NSP/004/120 - (OHI 20) Guidance on Mounting Overhead Line Plant and Equipment on 11kV, 20kV and 33kV Poles

1. Purpose

The purpose of this document is to provide guidance on the approved arrangement drawings detailing the mounting of additional equipment onto 11kV, 20kV and 33kV structures used on the Northern Powergrid overhead line distribution network.

This document supersedes the following documents, all copies of which should be destroyed:

Document Reference	Document Title	Version	Published Date
NSP/004/120	(OHI 20) Guidance on mounting overhead line plant and equipment on HV poles	3.0	June 2017

2. Scope

This document covers all plant and equipment required to be mounted onto 11kV, 20kV and 33kV structures. It provides a range of detailed approved drawing arrangements indicating the agreed mounting position for the plant and equipment. Guidance is provided relating to the type of structure required and also how the equipment shall be connected. Additionally, each arrangement has an associated pole fabrication drawing that provides details of where the pole is scarfed and drilled to accept the equipment.

Appendix 1 is included within this document and lists approved pole mounted plant arrangements drawings for the following equipment:

- Cable termination poles
- Substation poles
- Air break switch disconnectors
- Enclosed switch disconnectors
- Pole mounted auto reclose circuit breakers
- Expulsion fuse switches
- Pole mounted regulators

2.1. Contents

3. Technical Requirements

3.1. Background

11kV to 33kV overhead line may require one or more of the following items of plant or equipment to be mounted onto a support: -

a) Pole mounted air break switch disconnectors

b) Drop out expulsion fuses/solid links or intelligent sectionalisers

c) Pole mounted power transformers

d) Pole mounted auto reclose circuit breakers and associated equipment (voltage transformer, control cubical and LV isolation box etc.)

e) Surge arresters

f) Cable terminations

g) Triggered spark gaps

h) Fault passage indicators

i) 400A low voltage fused cut-outs

j) Air break switch disconnectors

k) Enclosed switch disconnectors

To ensure that a standard design approach is maintained across Northern Powergrid, a range of detailed assembly drawings catering for standard arrangements have been prepared. Each drawing has been developed to take into account the Electricity Safety, Quality and Continuity Regulations 2002, operational requirements and potentially Live Line Working requirements.

Appendix 1 tabulates the approved arrangement drawings that must be utilised and the drawing reference numbers that must be included on any line records or schedules. No other pole arrangements shall be erected without prior agreement from the Policy and Standards Section.

Notes

As a general rule, poles supporting pole mounted equipment are classified as earthed supports i.e., all steelwork and metallic pole mounted equipment is bonded together and connected with an earthing conductor to an earth stake. As a consequence, this makes the supports more susceptible to lightning overvoltage events due to the decrease in the available BIL, this is particularly true at 20kV. As such particular care must be taken when selecting pin and tension insulators to ensure that earthed insulator designs have been applied. In addition, 20kV networks also suffer from an increased frequency of transient faults created by wildlife flashovers to earth. To reduce the incidence of this type of fault all 20kV earthed supports shall be fitted with bird guards/shrouding on insulators and or insulated tubing on horizontal pilot pin insulators.

3.1.1. Procedure for Introducing New Pole Arrangements

Where pole arrangements other than those detailed in Appendix 1 are required. Copies of proposed arrangement drawings must be submitted to the Policy and Standards Section for consideration. Where the proposed arrangement is acceptable the drawing will be issued an agreed drawing number which must be referenced on any future line schedule.

3.2. Pole Mounted Aerial Break Switch Disconnector (ABSD)

ABSD's shall be designed and supplied in accordance with the company technical specification NPS/001/003 - Technical Specification for Overhead Line Air Break Switch Disconnectors.

The current design of ABSD's installed in Northern Powergrid are all high level, (Category O) independent manual units operated using insulated rods from ground level allowing them to be mounted onto unearthed poles thus improving the lightning performance of the circuit and removing the need to install or inspect earth mat arrangements. The switches are designed for mounting onto both Single, 'H' or Rutter type poles.

