NSP/004/109 - (OHI 9) Guidance on Anti-Climbing Devices, Safety Signs and Labels Required on Overhead Line Supports

1. Purpose

The purpose of this document is to provide guidance on the installation requirements for anti-climbing devices, safety signs and labels for overhead line supports.

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

Document Reference	Document Title	Version	Published Date
NSP/004/109	(OHI 9) Guidance on anti-climbing devices, safety signs and labels required on O/H lines	4.0	Feb 2022

2. Scope

This document is limited to the type and installation requirements for all types of anti-climbing device, safety signs and information labels required on overhead line supports up to and including 132kV.

This document shall be read in conjunction with Northern Powergrid policy document MNT/004/012 – Guidance on the Risk Assessment of Overhead Lines

This document has been designed to fully comply with ENA TS 43-90 and satisfy the requirements of The Electricity Safety, Quality and Continuity Regulations. .

2.1. Table of Contents

3. Technical Specification

This document is split into 3 parts:

- Risk Assessment of Overhead Line supports
- Types and installation requirements for anti-climbing devices
- Installation requirements for signs and labels on overhead line supports.

3.1. Risk Assessment of Overhead Line Supports

For the safety of the public and the security of the supply system care must be taken to prevent or deter against the unauthorised climbing of overhead line supports. The precautions must be selected to offer the best degree of deterrent against climbing taking account of the environment and the likelihood of interference from third parties.

To comply with the requirements of the ESQC regulations each overhead line needs to be classified in terms of the risk of interference, vandalism or unauthorised access. Different risk classifications must be assigned to different parts of the overhead line if the risks associated with that part of the line vary. In assigning the risk for a section of overhead line it is implicit that the level of risk at each support is assessed, so that the points at which the risk classification changes can be clearly identified.

The Northern Powergrid policy document MNT/004/012 shall be used to assess the following risks;

- Classification of Equipment Classification of surrounding land

The results of this risk assessment plus the outcome from clauses 3.1.1 and 3.1.2 shall then be used to determine the overall classification and appropriate mitigating measures that may include additional safety signs, changes to inspection frequency and enhanced anti-climbing devices.

3.1.1. Classification of Equipment

The tabulated selection matrix in MNT/004/012, Section 3.3.1 provides a low, medium or high-risk classification for the asset that depends on the voltage and type of support.

3.1.2. Classification of Surrounding Land

MNT/004/012, Section 3.3.2 provides details of locations classified as recreational sites, vocational areas and other areas of local environment that may increase the risk. An assessment of each location considering the surroundings will result in a risk category being identified.

3.1.3. Overall Classification

MNT/004/012, Section 3.3.3 provides a matrix that determines the overall classification of the location.

3.1.4. Table of Anti-climbing Guard Types Applied to Supports:-

Type of Support	High risk area as defined in MNT/004/012	Type of Guard*
Single pole or Portal support not regarded as climbable	No	None required
	Yes	Enhanced
Portal support and lattice tower supports with or without platforms or down leads regarded as climbable	No	Basic
	Yes	Enhanced

*Note - Following an assessment on the relative installation costs and risks of injury during the installation of the basic barbed wire system, pre-wrapped outrigger brackets shall now be used as the standard method of protecting a pole that requires basic or enhanced anti-climbing protection.

3.1.5. Table of Anti-climbing Guard Types Applied to Stays:-

Type of Support	High risk area	Type of Guard
Single or more than one and not in such a position as to facilitate climbing	No	None required
	Yes	Fit barbed wire anti climbing guard above obstacle
More than one and in such a position to facilitate climbing	No	
	Yes	

3.2. Types and Installation Requirements for Anti-Climbing Devices

3.2.1. Anti-Climbing Devices to be Used on Wood Pole Overhead Lines:-

3.2.1.1. Basic Anti-Climbing Guards

ENA TS 43-90, describes a basic anti-climbing guard as:-

- A pole wrapped with a minimum of twelve turns of barbed wire stapled around the pole, starting at a minimum of 2.75m from the ground or obstacle and extending downwards for 0.6m.
- The barbed wire shall be applied continuously over cables and earth conductors attached to the pole. However, precautions shall be taken to ensure that no damage occurs to the cable or earth wire insulation.
- Sufficient staples shall be used to prevent the wire being pulled of the pole.
- Switch operating rods shall be wrapped separately with barbed wire from a minimum distance of 2.75m from the ground or obstacle extending upwards for 1.5m with the operating rod in the upwards position. Alternatively, where the insulating insert is at the lower end of the operating rod, the barbed wire wrap on the rod may commence immediately above the insert. The barbed wire must not encroach or bridge the insulating insert.
- Cross members within 3.0 m from the ground level but not less than 2.0m (other than lattice steel masts where outrigger brackets shall be used) shall be close wrapped with barbed wire extending from the lowest point upwards for 0.6m minimum.
- See clause 3.2.1.3

3.2.1.2. Enhanced Anti-Climbing Guards

ENA TS 43-90, describes an enhanced anti-climbing guard as:-

An Outrigger bracket supporting barbed wire - The bracket shall provide a minimum of 3 parallel strands of barbed wire at 140mm spacing.

Note – The pre-wrapped outrigger brackets detailed in appendixes 1 & 2 are deemed to meet the definition of “enhanced anti-climbing guards”

See clause 3.2.1.3

3.2.1.3. Northern Powergrid Standard Anti-Climbing Guards

Following an assessment on the relative installation costs and risks of injury during the installation of the basic barbed wire system, pre-wrapped outrigger brackets shall now be used as the standard method of protecting a pole that requires basic or enhanced anti-climbing protection.

