	*	0.28	0.44	0.63	0.86	1.13	1.43	1.76	2.13	2.53
50	*	0.28	0.44	0.64	0.87	1.13	1.43	1.77	2.14	2.54
55	*	0.28	0.44	0.64	0.87	1.13	1.43	1.77	2.14	2.55
60	*	0.28	0.44	0.64	0.87	1.14	1.44	1.78	2.15	2.56
65	*	0.29	0.45	0.64	0.87	1.14	1.44	1.78	2.16	2.57
70	*	0.29	0.45	0.64	0.88	1.14	1.45	1.79	2.16	2.57
75	*	0.29	0.45	0.65	0.88	1.15	1.45	1.79	2.17	2.58
80	*	0.29	0.45	0.65	0.88	1.15	1.46	1.8	2.17	2.59

* Tensions are not given in the above table due to the fact that sags are given for both 2 core ABC and 4 core ABC of the same conductor size. It is extremely unlikely that a service span would be sagged by using a dynamometer.

These figures are based on the maximum loading on a building not exceeding 1.3kN per fixing as stated in Section **Error! Reference source not found.**.

** Max span length for single phase = 30m.
Max span length for three phase = 20m.

C5.2 Service, Pole-To-House, Concentric, Cu, Single Phase, 25mm²

C5.2.1 Summary Data

Recommended Span 20m.

A FoS value of 2.5 is used on Stays, Windspan, Foundation and Single Pole Strut Loading Capabilities. A maximum Span of 30m is allowed. Maximum Working Tension (MWT) = 1.3kN (132.5kgf).

C5.2.2 Data Tables

Table 3: Service, Pole-To-House, Concentric, Cu, Single Phase, 25mm² – Design Sag/Tension

TEMP (°C)	TENSION (KGF)	DESIGN TABLE								
		SAG (M) FOR SPAN LENGTH (M)								
		2.5	5	7.5	10	12.5	15	20	25	30
-5.6	60.8	0.01	0.02	0.05	0.08	0.13	0.18	0.32	0.50	0.72
0	55.8	0.01	0.02	0.05	0.09	0.14	0.20	0.35	0.55	0.79
5	52.2	0.01	0.02	0.05	0.09	0.15	0.21	0.37	0.58	0.84
10	49.0	0.01	0.02	0.06	0.10	0.16	0.22	0.40	0.62	0.89
15	46.4	0.01	0.03	0.06	0.11	0.16	0.24	0.42	0.66	0.95
20	44.1	0.01	0.03	0.06	0.11	0.17	0.25	0.44	0.69	1.00
25	42.0	0.01	0.03	0.07	0.12	0.18	0.26	0.46	0.72	1.04
30	40.3	0.01	0.03	0.07	0.12	0.19	0.27	0.48	0.76	1.09
35	38.7	0.01	0.03	0.07	0.13	0.20	0.28	0.50	0.79	1.13
40	37.2	0.01	0.03	0.07	0.13	0.20	0.29	0.52	0.82	1.18
45	36.0	0.01	0.03	0.08	0.14	0.21	0.31	0.54	0.85	1.22
50	34.8	0.01	0.04	0.08	0.14	0.22	0.32	0.56	0.88	1.26
55	33.7	0.01	0.04	0.08	0.14	0.23	0.33	0.58	0.90	1.30
60	32.7	0.01	0.04	0.08	0.15	0.23	0.34	0.60	0.93	1.34
65	31.8	0.01	0.04	0.09	0.15	0.24	0.34	0.61	0.96	1.38

70	31.0	0.01	0.04	0.09	0.16	0.25	0.35	0.63	0.98	1.42
75	30.2	0.01	0.04	0.09	0.16	0.25	0.36	0.65	1.01	1.45
80	29.5	0.01	0.04	0.09	0.17	0.26	0.37	0.66	1.03	1.49

Table 4: Service, Pole-To-House, Concentric, Cu, Single Phase, 25mm^2 – Erection Sag/Tension