Note where ABSD's are installed on overhead lines constructed with HV covered conductors as covered by NSP/004/044 then the default narrow crossarms used for this arrangement shall be substituted with standard open wire construction crossarms to provide sufficient clearance for hot glove switch maintenance activities to be carried out.

Key Features

- Operating mechanism has been fixed on poles at a fixed height of 4.3m from ground level irrespective of the actual pole height and switch mounting position ensuring switches can always be operated using 3 insulated rods.
- Poles up to and including 14.0m in height can be accommodated without a requirement to utilise pilot pins.
- ABSD can only be mounted in the horizontal orientation.
- All jumpers and connections shall be in accordance with NSP/004/107 - (OHI 7) Guidance on the selection of conductor jumpers and non-tension joints. – All jumpers must be PVC insulated Hiflex conductor which incorporated stress relieving heat shrinks at all terminating points.
- See drawing 1091471525 sheet 1 for ABSD details.

3.3. Drop Out Expulsion Fuses or Intelligent Sectionalisers

Drop out expulsion fuses and intelligent sectionalisers shall be designed and supplied in accordance with the company technical specification NPS/001/004 - Technical Specification for 11, 20 and 33kV Pole Mounted Expulsion Fuses and Solid Links and NPS/001/032 - Technical Specification for 11 and 20kV pole mounted Auto Sectionalising Links.

Under normal circumstances fuse isolators shall be arranged such that, after operation of a fuse or sectionalising link, the jumpers that remain live will normally be those that are attached to the top of the fuse carrier.

Fuse isolators shall be mounted a minimum of 5.1m from ground level and a maximum of 6.5m (equivalent to a maximum of 5 insulated rods) from ground level. All associated jumpers must maintain a minimum clearance of 4.6m from the ground increasing to 5.8m where the equipment is located adjacent to roads.

Where pilot pins are mounted to provide jumper support at 20kV, the exposed metalwork of the insulator pins shall be protected through the use of tubular bird guards.

3.3.1. Drop Out Expulsion Fuse Isolators

Key Features

- A polymeric back portion suitable for use at 11kV or 20kV see drawing 1091471503 sheet 1 for details.
- Units can utilise fuse carriers, solid links or re-settable intelligent sectionalisers.
- Units are designed to incorporate a bypass capability to allow a temporary shorting device to be installed while fuse links, solid links or sectionalisers are interchanged by live line techniques.

3.3.2. Fuse Elements

See drawing 1091471503 sheets 3 and 3a for details of available fuse elements.

3.3.3. Intelligent Sectionalisers

Auto-sectionalisers discriminate between a transient and a persistent fault by counting the passage of fault current during the auto-reclose sequence. They operate during the dead time of the auto-reclose sequence, after a pre-determined number of passages of fault current.

See drawing 1091471504 sheet 1 for details on the intelligent sectionalisers.

Sectionalisers are suitable for installation on multi voltages i.e., 6kv, 11kv or 20kv.

It is intended that the sectionalisers will always be fitted to back portions fitted with composite insulators.

The sectionalisers will be colour coded for current rating and number of shots making identification possible from ground level.

Care must be taken when specifying the installation site for intelligent sectionalisers as the load on the protected network must be a continuous minimum value of 0.3A to ensure the capacitors within the sectionalisers can scavenge sufficient current to ensure correct operation of the sectionalisers.

3.4. Pole Mounted Transformers

Pole mounted transformers shall be designed and supplied in accordance with the company technical specification NPS/003/034 - Technical Specification for Pole-Mounted Distribution Transformers.

Pole Mounted Transformers are specified with transformer tappings providing a variation of the no-load primary voltage of -5%, -2.5%, 0%, +2.5% and +5% this revised arrangement offers a greater flexibility for dealing with the issues associated with high volts from distributed generation schemes connected to overhead lines. Unless specified otherwise transformers shall be installed with the default tap position set to position 3 i.e., 0%.