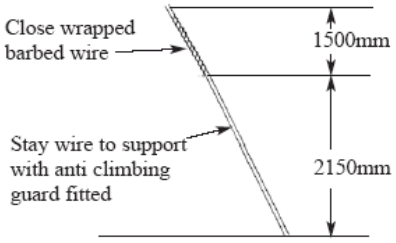
- Drawing 1091010408 sheet 8 shown in Appendix 1 provides additional info on the application of pre-wrapped brackets on single poles.
- Drawing 1091010408 sheet 19 shown in Appendix 2 provides additional info on the application of pre-wrapped brackets on 'H' poles.

The following list details a range of outrigger brackets specifically designed for non-standard situations and detailed with NPS/001/029 - Technical Specification for Wood Pole and Tower Anti-Climbing Guards;

Drawing No.	Description
1091010408 sheet 2	Anti-climbing devices for wood pole 'A' poles and Riley & Neate lattice masts
1091010408 sheet 3	Anti-climbing devices – 'Wood 'H' poles
1091010408 sheet 11	Anti-climbing devices for Riley & Neate lattice masts
1091010675 sheet 33	Anti-climbing devices for rutter poles associated with woodhouse mast replacement structures

3.2.1.4. Guarding of Stays

Where stays are in close proximity to each other and may be climbable, they shall be wrapped with barbed wire from a point 2.15m from the ground measured vertically, extending upwards for a distance of 1.5m



3.2.2. Anti-Climbing Guard to be Used on Steel Towers or Mast Lines:-

3.2.2.1. Basic Anti-Climbing Guards

- ENA TS 43-90, describes a basic anti-climbing guard as an outrigger bracket supporting barbed wire. All Anti-climbing guards for lattice towers shall be in accordance with drawing number 1091010408 sheet 6 and must be positioned between 2.8m and 3.5m from ground level at each tower position, however, in special circumstances this height may raise to a maximum of 5.0m.
- Any plan bracing which may aid climbing past the main anti-climbing device shall be close wrapped with barbed wire.
- All barbed wire shall be tight. It shall rest in slots in support brackets and shall be well secured.
- The maximum distance between strands and horizontal tower member shall not exceed 150mm.
- No unprotected space greater than 230mm across shall be left inside the device.

- Spacers shall be fitted in any run of barbed wire greater than 2.0m. They shall be evenly spaced at intervals not exceeding 1.5m as illustrated in drawing 1091010408 sheet 6.
- Normally five strands of barbed wire are required outside the tower face and four strands inside, all spaced at 150mm.
- Care shall be taken to ensure that incorrect positioning of guards or guard combinations don't result in climbing assistance rather than obstructions.
- Position anti-climbing guards not more than 400mm above the level of tower horizontal members which could be used as climbing aids to overcome the guard.
- All barbed wire wraps shall utilise triple life (using stainless steel barbs of not less than 15mm in length) wire with barb spacing of not more than 50mm between centres. Barbed wire shall comply with NPS/001/015.

Gates and End Frames

- Gates in accordance with drawing 1091010408 sheet 6 shall be provided on all tower legs. Where step bolts are fitted, the gates must open upwards and be stable in the open position. Gates shall be provided with holes for a security lock or nut and bolt.
- All gates and corner support angles/brackets shall be supplied pre-wrapped with barbed wire.

3.2.2.2. Enhanced Anti-Climbing Guards

In accordance with ENA TS 43-90 an enhanced anti-climbing device shall consist of two levels of outrigger bracket. (With the second system installed approximately 600mm above the first).

Or

A standard anti-climbing system as detailed in clause 3.2.2.1 with the addition of a 2.4m high palisade security fence around the tower base.

3.2.2.3. Types of Anti-Climbing Guards for Lattice Towers

The style of guarding for lattice towers is determined by the size of the tower base rather than the type of location. For towers with base dimensions of less than 6.0m, they shall be fitted with an all perimeter type anti-climbing guard. For towers with base dimensions of more than 6.0m, they shall be supplemented with additional corner type anti-climbing guards. (See appendix 7 for details of the two standard types).

3.2.3. Existing Anti-Climbing Devices (that do not comply with the previous requirements)

- When additional apparatus is attached to a support, or where the conditions in which the structure is situated change, then the existing guard shall be modified or renewed to comply with the previous paragraphs.
- All existing 33 and 66kV single circuit wood pole and steel terminal supports should have been modified to incorporate compliant anti-climbing guards already, but if any are found that have not already been modified, they shall have a guard installed similar to that shown on drawing 1091010408 sheet 3, figure 16 or 16b, sheet 4 figure 19 or sheet 5, figure 20.
- All existing 'H' type Riley & Neate masts, designated by drawing numbers 33.41/6.905 (66.5/10.4010), 33.41/6.917 (66.5/10.4011), 33.41/6.922 (66.5/10.1215, 33.41/6.923 (66.5/10.1217), 33.41/6.1033 (66.5/10.1216), 66.5/10.4000, 66.5/10.4019 shall be fitted with outrigger brackets in accordance with drawing no. 1091010408 sheet4, figure 18 or sheet 13.
- Special attention shall be given to existing supports with cables attached, in particular where cables are drawn in pipes for the first 1.8 – 2.4m of the structure and barbed wire is attached which encloses both the pole and the cable. In such cases outrigger type guards must be fitted

or, if not practicable, barbed wire shall be wrapped separately around the pole and around the cable pipe.

3.3. Installation Requirements for Signs and Labels on Overhead Line Supports

3.3.1. Signs and Labels

Signs and labels are required at overhead line supports to warn people of danger and give details about a support. MNT/003 - Statutory Labelling of Operational Assets provides further details on Northern Powergrid policy regarding the statutory labelling of operational assets.