TEMP (°C)	TENSION (KGF)	ERECTION TABLE								
		SAG (M) FOR SPAN LENGTH (M)								
		2.5	5	7.5	10	12.5	15	20	25	30
-5.6	72.7	0.00	0.02	0.04	0.07	0.10	0.15	0.27	0.42	0.60
0	65.5	0.00	0.02	0.04	0.07	0.12	0.17	0.30	0.47	0.67
5	60.2	0.01	0.02	0.05	0.08	0.13	0.18	0.32	0.51	0.73
10	55.8	0.01	0.02	0.05	0.09	0.14	0.20	0.35	0.55	0.79
15	52.2	0.01	0.02	0.05	0.09	0.15	0.21	0.37	0.58	0.84
20	49.0	0.01	0.02	0.06	0.10	0.16	0.22	0.40	0.62	0.89
25	46.4	0.01	0.03	0.06	0.11	0.16	0.24	0.42	0.66	0.95
30	44.1	0.01	0.03	0.06	0.11	0.17	0.25	0.44	0.69	1.00
35	42.0	0.01	0.03	0.07	0.12	0.18	0.26	0.46	0.72	1.04
40	40.3	0.01	0.03	0.07	0.12	0.19	0.27	0.48	0.76	1.09
45	38.7	0.01	0.03	0.07	0.13	0.20	0.28	0.50	0.79	1.13
50	37.2	0.01	0.03	0.07	0.13	0.20	0.29	0.52	0.82	1.18
55	36.0	0.01	0.03	0.08	0.14	0.21	0.31	0.54	0.85	1.22
60	34.8	0.01	0.04	0.08	0.14	0.22	0.32	0.56	0.88	1.26
65	33.7	0.01	0.04	0.08	0.14	0.23	0.33	0.58	0.90	1.30
70	32.7	0.01	0.04	0.08	0.15	0.23	0.34	0.60	0.93	1.34
75	31.8	0.01	0.04	0.09	0.15	0.24	0.34	0.61	0.96	1.38
80	31.0	0.01	0.04	0.09	0.16	0.25	0.35	0.63	0.98	1.42

C5.3 Concentric, Cu, Three Phase, 25mm²

C5.3.1 Summary Data

Maximum Span 20m.

A FoS value of 2.5 is used on Stays, Windspan, Foundation and Single Pole Strut Loading Capabilities. MWT = 1.3kN (132.5kgf).

C5.3.2 Data Tables

Table 5: Concentric, Cu, Three Phase, 25mm² – Design Sag/Tension

TEMP (°C)	TENSION (KGF)	DESIGN TABLE								
		SAG (M) FOR SPAN LENGTH (M)								
		2.5	5	7.5	10	12.5	15	20	25	30
-5.6	62.5	0.01	0.04	0.10	0.17	0.27	0.39	0.69	1.07	1.55
0	61.0	0.01	0.04	0.10	0.18	0.28	0.40	0.70	1.10	1.58
5	59.8	0.01	0.04	0.10	0.18	0.28	0.40	0.72	1.12	1.62
10	58.6	0.01	0.05	0.10	0.18	0.29	0.41	0.73	1.15	1.65
15	57.6	0.01	0.05	0.11	0.19	0.29	0.42	0.75	1.17	1.68
20	56.5	0.01	0.05	0.11	0.19	0.30	0.43	0.76	1.19	1.71
25	55.5	0.01	0.05	0.11	0.19	0.30	0.44	0.77	1.21	1.74
30	54.6	0.01	0.05	0.11	0.20	0.31	0.44	0.79	1.23	1.77
35	53.7	0.01	0.05	0.11	0.20	0.31	0.45	0.80	1.25	1.80
40	52.8	0.01	0.05	0.11	0.20	0.32	0.46	0.81	1.27	1.83
45	52.0	0.01	0.05	0.12	0.21	0.32	0.46	0.83	1.29	1.86
50	51.3	0.01	0.05	0.12	0.21	0.33	0.47	0.84	1.31	1.89
55	50.5	0.01	0.05	0.12	0.21	0.33	0.48	0.85	1.33	1.92
60	49.8	0.01	0.05	0.12	0.22	0.34	0.49	0.86	1.35	1.94
65	49.1	0.01	0.05	0.12	0.22	0.34	0.49	0.88	1.37	1.97

70	48.5	0.01	0.06	0.12	0.22	0.35	0.50	0.89	1.39	2.00
75	47.8	0.01	0.06	0.13	0.22	0.35	0.51	0.90	1.40	2.02
80	47.2	0.01	0.06	0.13	0.23	0.36	0.51	0.91	1.42	2.05