On single-phase pole mounted transformers rated 16kVA, 25kVA and 50kVA, with standard voltage ratios of 6,600/250V, 11,000/250, 20,000/250 and 33,000/250V, the Northern Powergrid preference is still for an external self-positioning tapping switch, however an alternative tapping arrangement may be provided on the lower voltage winding, by means of connection to external LV bushings.

Where both HV and LV terminations are mounted on the tank cover then the LV terminals shall be equipped with approved, individual, durable, long-term UV stable, HV rated, insulating shrouds.

3.4.1. Terminal markings on Pole mounted transformers

Three Phase Systems	2W, 2V, 2U 2N left to right when facing the terminals
Single Phase 3-Wire Systems	2.1, 2.3, 2.2 left to right when facing the terminals
Single Phase 2 or 3 wire Systems	2.1, 2.3 on the left-hand side of the tank and 2.2 on the right-hand side of the tank
Single Phase up to 50kVA for use on 2 wire systems only	2.1, 2.3 on the left-hand side of the tank and 2.4, 2.2 on the right-hand side of the tank

G78 Transformers

Note - G78 transformers are supplied equipped with surge arrestors between the HV connections and the transformer tank and an external electrical bond between the neutral terminal and the transformer tank earth connection. This bond shall have a minimum cross section of 70mm2 copper, or equivalent.

Duplex Gap spacing

To protect transformers against transient overvoltage on the HV side, all transformers are fitted with duplex spark gaps. The gaps shall be confirmed during installation as follows: -

Voltage	Gap Setting
11kV	2 x 25mm
20kV	2 x 38mm

3.4.2. Jumpers and Connections to Pole Mounted Transformers

LV Connections

Connections between the LV terminals of pole mounted transformers and LV fuse cut-outs shall be provided through the use of PVC insulated and sheathed, single core, annealed copper conductors. Connections to the LV bushings shall be via single hole fixing compression lugs with holes appropriate to the stem diameter through the bushing.

Where both LV and HV bushings are mounted on the lid of the transformer, HV rated shrouds shall be fitted to the LV bushing in order to eliminate HV induced voltages onto the LV network in the event of a transient fault.

Transformer Rating	Three phase current requirement in Amps to match TX kVA @433V	Required Cable Size	Standard LV Bushing Size	Lug hole Diameter
50kVa or below	67A	35mm2	Type A (250A) M12	14mm
100 kVA	133 A	95mm2	Type B (630A) M20	22mm
200 kVA	267A			
315 kVA	420A	120mm2		

HV Connections

Connections between the HV conductor and transformer HV terminals shall be provided through the use of 32mm2 (7/2.46mm) Hard drawn (black) PVC insulated jumpers terminated onto the M12 HV studs.

See NSP/004/107 - (OHI 7) Guidance on the selection of conductor jumpers and non-tension joints for further information on connections to overhead lines.

3.4.3. Pole Mounted Transformer Wildlife Protection

As a default all new 20kV pole mounted transformer installations shall include for the installation of wildlife protection systems. The HV bushing shrouds kits shall consist of shrouds for the HV bushings and insulated tubing for inclusion around the duplex gap arcing horns.