Details of the normal mounting location for all tower plates can be found in MNT/003 clause 3.2.7.1 and detailed drawing 1091010378 sht1 (Appendix 6 of this document)

3.3.2. Safety Signs

Drawings No	Description	Cat Number
1091010229 sheet 1	Safety Sign for Wood poles	363318
1091010229 sheet 2	Safety Sign for Steel Masts	363322
1091010229 sheet 3	Safety Sign for Steel Towers	363587
1091010229 sheet 10	Safety Sign for Steel Poles (self-adhesive)	360112

Poles

Single poles deemed low risk sites shall be fitted with one safety sign on the side of the pole facing ascending pole numbers, except where the pole is adjacent to roads, footpaths, etc. and the safety sign shall face the direction of approach to the pole. On two pole structures, two safety signs shall be fitted, one on each leg of the structure facing ascending and descending pole numbers.

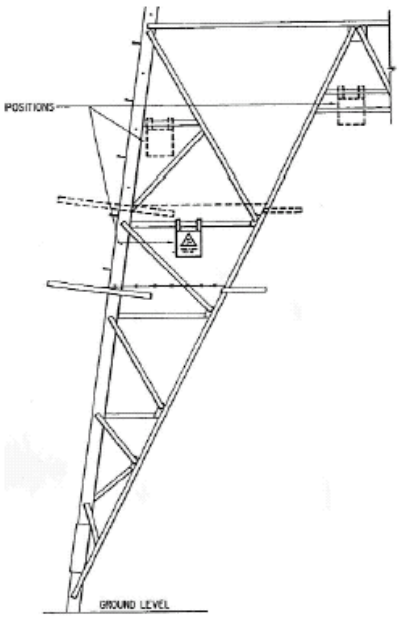
The signs on wood pole and steel poles shall be mounted a minimum of 3.0m above ground level and above the anti-climbing guard where fitted. Safety signs shall always be positioned to make sure that they are displayed below an area of danger. (This is particularly important on towers supporting low level sealing ends).

Poles classified as medium or high risk shall be fitted with two standard safety signs at the same height on opposite sides of the pole. On two pole structures, fit two signs on each limb of the structure.

Towers or Masts

Steel towers shall be fitted with four safety signs fitted to every face of the tower along the route of the line. They shall be fixed on the first horizontal bracing above the anti-climbing guard and located close to the climbing leg.

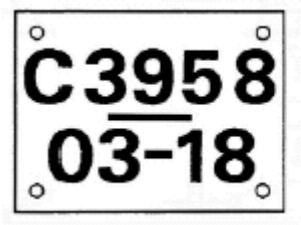
There are several different designs of steel towers and for this reason the location of safety sign will vary. An example of suitable steelwork for fitting the safety signs to steel towers is shown on drawing number 1091010229 sheet 4.

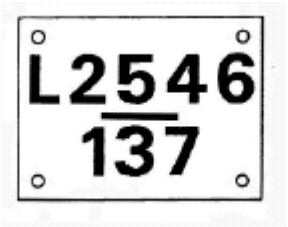


3.3.3. Number Plates

General

Every overhead line support shall be fitted with a number plate. The lowest numbered support of each distributor shall preferably be nearest to the source of supply at the time of commissioning. Examples are shown below:





HV & EHV Wood Pole Supports

The number plates on wood poles shall be mounted above any anti-climbing devices, and immediately below the safety sign. For details on the approved number plate see drawing number 1091010228 Sheet 3 or Y003X3506.

EHV Double Circuit Tower lines

The number plate on tower lines shall be as detailed in drawing number 1091010511 Sheet 1

LV Supports

A number plate shall be provided on all supports except those carrying service conductors. The numbers shall be positioned approximately 1.7m above ground level, preferably on the side of the pole supporting the conductors. For details on the approved number plate see drawing number 1091010228 Sheet 3. Where steel poles are incorporated into LV networks, the pole numbers shall be stencilled.

3.3.4. LV Supports – Joint Use

In accordance with ENA Recommendation EB/TP "Engineering Recommendation for Telecommunication Providers and Distribution Network Operators Joint Use of Poles". All LV poles where a licence for joint use has been granted shall carry a label as shown on drawing number 1091193160. The label shall be fixed at a height of not less than 1.8m above ground level and on the same face of the pole as the number plate.

Label Coding

J – indicating joint use – number as appropriate – indicating maximum permitted number of category 10 attachments

C – if cables larger than category 10 are authorised

Note Telecommunication Provider attachments are not permitted on HV poles, poles supporting LV Underground cable, static balancers, regulators or LV Fuses.

3.3.5. Phase Plates

Phase plates shall be attached to all the following types of supports:

Terminal, substation, switch station, tee-offs, where the number of conductors change, where the conductor formation permanently changes, section supports where interrupter cables are likely to be connected, both sides of transition supports and to other supports where declaration of phasing may assist operational needs.

Phase plates shall be mounted a minimum height of 3m above ground level and immediately above the danger plate.

For details of the approved phases plates see the following drawings:

Wood Pole Phase Plates: 1091010226 Sheet 1

Tower Phase Plates: 1091010226 Sheet 2

The standard phase sequence on wood pole overhead line networks operating at up to and including 66kV, where the conductors are in a horizontal or triangular formation shall be:

RED, YELLOW, BLUE

Positioned left to right where the observer is looking with his back to facing the lower numbered supports

Where the conductors are situated in a vertical formation the colour sequence shall be:

RED, YELLOW, BLUE, top to bottom

3.3.6. Feeder Name Plates – Single Circuit HV Supports

Feeder name plates shall be attached to supports at the following locations:

All terminal poles, tee off poles, poles with underground cables, substations, switch stations, at all positions where it will provide information pertinent to operational requirements. Ie road crossings, where hv lines cross each other, on both lines at the support on each side of the crossing, on every support of each HV line where feeders are within 90m of each other.