Table 6: Concentric, Cu, Three Phase, 25mm^2 – Erection Sag/Tension

TEMP (°C)	TENSION (KGF)	ERECTION TABLE								
		SAG (M) FOR SPAN LENGTH (M)								
		2.5	5	7.5	10	12.5	15	20	25	30
-5.6	65.4	0.01	0.04	0.09	0.16	0.26	0.37	0.66	1.03	1.48
0	63.7	0.01	0.04	0.09	0.17	0.26	0.38	0.67	1.05	1.52
5	62.3	0.01	0.04	0.10	0.17	0.27	0.39	0.69	1.08	1.55
10	61.0	0.01	0.04	0.10	0.18	0.28	0.40	0.70	1.10	1.58
15	59.8	0.01	0.04	0.10	0.18	0.28	0.40	0.72	1.12	1.62
20	58.6	0.01	0.05	0.10	0.18	0.29	0.41	0.73	1.15	1.65
25	57.6	0.01	0.05	0.11	0.19	0.29	0.42	0.75	1.17	1.68
30	56.5	0.01	0.05	0.11	0.19	0.30	0.43	0.76	1.19	1.71
35	55.5	0.01	0.05	0.11	0.19	0.30	0.44	0.77	1.21	1.74
40	54.6	0.01	0.05	0.11	0.20	0.31	0.44	0.79	1.23	1.77
45	53.7	0.01	0.05	0.11	0.20	0.31	0.45	0.80	1.25	1.80
50	52.8	0.01	0.05	0.11	0.20	0.32	0.46	0.81	1.27	1.83
55	52.0	0.01	0.05	0.12	0.21	0.32	0.46	0.83	1.29	1.86
60	51.3	0.01	0.05	0.12	0.21	0.33	0.47	0.84	1.31	1.89
65	50.5	0.01	0.05	0.12	0.21	0.33	0.48	0.85	1.33	1.92
70	49.8	0.01	0.05	0.12	0.22	0.34	0.49	0.86	1.35	1.94
75	49.1	0.01	0.05	0.12	0.22	0.34	0.49	0.88	1.37	1.97
80	48.5	0.01	0.06	0.12	0.22	0.35	0.50	0.89	1.39	2.00

C5.4 Concentric, Cu, Single Phase, 35mm^2

C5.4.1 Summary Data

Recommended Span 20m.

A FoS value of 2.5 is used on Stays, Windspan, Foundation and Single Pole Strut Loading Capabilities. A maximum Span of 20m is allowed. MWT = 1.3kN (132.5kgf).

C5.4.2 Data Tables

Table 7: Concentric, Cu, Single Phase, 35mm^2 – Design Sag/Tension

TEMP (°C)	TENSION (KGF)	DESIGN TABLE								
		SAG (M) FOR SPAN LENGTH (M)								
		2.5	5	7.5	10	12.5	15	18	20	22.5
-5.6	62.2	0.01	0.03	0.06	0.10	0.16	0.23	0.31	0.41	0.52
0	58.6	0.01	0.03	0.06	0.11	0.17	0.24	0.33	0.44	0.55
5	55.8	0.01	0.03	0.06	0.11	0.18	0.26	0.35	0.46	0.58
10	53.4	0.01	0.03	0.07	0.12	0.19	0.27	0.37	0.48	0.60
15	51.2	0.01	0.03	0.07	0.12	0.19	0.28	0.38	0.50	0.63
20	49.3	0.01	0.03	0.07	0.13	0.20	0.29	0.40	0.52	0.66
25	47.5	0.01	0.03	0.08	0.13	0.21	0.30	0.41	0.54	0.68
30	45.9	0.01	0.03	0.08	0.14	0.22	0.31	0.42	0.56	0.70
35	44.5	0.01	0.04	0.08	0.14	0.22	0.32	0.44	0.57	0.73
40	43.2	0.01	0.04	0.08	0.15	0.23	0.33	0.45	0.59	0.75
45	42.0	0.01	0.04	0.09	0.15	0.24	0.34	0.47	0.61	0.77
50	40.9	0.01	0.04	0.09	0.16	0.24	0.35	0.48	0.62	0.79
55	39.8	0.01	0.04	0.09	0.16	0.25	0.36	0.49	0.64	0.81
60	38.9	0.01	0.04	0.09	0.16	0.26	0.37	0.50	0.66	0.83
65	38.0	0.01	0.04	0.09	0.17	0.26	0.38	0.51	0.67	0.85
70	37.1	0.01	0.04	0.10	0.17	0.27	0.39	0.53	0.69	0.87