3.4.4. Transformer Types and Mounting Requirements (with typical weights and dimensions)

Description	Total Mass of Transformer (kg)	Dimensions Length (under Cond)	Width (offset from Pole	Height	Single Bolt Fix or Platform	Min - Single Pole or 'H' pole when installed in main line	Min - Single Pole or 'H' pole when installed on totem or inverted pole
11kV Pole Mounted Transformers							
25kva (11/250v) -1Phase	232	760	817	1270	SB	S	S
50kva (11/250v)/25kva (11/250-0-250v) 1Ph/split Ph	420	1320	890	1265	SB/P	S	S
100kva (11/250v)/50kva (11/250-0-250v)1Ph/split Ph	710	1320	990	1250	P	S	S
25kva (11/433v) -3Ph info only - no longer available	320	800	490	1010	P	S	S
50kva (11/433v) -3Phase	590	1096	890	1160	P	S	S
100kva (11/433v) -3Phase	850	1226	969	1304	P	S	S
200kva (11/433v) -3Phase	1097	1280	1030	1313	P	S	H
315kva (11/433v) -3Phase	1400	1155	975	1320	P	H	H
G78 – 50kva (11/433v) -3Phase	765	1070	870	1440	P	S	S
G78 – 100kva (11/433v) -3Phase	997	1160	915	1475	P	S	S
20kV Pole Mounted Transformers							
16kva (20/250V-1Ph info only - no longer available	189	772	1033	1042	SB	S	S
25kva (20/250v) -1Phase	308	792	1053	1270	SB	S	S
50kva (20/250v) -1Phase	434	815	1077	1260	SB	S	S
100kva (20/250v) / 50kva (20/250-0-250v) 1Ph/split	750	1320	1160	1320	P	S	S
200kva (20/250v) / 100kva (20/250-0-250v) 1Ph/split	1070	1380	1050	1505	P	H	H
50kva (20/433V) -3Phase	779	1320	1055	1360	P	S	S
100kva (20/433v) -3phase	970	1050	1055	1454	P	H	H
200kva (20/433v) -3phase	1400	1368	1173	1490	P	H	H
315kva (20/433v) -3phase	1400	1268	975	1315	P	H	H

Notes relating to the logic used in the formulation of the above tables.

- Split contract / so worse case dimensions / weight documented in the table.
- 10% variance allowance had been given during PMT procurement approval.
- ENA TS 35-1 allows for single bolt transformers up to 50kva provided weight does not exceed 400kg.
- ENA TS 43-95 fig 23 allows single pole platform mounted transformers up to 100kVa or 1000kg. Due to the general reduction in weight of pole mounted transformers we are using the 1000kg criteria as the major design driver. To ensure the PMT will fit onto the platform the maximum offset from the pole of 725mm to fit on the platform.
- ENA TS 43-95 fig 24 allows for 'H' pole platform mounted transformers up to 315kVa or 1400kg.
- To maintain the RYB left to right phasing on 20kV terminal poles, (back to the line source) requires all terminal arrangements to be mounted on 'H' poles.
- A risk assessment approach has been applied to define different criteria for transformers located on intermediate or stayed supports compared with those located on unaided self-supporting supports. This results in the table reflecting a greater use of 'H' pole platform mounted structures where the weight is distributed about the centreline of the support compared with a cantilever

load on single pole platforms. This policy aims to reduce the incidence of leaning poles on totem or inverted s/s supports. The application of stays to the pole side of inverted poles shall cease as a means of maintaining perpendicular poles as they rarely correct the situation and may create additional electrical hazards.

3.5. Pole Mounted Auto Reclose Circuit Breakers and Enclosed Switch Disconnectors

Pole mounted auto reclose circuit breakers shall be designed and supplied in accordance with the company technical specification NPS/001/009 - Technical Specification for 11kV, 20kV and 33kV Pole Mounted Auto-Reclose Circuit Breakers and Enclosed Switch Disconnectors.

PM ARCB's installations shall be installed in accordance with drawing 1091091310 sheet 10 with all jumpers and connections arranged as detailed in NSP/004/107 - (OHI 7) Guidance on the selection of conductor jumpers and non-tension joints.

Enclosed Switch Disconnector's installations shall be installed in accordance with drawing 1091091310 sheet 14.

PM ARCB installations shall be provided with an Enclosed Switch Disconnectors as shown on drawing 1091091310 sheet 14, an "In-Line Isolator" as shown on drawing 1091010752 or a local ABSD on the load side of the installation. This will enable the recloser site to be used as a point of isolation without the need to cut or temporarily remove jumpers. Installations must incorporate fully rated live line section insulators. installations and not be solely reliant upon the potential to cut jumpers across tension insulators on section poles. PMAR CB installations would not require the installation of an enclosed switch disconnectors to use as a point of isolation. this function would be satisfied through the use of a locally situated ABSD on situated ABSD on load side of the installation. A point of isolation.