Plates on wood poles shall be mounted at approximately 1.5m above ground level, * normally on the left hand face of the support, were the observer has his back towards the lower pole numbers on the supports.

* Exceptions – at road, rail, HV line crossings and lines in close proximity, mount plates to face towards the crossing or adjacent line (in the case of proximities)

Details of approved feeder name plates can be found on drawing 1091010414 sht2

Feeder name plates fitted to single circuit masts and double circuit towers require a support flat to drawing no 1091010301 sheet 2 to allow the name plate to be fitted to a step bolt at the anti-climbing height level.

For guidance on the current Northern Powergrid (Northeast) naming and labelling policy on switchgear and associated equipment see Engineering Recommendation E805.

For guidance on the current Northern Powergrid naming and labelling policy on substations and switch stations see Engineering Recommendation E718.

3.3.7. Circuit ID Plates – Double Circuit HV Supports

All supports on double circuit towers lines shall be fitted with circuit ID plates.

A circuit identification plate carrying the three alphabetical code letters identifying the circuit shall be allocated to reach circuit of a double circuit overhead line. Normally, when facing ascending pole or tower numbers, the left hand circuits shall carry black identifications on a white background, whilst the right hand circuit shall carry white identifications on a red background.

Plates shall be mounted on the transverse faces of every pole or tower at approximately 3.0m above ground level, adjacent to the appropriate climbing positions and an additional circuit identification plate shall be fixed immediately below each crossarm.

Details of approved plates are detailed on drawing 1091010355 sheet 1 and fixed in place as detailed on 1091010355 sheet 3.

3.3.8. Property Plates, HV Supports

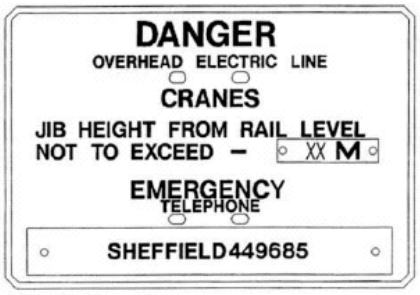
Property plates shall be attached to all single circuit steel masts as shown on drawing no 1091010301 sheet 1 or where ownership is indicated otherwise as on the danger/Voltage plate fitted to Double Circuit steel towers.

It is no longer necessary for wood poles to be identified with the letters NE or YE as was previous practice.

It is also no longer necessary to install property plates onto pole mounted substation supports. Where existing signs are encountered during other works or inspections then the existing signs shall be removed.

3.3.9. Railway Crossing Plates

Railway crossing notices shall be installed at all locations where overhead lines cross railways. The numbers provide the rail operators with emergency contact numbers and provide safe working clearances for rail mounted cranes. For further guidance on" Access arrangements to Network Rail Infrastructure", reference shall be made to NSP/005/001.



The crossing plates shall be mounted on concrete posts positioned on railway property near the boundary and under the centre of the power line. They shall be fixed at each side of the crossing except at single line tracks where only one sign shall be fitted.

Details of approved posts and plates are shown on drawing numbers 1091010594 sheets 3, 4 & 5 respectively.

3.3.9.1. Inadvertent Contact Signs (Recreational Notices)

The following signs have been produced for uses in situations where we need to make the public aware of over running overhead power lines. Details on the actual drawings can be found on Drawing no. 1091010229 sheet 11.

Further details on the type and application of these signs can be found in Northern Powergrid policy document MNT/003 - Statutory Labelling of Operational Assets.

3.3.10. G78 Connection Warning Plates

G78 connection warning plates shall be installed at overhead line substation poles where the substation has been established to provide LV supplies to an adjacent G78 cellular phone site (i.e. where antennas have been mounted on the legs of a tower line.

The purpose of the sign is to remind staff that this substation site cannot be utilised to supply any other customers due to the risk of transferred voltage potentials.

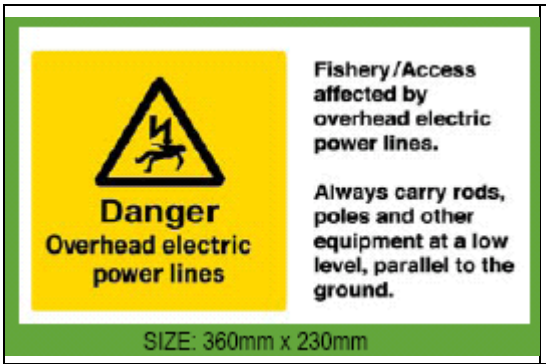
3.3.11. Fishing Notices

Where HV lines cross over rivers or ponds they shall be fitted with fishing warning or prohibition notice signs.

Appendix 8 and 9 provide further guidance on the application requirements for these signs. This information has also been recorded in drawing 1091010229 sheets 9 and 10.

Further information can be found in the following guide;

http://www.energynetworks.org/modx/assets/files/electricity/she/public_safety/angling/Angling_Guide_070628.pdf

	(a) Warning Notice Warning Notices Should be used at access points to provide a general warning of the presence of overhead electric power lines on approaches to the fishery and/or affecting the fishery itself. Drawing No. 1091010229 sheet 8
	(b) Prohibition Notices (Approach) Angling Exclusion Zone sign Exclusion Zone signs should be used at the extremities of the angling exclusion zone. This type of sign is designed to warn anglers as they approach the electric power line and should be erected in a prominent position, at right angles to the water, to face the anglers as they approach the exclusion zone. Drawing No. 1091010229 sheet 8
	(c) Prohibition Notices Repeater / Under line Signs At some locations overhead lines may run parallel to the water for long distances, where this occurs it is recommended that repeater signs are erected at frequent intervals in line of sight but not exceeding 200m. These signs can also be used as a reminder sign directly below the overhead crossing. Note this type of signs shall be used in addition to the Angling Exclusion Zone signs Drawing No. 1091010229 sheet 8

4. References

Guidance shall comply with the relevant International Standards, British Standard Specifications and all relevant Energy Networks Association Technical Documents current at the time, except where varied by this standard. In respect the following documents are particularly relevant.