75	36.3	0.01	0.04	0.10	0.18	0.27	0.39	0.54	0.70	0.89
80	35.6	0.01	0.04	0.10	0.18	0.28	0.40	0.55	0.72	0.91

Table 8: Concentric, Cu, Single Phase, 35mm^2 – Erection Sag/Tension

TEMP (°C)	TENSION (KGF)	DESIGN TABLE								
		SAG (M) FOR SPAN LENGTH (M)								
		2.5	5	7.5	10	12.5	15	18	20	22.5
-5.6	70.4	0.01	0.02	0.05	0.09	0.14	0.20	0.28	0.36	0.46
0	65.5	0.01	0.02	0.05	0.10	0.15	0.22	0.30	0.39	0.49
5	61.8	0.01	0.03	0.06	0.10	0.16	0.23	0.32	0.41	0.52
10	58.6	0.01	0.03	0.06	0.11	0.17	0.24	0.33	0.44	0.55
15	55.8	0.01	0.03	0.06	0.11	0.18	0.26	0.35	0.46	0.58
20	53.4	0.01	0.03	0.07	0.12	0.19	0.27	0.37	0.48	0.60
25	51.2	0.01	0.03	0.07	0.12	0.19	0.28	0.38	0.50	0.63
30	49.3	0.01	0.03	0.07	0.13	0.20	0.29	0.40	0.52	0.66
35	47.5	0.01	0.03	0.08	0.13	0.21	0.30	0.41	0.54	0.68
40	45.9	0.01	0.03	0.08	0.14	0.22	0.31	0.42	0.56	0.70
45	44.5	0.01	0.04	0.08	0.14	0.22	0.32	0.44	0.57	0.73
50	43.2	0.01	0.04	0.08	0.15	0.23	0.33	0.45	0.59	0.75
55	42.0	0.01	0.04	0.09	0.15	0.24	0.34	0.47	0.61	0.77
60	40.9	0.01	0.04	0.09	0.16	0.24	0.35	0.48	0.62	0.79
65	39.8	0.01	0.04	0.09	0.16	0.25	0.36	0.49	0.64	0.81
70	38.9	0.01	0.04	0.09	0.16	0.26	0.37	0.50	0.66	0.83
75	38.0	0.01	0.04	0.09	0.17	0.26	0.38	0.51	0.67	0.85
80	37.1	0.01	0.04	0.10	0.17	0.27	0.39	0.53	0.69	0.87

C5.5 Concentric, Cu, Three Phase, 35mm^2

C5.5.1 Summary Data

Maximum Span 20m.

A FoS value of 2.5 is used on Stays, Windspan, Foundation and Single Pole Strut Loading Capabilities. MWT = 1.3kN (132.5kgf).

C5.5.2 Data Tables

Table 9: Concentric, Cu, Three Phase, 35mm^2 – Design Sag/Tension

TEMP (°C)	TENSION (KGF)	DESIGN TABLE								
		SAG (M) FOR SPAN LENGTH (M)								
		2.5	5	7.5	10	12.5	15	18	20	22.5
-5.6	61.2	0.01	0.05	0.10	0.19	0.29	0.42	0.57	0.74	0.94
0	59.9	0.01	0.05	0.11	0.19	0.30	0.43	0.58	0.76	0.96
5	58.9	0.01	0.05	0.11	0.19	0.30	0.43	0.59	0.77	0.98
10	57.9	0.01	0.05	0.11	0.20	0.31	0.44	0.60	0.79	1.00
15	56.9	0.01	0.05	0.11	0.20	0.31	0.45	0.61	0.80	1.01
20	56.0	0.01	0.05	0.11	0.20	0.32	0.46	0.62	0.81	1.03
25	55.1	0.01	0.05	0.12	0.21	0.32	0.46	0.63	0.83	1.04
30	54.3	0.01	0.05	0.12	0.21	0.33	0.47	0.64	0.84	1.06
35	53.5	0.01	0.05	0.12	0.21	0.33	0.48	0.65	0.85	1.08
40	52.8	0.01	0.05	0.12	0.22	0.34	0.49	0.66	0.86	1.09
45	52.0	0.01	0.05	0.12	0.22	0.34	0.49	0.67	0.87	1.11
50	51.3	0.01	0.06	0.12	0.22	0.35	0.50	0.68	0.89	1.12
55	50.7	0.01	0.06	0.13	0.22	0.35	0.51	0.69	0.90	1.14
60	50.0	0.01	0.06	0.13	0.23	0.36	0.51	0.70	0.91	1.15
65	49.4	0.01	0.06	0.13	0.23	0.36	0.52	0.71	0.92	1.17
70	48.8	0.01	0.06	0.13	0.23	0.36	0.52	0.71	0.93	1.18
75	48.2	0.01	0.06	0.13	0.24	0.37	0.53	0.72	0.94	1.19
80	47.6	0.01	0.06	0.13	0.24	0.37	0.54	0.73	0.95	1.21