3.6. Cable Terminations

Cable terminations shall be designed and supplied in accordance with the company technical specification NPS/002/015 - Technical Specification for 11 and 20kV Joints and Terminations and NPS/002/014 - Technical Specification for LV Joints and Terminations.

HV cables of polymeric triplex formation shall be terminated onto overhead supports using a cable termination support bracket as detailed on drawing 1181130009 sheet 6.

Cables shall be secured to supports using clips or cleats as appropriate. A spacing of approximately 450 - 600mm shall be adopted for LV & HV cables, respectively.

All cables shall have a cable guard fitted to protect the cable on the pole and reduce the risk of it being utilised as a climbing aid. The guard shall extend up the pole for a distance of 3.15m from ground level and be buried into the ground to a depth of 150mm. See drawing no. 1091010171 sheet 1 for details.

Note – Where a cable is controlled by expulsion fuses, it is company policy to arrange the expulsion fuses so that when they operate, the fuse hanging in the mounting is dead.

3.7. Earthing

Earthing shall be fully compliant with IMP/010/011 Code of practice for earthing LV networks and HV Distribution Substations. However, the following key values or requirements have been inserted into this document for ease of reference.

For earthing requirements at surge arrestors see clause 3.8.

3.7.1. Earthing Conductors

All non-current carrying metalwork associated with HV equipment at pole mounted substations, such as transformer tanks, aerial switches, top sections of stays and any HV cable terminations must be bonded together with 32mm^2 or 70mm^2 (green) PVC insulated copper conductor to an earth electrode which will

be referred to as the HV metalwork earth electrode. It shall normally be terminated onto the steelwork or plant using an appropriate compression lug connected to the bolt.

The approved type of earth electrodes should consist of two or more 1220 x 16mm2 driven earth rods. See drawing no 1091010146 for details.

The resistance to earth of the HV metalwork earth must be low enough to ensure operation of the HV protection in the event of a breakdown of the insulation between the HV line or HV transformer winding and the non-current carrying metalwork.

At substations protected by overhead line fuses or connected to lines provided with sensitive earth fault protection, the resistance to earth must not exceed 20 ohms. The arrangement for PM ARCB's including the control cubical and auxiliary control box are detailed in drawing 1091010708 Sheet 4.

3.7.2. Neutral Earthing Conductors at pole mounted substations

The Neutral conductor of the LV network and any non-current carrying metalwork associated with LV cable terminations shall be bonded together and connected by means of a 32mm2 insulated (black) copper lead to an earth electrode, which will be referred to as the LV Neutral earth electrode. See drawing no 1091010209 and 1091193339 for details.

The resistance to earth of the LV Neutral earth electrode must not exceed 20 ohms.

3.8. Surge Arresters

Surge Arresters shall be designed and supplied in accordance with the company technical specification NPS/001/008 - Technical Specification for Gapless Metal Oxide Surge Arrestors. Surge arresters shall normally be installed in all cable terminations and disconnected prior to the pre-commissioning overvoltage testing of cables.

To ensure effective operation of surge arrester they shall be installed as close as possible to the cable termination (modern arresters act as a substitute for stand-off / support insulators used in cable terminations). HV and earth connections shall be as short and straight as possible, with the arrester earth terminal bonded directly to the HV cable earth terminal then taken down to an earth electrode.

The combined resistance to earth of the electrode and cable sheath for surge diverter installations shall not exceed 10Ω.

Description	Drawings Number
11kV surge arrester	1091480162 sht 2
20kV surge arrester	1091480164 sht 2
33kV surge arrester	1091480165 sht 3 or sht 4
66kV surge arrester	1091480166 sht 1& sht 2

Further guidance on the company's application policies can be found in IMP/007/011 - Code of practise for the application of lightning protection.