4.1. External Documentation

Reference	Title
ENA Engineering Recommendation EB/TP	Engineering Recommendation for Telecommunication Providers and Distribution Network Operators joint use of poles
ENA Engineering Recommendation G78	Recommendations for Low Voltage Connections to Mobile Telephone Base Stations with Antennae on High Voltage Structures
ENA TS 43-90	Anti-climbing measures and safety signs for overhead lines
Statutory Instrument 2009 No. 639	The Electricity Safety, Quality and Continuity (Amendment) Regulations 2009

4.2. Internal Documentation

Reference	Title
MNT/003	Statutory Labelling of Operational Assets
NPS/001/029	Technical Specification for Wood Pole and Tower Anti-Climbing Guards
NPS/001/015	Technical Specification for Barbed Wire
MNT/004/012	Guidance on the Risk Assessment of Overhead Lines
NSP/005/001	Access arrangements to Network Rail Infrastructure
Legacy Guidance Documents	
Engineering Recommendation E718.	Naming and numbering of Substations and Switch-stations
Engineering Recommendation E805.	Rules for the naming and Labelling of Switchgear and associated Equipment

4.3. Amendments from Previous Version

Reference	Description
2.0 - Scope	MNT/004/012 – Guidance on the Risk Assessment of Overhead Lines replaces NSP/004/012
3.1 - Risk Assessment of Overhead Line Supports	Section amended to align with MNT/004/012
3.3 - Installation Requirements for Signs and Labels on Overhead Line Supports	Section amended to align with MNT/004/012
Section 4 - References	Table updated
Section 6 – Authority of Issue	Section updated to reflect current structure
Appendix 5 – Anti Climbing Guards for Riley and Neate Masts and A Poles	Title changed to include wood “A” poles

5. Definitions

Term	Definition
EHV	Extra High Voltage, voltages of 22000V and above
HV	High Voltage, voltages in excess of 1000V AC but less than 22,000V

Term	Definition
LV	Low Voltage, up to 1000V

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
Eve Fawcett	Governance Administrator	02/12/2024

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 & Reason	
Yes	Period: n/a	Reason: n/a
Should this document be displayed on the Northern Powergrid external website?		Yes
		Date
Steven Salkeld	Policy and Standards Engineer	02/12/2024

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.

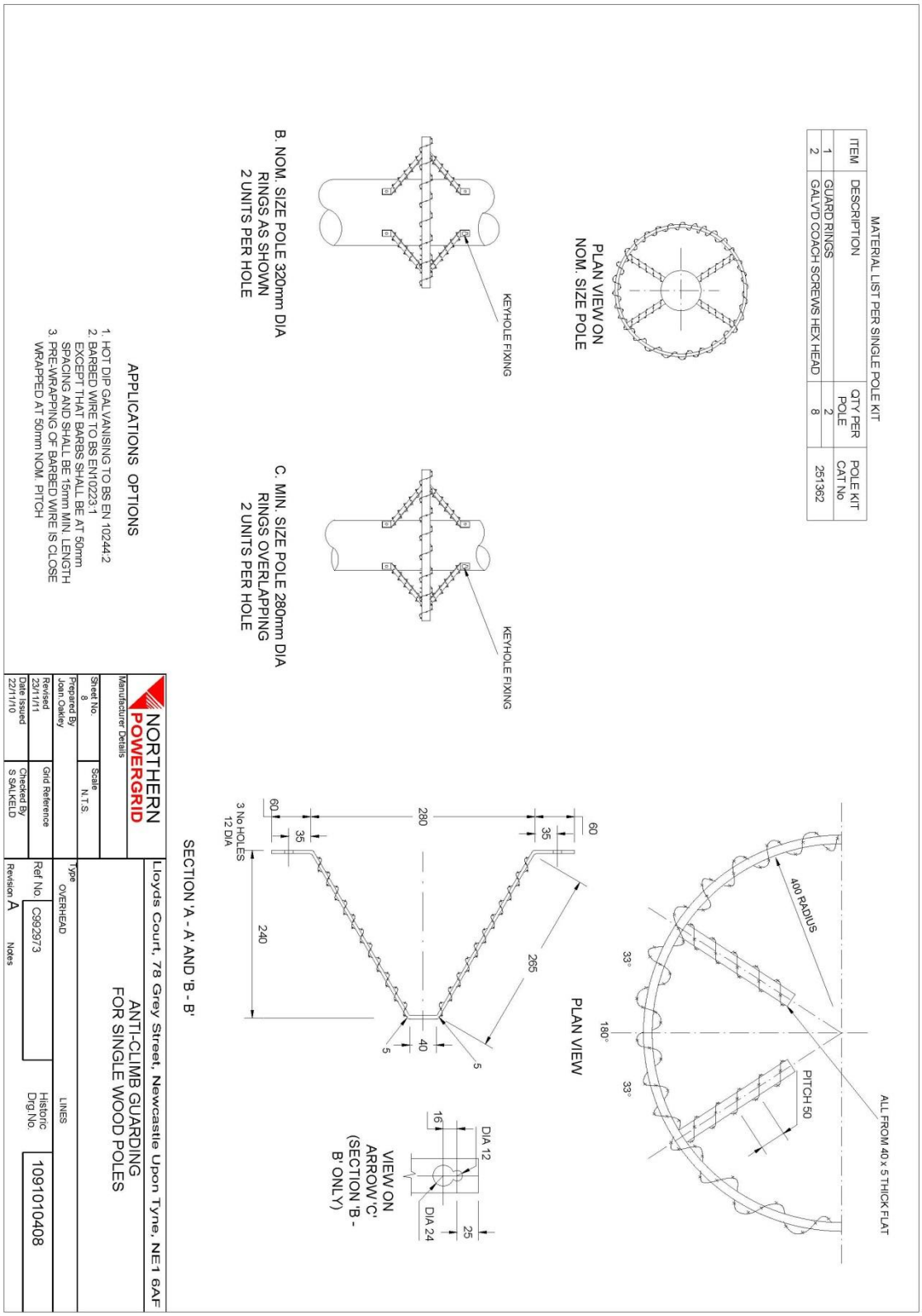
		Date
Aaron Chung	Policy and Standards Engineer	03/12/2024