Table 10: Concentric, Cu, Three Phase, 35mm^2 – Erection Sag/Tension

TEMP (°C)	TENSION (KGF)	DESIGN TABLE								
		SAG (M) FOR SPAN LENGTH (M)								
		2.5	5	7.5	10	12.5	15	18	20	22.5
-5.6	63.6	0.01	0.04	0.10	0.18	0.28	0.40	0.55	0.72	0.91
0	62.2	0.01	0.05	0.10	0.18	0.29	0.41	0.56	0.73	0.93
5	61.0	0.01	0.05	0.10	0.19	0.29	0.42	0.57	0.75	0.94
10	59.9	0.01	0.05	0.11	0.19	0.30	0.43	0.58	0.76	0.96
15	58.9	0.01	0.05	0.11	0.19	0.30	0.43	0.59	0.77	0.98
20	57.9	0.01	0.05	0.11	0.20	0.31	0.44	0.60	0.79	1.00
25	56.9	0.01	0.05	0.11	0.20	0.31	0.45	0.61	0.80	1.01
30	56.0	0.01	0.05	0.11	0.20	0.32	0.46	0.62	0.81	1.03
35	55.1	0.01	0.05	0.12	0.21	0.32	0.46	0.63	0.83	1.04
40	54.3	0.01	0.05	0.12	0.21	0.33	0.47	0.64	0.84	1.06
45	53.5	0.01	0.05	0.12	0.21	0.33	0.48	0.65	0.85	1.08
50	52.8	0.01	0.05	0.12	0.22	0.34	0.49	0.66	0.86	1.09
55	52.0	0.01	0.05	0.12	0.22	0.34	0.49	0.67	0.87	1.11
60	51.3	0.01	0.06	0.12	0.22	0.35	0.50	0.68	0.89	1.12
65	50.7	0.01	0.06	0.13	0.22	0.35	0.51	0.69	0.90	1.14
70	50.0	0.01	0.06	0.13	0.23	0.36	0.51	0.70	0.91	1.15
75	49.4	0.01	0.06	0.13	0.23	0.36	0.52	0.71	0.92	1.17
80	48.8	0.01	0.06	0.13	0.23	0.36	0.52	0.71	0.93	1.18

C6 Design Data for Unstayed Supports

Table 1: In-line Support with Service Span Attachments

In the table below, the effect of the unbalanced loading imposed by a single service span attachment has been converted to an equivalent addition to the actual wind loading span of the main line conductor.

The required pole size shall be determined by adding the actual main line wind loading span to the addition below. The pole shall be selected from the appropriate main line conductor table.

(It has been assumed that wind loading affects only the main line conductor; the service span being at right angles to the main – the latter then having a MWT based on ice loading with no wind.)

Main	Service			
	2x35mm^2	4x35mm^2	2x95mm^2	4x95mm^2
2x35mm^2	45m	-	-	-
4x35mm^2	33m	59m	38m	-
2x95mm^2	35m	-	39m	-
4x95mm^2	24m	44m	28m	53m

Table 2: Angle Support with no Service Span Attachments (Medium Poles)

Unstayed angle supports shall have one 1.3m foundation block fitted at 0.5 m below the ground line.

Allowed maximum line deviation angles have been calculated based on the worst case wind loading span capability for medium or stout grades of pole, with pole top horizontal loadings due to MWT and line deviation angle converted to an equivalent wind loading span.