3.9. Triggered Spark Gaps

Triggered Spark Gaps shall be designed and supplied in accordance with the company technical specification NPS/001/006 - Technical Specification for Insulators for Overhead Lines up to and including 132kV.

Triggered spark gaps shall be mounted in accordance with drawing 1091200014 sheet 1.

3.10. Fault Passage Indicators

Fault passage indicators shall be designed and supplied in accordance with the company technical specification NPS/001/014 - Technical Specification for Overhead Line Fault Passage Indicators.

Remote indication FPI's have the ability to identify the fault status locally via a visual flashing light and simultaneously send a signal to a centralised remote monitoring centre via an inbuilt GSM communications system.

3.10.1. Installation

Fault passage indicators shall normally be installed on clean intermediate or angle section poles approximately 3.5m below the conductors. Ideally the selected supports will be adjacent to aerial switches, or solid spurs. Fault passage indicators work on the principle of sampling the magnetic field given out from the conductors, hence, to ensure reliable operation they must be kept away from other sources of magnetic fields. Local knowledge of road crossings etc. should be used for the final choice of location.

Location in the network where FPI's should not be installed on supports

a) With underground cables

b) With transformers

c) With double circuit lines

d) With tee off lines

e) Closer than 300m to adjacent 275-400kV lines

f) Closer than 150m to adjacent 132kV lines

g) Closer than 100m to adjacent 66kV lines

h) Closer than 50m to adjacent 33kV lines

i) Closer than 30m to adjacent 20/11kV lines

j) Closer than 100m to rail track HV overhead conductors

3.11. 400A LV Fuse Cut-out

400A LV Fuse Cut-outs shall be designed and supplied in accordance with the company technical specification NPS/002/006 - Technical Specification for Service Cut-outs, Terminal Blocks, Meter Tail Protectors and Pole Mounted Fuse Units.

LV fuse cut-outs shall be fixed to wood pole supports using M12 x 85mm coach screws at a minimum height from ground level of 3.66m with nominal 305mm spacing between units. The units must be mounted to ensure there is no hazard to the operator from the ACD (Anti Climbing Devices) during fuse removal.

3.12. Pole Mounted Regulators

11 and 20kV pole mounted regulators shall be designed and supplied in accordance with the company technical specification NPS/003/020 - Technical Specification for Pole Mounted Regulators mounted as detailed in arrangement drawing 1091080800 sheet 2 and consist of 3 single phase regulators connected on a four pole structure. All jumpers and connections arranged as detailed in NSP/004/107 - (OHI 7) Guidance on the selection of conductor jumpers and non-tension joints.

4. References

The requirements described within this specification shall comply with the latest versions of the relevant International Standards, British Standard Specifications and all relevant Energy Network Association Technical Specifications (ENATS).

4.1. External Documentation

Reference	Title
ENA TS 35-1 Part 4 Issue 6: 2014	Distribution Transformers - Part 4 - Pole Mounted
ENA TS 43-95 Issue 6: 2021	Steelwork for Overhead Lines
ESQCR	Statutory Instrument 2002 No. 2665, The Electricity Safety, Quality and Continuity Regulations 2002 and the 2006 Amendment