6.4. Authorisation

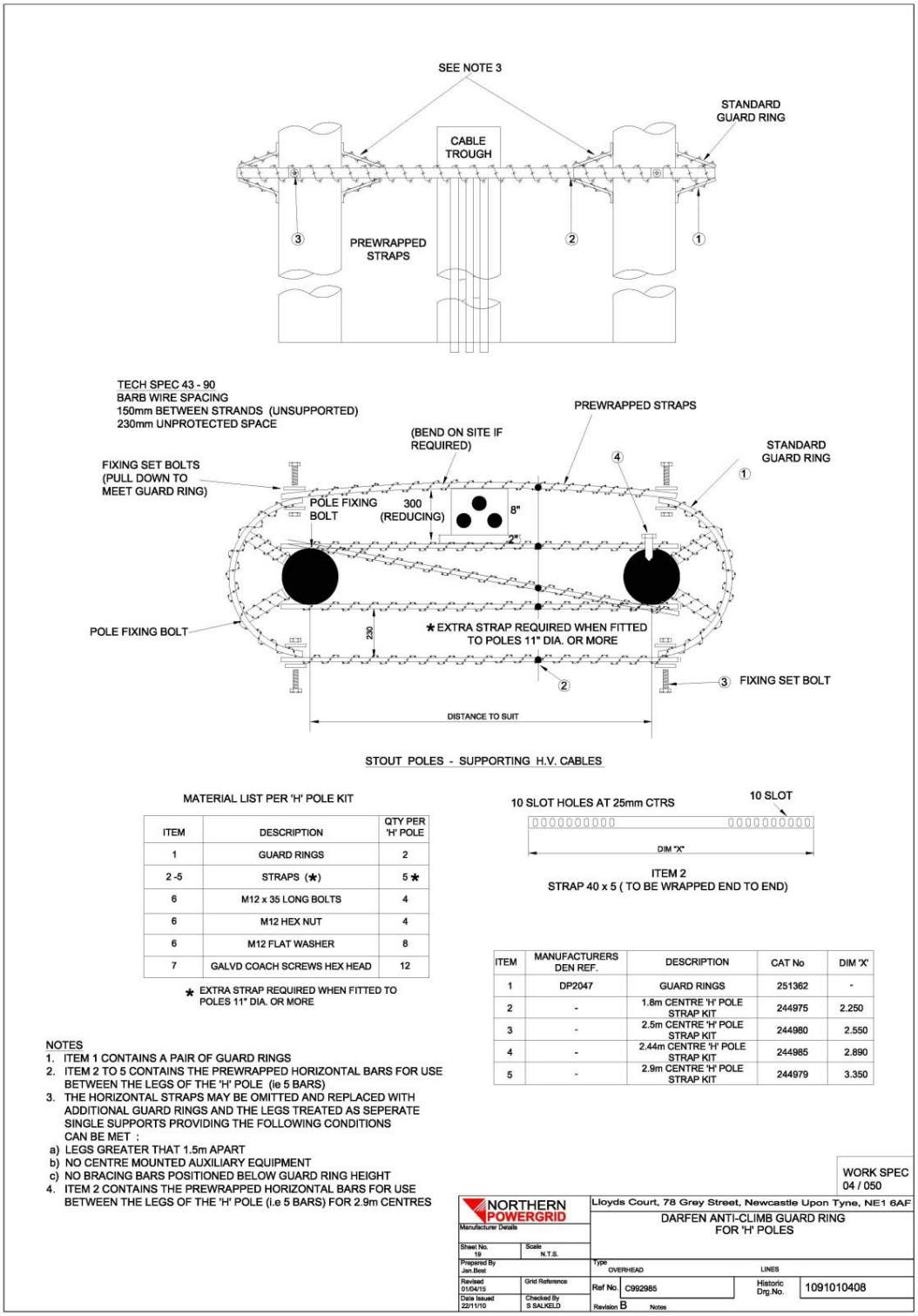
Authorisation is granted for publication of this document.