Maximum angle of line deviation for stated LV ABC main line conductor size on medium poles for wind loading spans:

	Up to 40m	41m-50m	51m-60m	61m-70m	71m-80m	81m-90m
2x35mm^2	46°	44°	42°	40°	not allowed	not allowed
4x35mm^2	31°	29°	27°	25°	not allowed	not allowed
2x95mm^2	23°	22°	20°	19°	18°	16°
4x95mm^2	7°	7°	6°	5°	4°	3°

Table 3: Angle Support with no Service Span Attachments (Stout Poles)

Maximum angle of line deviation for stated LV ABC main line conductor size on stout poles for wind loading spans:						
	Up to 40m	41m-50m	51m-60m	61m-70m	71m-80m	81m-90m
2x35mm^2	62°	60°	58°	56°	not allowed	not allowed
4x35mm^2	42°	40°	38°	36°	not allowed	not allowed
2x95mm^2	32°	31°	29°	28°	26°	25°
4x95mm^2	11°	10°	9°	8°	7°	7°

Table 4: Angle Support with One Service Span Attachment (Medium Poles)

Unstayed angle supports shall have one 1.3m foundation block fitted at 0.5 m below the ground line.

Allowed maximum line deviation angles have been calculated based on the worst case wind loading span capability for medium or stout grades of pole, with pole top horizontal loadings due to MWT and line deviation angle converted to an equivalent wind loading span.

A single service span attachment within the included angle of deviation is assumed.

Maximum angle of line deviation with one service span attachment for stated LV ABC main line conductor size on medium poles for wind loading spans:

	Up to 40m	41m-50m	51m-60m	61m-70m	71m-80m	81m-90m
2x35mm^2	37°	35°	33°	31°	not allowed	not allowed
4x35mm^2	19°	17°	15°	13°	not allowed	not allowed
2x95mm^2	18°	16°	15°	13°	12°	11°
4x95mm^2	3°	2°	2°	not allowed	not allowed	not allowed

Table 5: Angle Support with One Service Span Attachment (Stout Poles)

Maximum angle of line deviation with one service span attachment for stated LV ABC main line conductor size on stout poles for wind loading spans:						
	Up to 40m	41m-50m	51m-60m	61m-70m	71m-80m	81m-90m
2x35mm^2	53°	51°	49°	47°	not allowed	not allowed
4x35mm^2	31°	29°	27°	25°	not allowed	not allowed
2x95mm^2	26°	25°	24°	22°	21°	19°
4x95mm^2	7°	6°	5°	4°	3°	2°

C7 Solutions to Out-of-Balance Problems

C7.1 Forces Involved and pole Considerations

Refer to Table 1 below for the forces applied to the pole at an open-wire/ABC transition, and for unstayed forces that can be applied to different pole sizes and types.

Existing intermediate poles do not need wood foundation blocks, but any replacement must have them fitted. Any terminal poles, either existing or new, must have foundation blocks fitted if they are to be used unstayed.

C7.2 Options for Solving an Out-of-Balance Problem

If wayleaves and space permit, out-of-balance stays shall be used.

If wayleaves and space restrict the use of out-of-balance stays, then the out-of-balance issue may be resolved by adjusting tensions by not more than 10%. Note, by adjusting tensions this will alter the sag which may cause another clearance issue.

If the above solutions are impractical, the following methods shall be considered:

- Unstayed pole (consider changing the pole to a stout or extra stout, if required)
- Extending the ABC to a stayed pole.
- Erecting a larger size of ABC to reduce the out-of-balance force.

Table 1: Forces Involved at Conductor Transitions

CONDUCTOR		MAX WORKING TENSION (KGF) *	ERECTION TENSION (KGF)	NOTES
METRIC	IMPERIAL SIZE (IN^2)			
$16mm^2$ Cu bare and PVC	0.025 Cu	220	163	Source ENA TS 43-30, 4.1.
$32mm^2$ Cu bare and PVC	0.05 Cu	454	336	
	0.058 Cu	526	390	Estimated from 0.05 Cu.
50 mm^2 Al bare and PVC	-	422	303	Source ENA TS 43-30, 4.1.
70 mm^2 CU bare and PVC	0.1 Cu	612	453	
TENSIONS UNDER DESIGN LOADINGS				
ABC, $2x35mm^2$	-	272	66	All at -6 deg.
ABC, $2x95mm^2$	-	651	325	
ABC, $4x35mm^2$	-	418	132	
ABC, $4x95mm^2$	-	1156	651	
Steel Pole	-	-	1300	This is with 2.2 factor of safety.
Other source material used in the compilation of the above data: BS 1990; CP420 Pt 1 Ch 24, Drawing HQ.A4.51.09-430.				
* Bare wire "Max Working Tension" is per conductor.				