4.2. Internal Documentation

Reference	Title
IMP/007/011	Code of Practice for the Application of Lightning Protection
IMP/010/011	Code of Practice for Earthing LV Networks and HV Distribution Substations
NPS/001/003	Technical Specification for 11kV, 20kV and 33kV Overhead Line Air Break Switch Disconnectors
NPS/001/004	Technical Specification for 11kV, 20kV and 33kV Pole Mounted Expulsion Switch, Fuse Tube and Solid Link
NPS/001/006	Technical Specification for Insulators for Overhead Lines up to and including 132kV
NPS/001/008	Technical Specification for Gapless Metal Oxide Surge Arrestors
NPS/001/009	Technical Specification for Technical Specification for 11kV, 20kV and 33kV Pole Mounted Auto-reclose Circuit Breakers and Enclosed Switch Disconnectors
NPS/001/014	Technical Specification for Overhead Line Fault Passage Indicators
NPS/001/032	Technical Specification for 11, 20 Pole Mounted Auto Sectionalising Links
NPS/002/006	Technical Specification for Service Cut-outs, Terminal Blocks, Meter Tail Protectors and Pole Mounted Fuse Units
NPS/002/014	Technical Specification for LV Joints and Terminations
NPS/002/015	Technical Specification for 11 & 20kV Joints and Terminations
NPS/003/020	Technical Specification for 11 & 20kV Pole Mounted Regulators
NPS/003/034	Technical Specification for 11 & 20kV Pole Mounted Distribution Transformers
NSP/004/044	Specification for HV Wood Pole Lines of Compact Covered Construction up to and including 33kV
NSP/004/107	(OHI 7) Guidance on the selection of conductor jumpers and non-tension connections

4.3. Amendments from Previous Version

Reference	Description
2 – Scope	Enclosed Switch Disconnectors added
3.1 – Background	Enclosed Switch Disconnectors added
3.4.5 – Transformers Table	Table updated with average dimensions and weights of currently purchased transformers.
3.5 - Pole Mounted Auto Reclose Circuit Breakers and Enclosed Switch Disconnectors	Enclosed Switch Disconnectors added
Appendix 1 - Approved arrangement drawings	Pole mounted regulator drawing numbers added
Whole document	Reference documents and drawing numbers updated

5. Definitions

Term	Definition
N/A	

6. Authority for Issue

6.1. CDS Assurance

I sign to confirm that I have completed and checked this document and I am satisfied with its content and submit it for approval and authorisation.

		Date
Deb Dovinson	Governance Administrator	20/03/2024

6.2. Author

I sign to confirm that I have completed and checked this document and I am satisfied with its content and submit it for approval and authorisation.

Review Period - This document should be reviewed within the following time period:

Standard CDS review of 3 years	Non-Standard Review Period and Reason	
Yes	Period: 3 Years	Reason: n/a
Should this document be displayed on the Northern Powergrid external website?		Yes
		Date
Aaron Chung	Policy and Standards Engineer	02/04/2024

6.3. Technical Assurance

I sign to confirm that I am satisfied with all aspects of the content and preparation of this document and submit it for approval and authorisation.

		Date
Ged Hammel	Senior Policy and Standards Engineer	25/03/2024

6.4. Authorisation

Authorisation is granted for publication of this document.