		Date
Paul Black	Head of System Engineering	11/12/2024

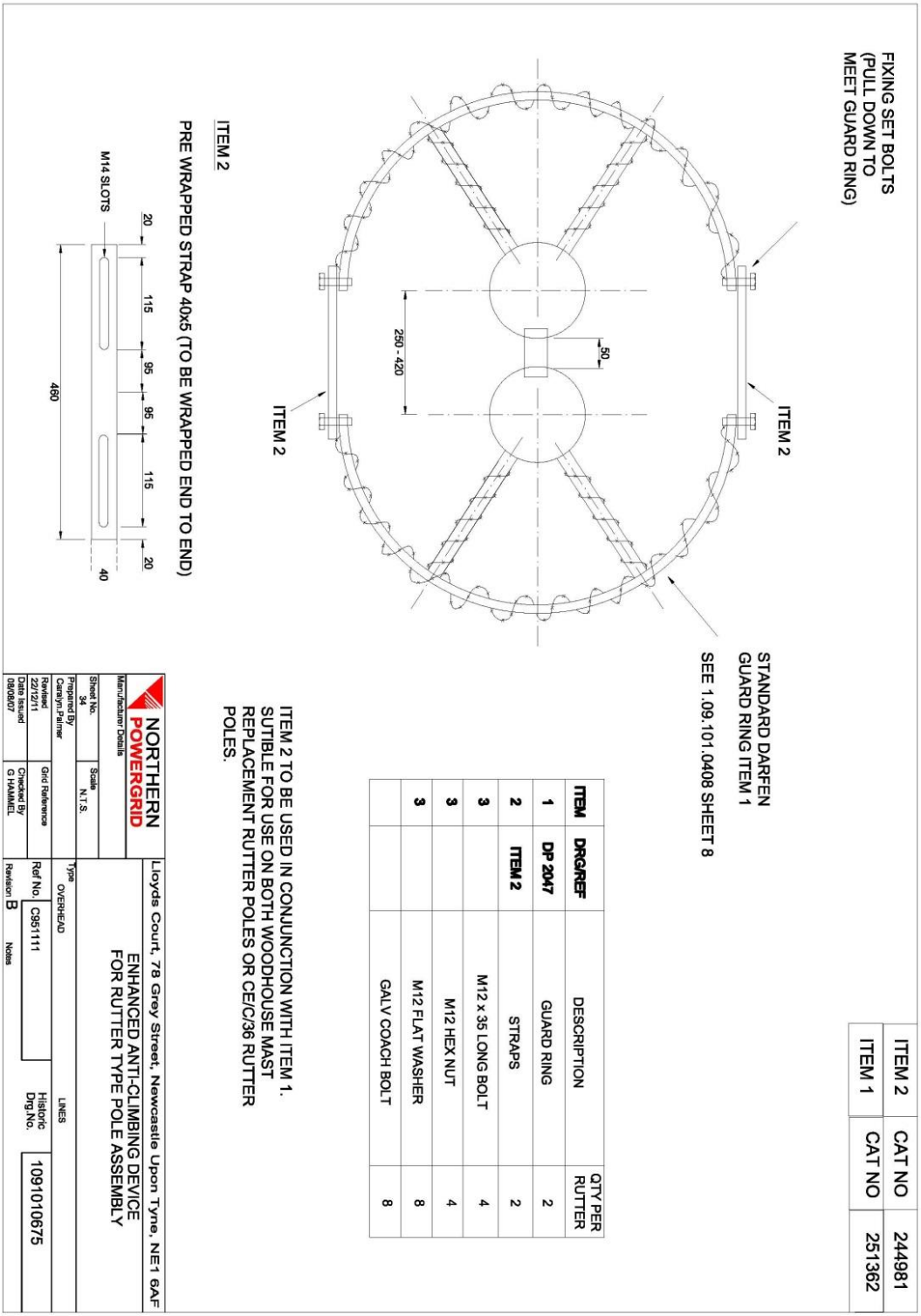
Appendix 1 – Anti Climbing Guard for Single Wood Poles