		Date
Paul Black	System Engineering Manager	22/05/2024

Appendix 1 – Approved Pole Mounted Arrangement Drawings

	Drawing No.	
Arrangement	11 kV	20 kV
Standard Cable Termination Poles		
Cable Laypole	1.00.043.4009 sht 5	
Cable Terminal (single)	1.00.043.4010 sht 6	
Cable Terminal (H Pole)	1.00.043.4011 sht 6	
Standard Substation Poles		
Single Phase		
Single Pole Term. Trans, Platform or Single bolt fixing, without fuses	1.09.107.0810 sht 1	
Single Laypole Trans, Platform or Single bolt fixing, without fuses	1.09.107.0811 sht 1	
Single Straight Line Pole, Trans, Platform or Single bolt fixing, without fuses	1.09.107.0814 sht 1	
Single Pole Term, In Line or Laypole Trans, with or without fuses	1.09.108.0821 sht 3	1.00.043.4010 sht 2
Single Pole Totem, Trans, with HV Fuses	1.09.107.0819 sht 3	
Three Phase		
Single Pole Terminal Transformer, Platform Mounted, without fuses	1.09.107.0810 sht 2	1.00.043.4010 sht 2
Single Laypole Trans, Platform mounted without fuses	1.09.107.0811 sht 2	
Single Straight Line Pole, Trans, Platform mounted without fuses	1.09.107.0814 sht 2	
11 kV Terminal S/S, Line or Laypole S/S - Three Phase with or without fuses	1.09.108.0821 sht 1	Not Available
'H' Pole Terminal, Trans, Platform Mounting without fuses	1.09.108.0860 sht 1	
'H' Laypole, Trans, Platform Mounting without fuses	1.09.108.0860 sht 3	
'H' Terminal Pole, Trans, Platform Mounting c/w fuses	1.09.108.0860 sht 5	
'H' Totem Pole, Trans, Platform Mounting c/w fuses	1.09.108.0862 sht 3	
Short Leg 'H' Pole Terminal or in line, Trans, without Fuses	1.09.108.0864 sht 1	
Short Leg 'H' Pole Term or in line, Trans, Short leg 90° to line c/w fuses.	1.09.108.0864 sht 2	
Single Totem Pole, Trans, Platform Mounted	1.09.108.0865 sht 1	
ABSD Poles	11 kV	20 kV
ABSD mounted on Single Intermediate pole	1.09.109.0906 sht 7	
ABSD mounted on 'H' Intermediate pole	1.09.109.0908 sht 1	
ABSD mounted on Lay Terminal 'H' Pole	1.09.109.0906 sht 3	
ABSD mounted on Lay Terminal Single Pole	1.09.110.0933 sht 1	
ABSD mounted on Single Intermediate pole with Fuse Isolators and Cable Termination	1091100932 sht 5	
ABSD mounted on Single Terminal Pole with Cable Termination	1.09.110.0937 sht 5	
ABSD mounted on Single Terminal Pole with Cable Termination and HV Fuses (min 11.0m Height Pole)	109.110.0937 sht6	
ABSD mounted on H Terminal Pole with Cable Termination	1.09.109.0907 sht 11	
Auto Recloser Poles		
PMAR (Nu-Lec or ABB) on Single Pole with In-Line Isolators (including Cast Resin VT's)	1.09.109.1310 sht 10	
PMAR (Nu-Lec or ABB) on Single Pole (including Oil Filled VT)	1.09.109.1310 sht 7	
11/20kV RL27 Enclosed Switch Disconnector on single pole inc, Cast resin VT	109.109.1310 sht 14	
Fuse Isolator Poles	11 kV	20 kV
Three Phase Tee Off to Laypole with HV Fuses (three fuses one side of pole)	1.09.112.1063 sht 1	
Three Phase Tee Off to Laypole with HV Fuses (two fuses one side of pole)	1.09.112.1061 sht 1	
Three Phase Full Span Tee off with HV Fuses	1.09.112.1064 sht 1	
Three Phase Straight Line Section pole with HV Fuses	1.09.112.1067 sht 1	
Single Phase Solid Tee Off with HV Fuses	1.09.111.1003 sht 1	
Three Phase Cable Term Pole Controlled by HV Fuses (Supply O/H to U/G)	1.00.043.4010 sht 10	

Three Phase Cable Term Pole Controlled by HV Fuses (Supply U/G to O/H)	1.09.112.1069 sht 1	
Three Phase H Cable Term Pole Controlled by HV Fuses (Supply O/H to U/G)	1.09.112.1069 sht 15	
Three Phase Intermediate Pole with cable term Controlled by HV Fuses (Supply O/H to U/G)	1.09.112.1069 sht 7	
Single Phase Tee Off to Laypole with HV Fuses	1.09.111.1000 sht 1	
Pole Mounted Regulators	11kV	20kV
Three phase pole mounted regulators	1.09.108.0800 sht 2	

Note: - The list shown above is not meant as an exhaustive list of possible pole arrangement drawings, however it does represent a range of common standard arrangements. Consideration will be given to the approval of other arrangements where sufficient justification exists and it can be confirmed that all clearances and operational practices can be satisfied without unduly effecting the operation of the network.