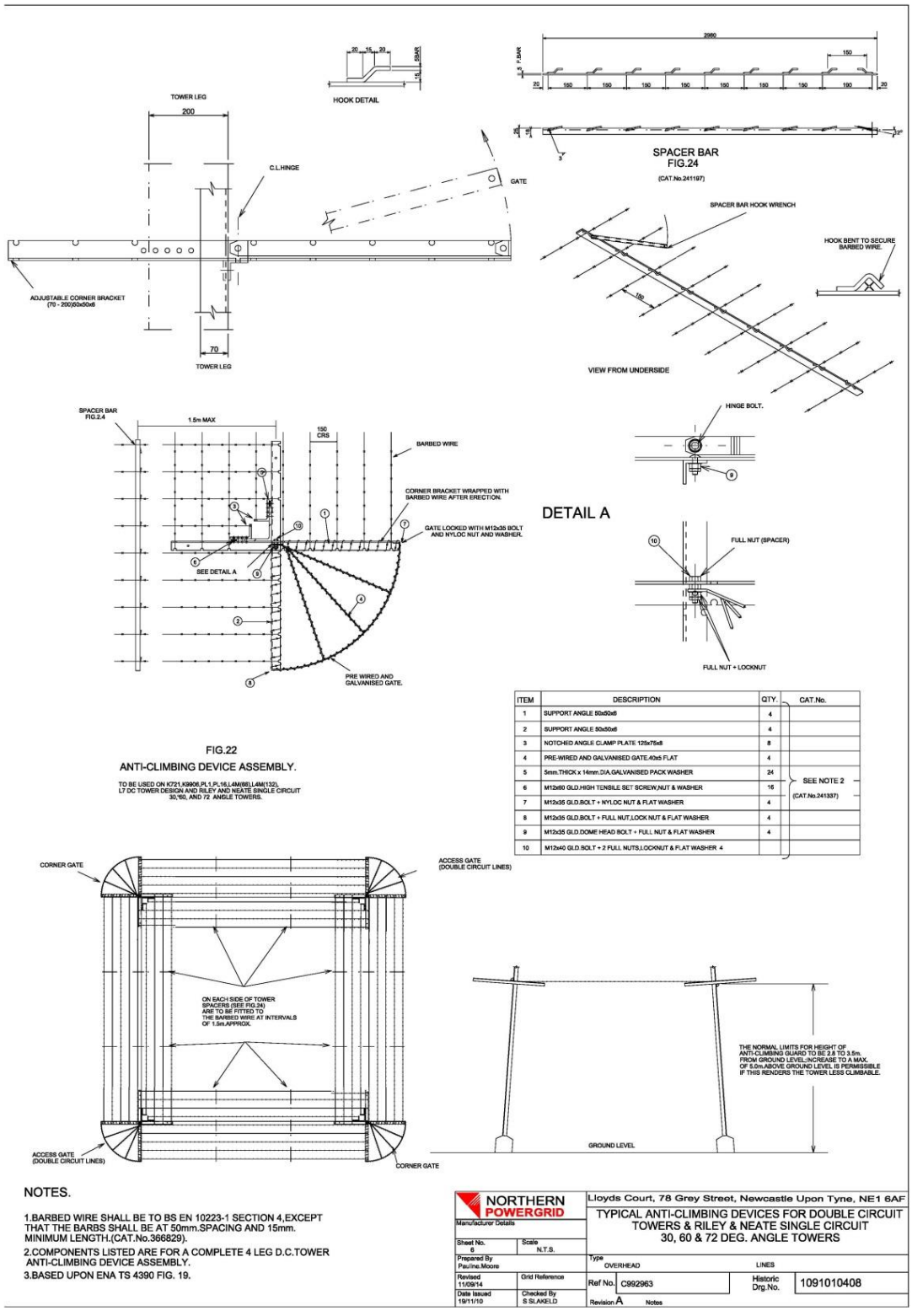
Appendix 2 – Anti Climbing H Pole Guard



Appendix 3 – Anti Climbing Guard for Rutter Pole

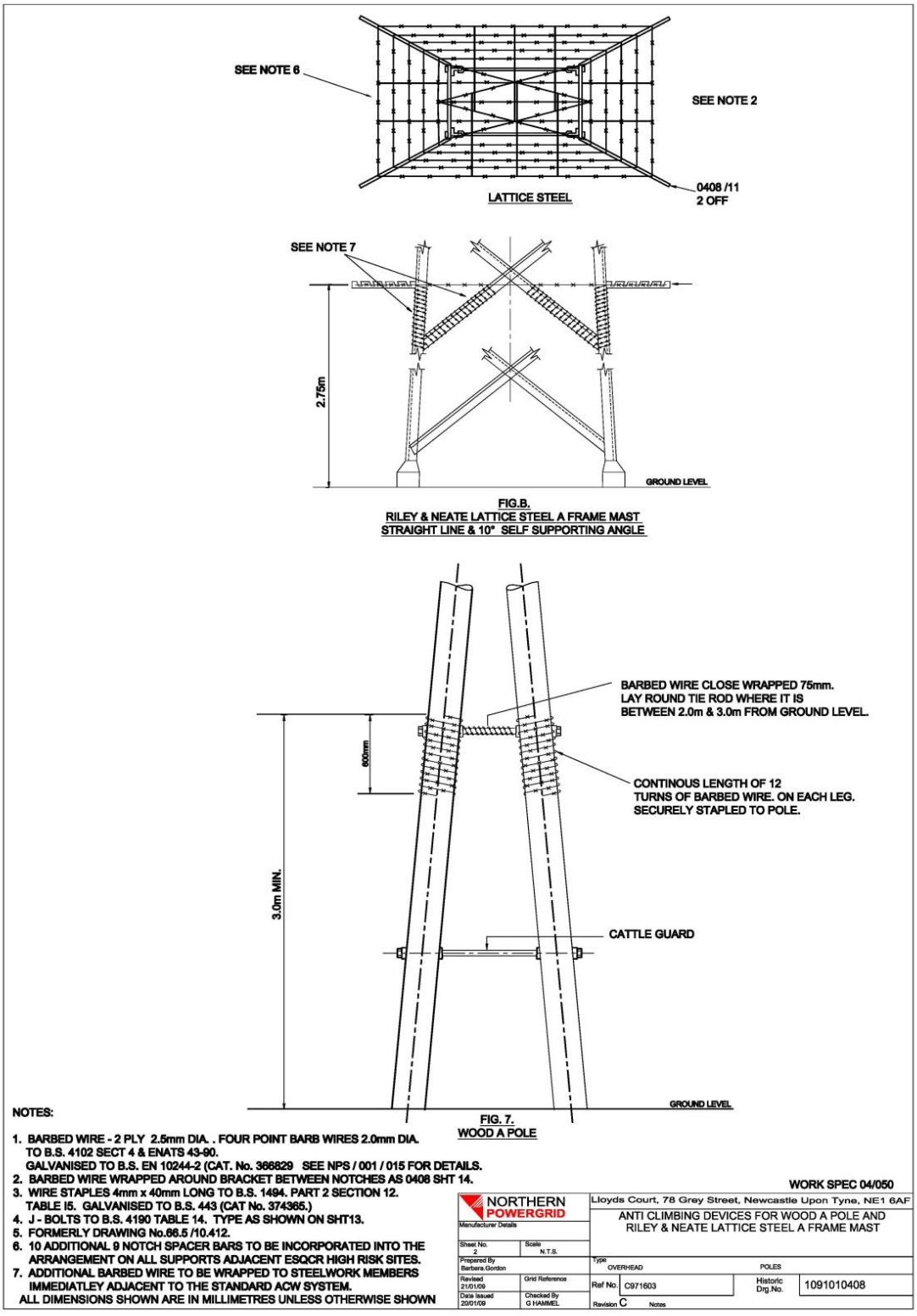


Appendix 4 – Anti Climbing Guard Tower Supports

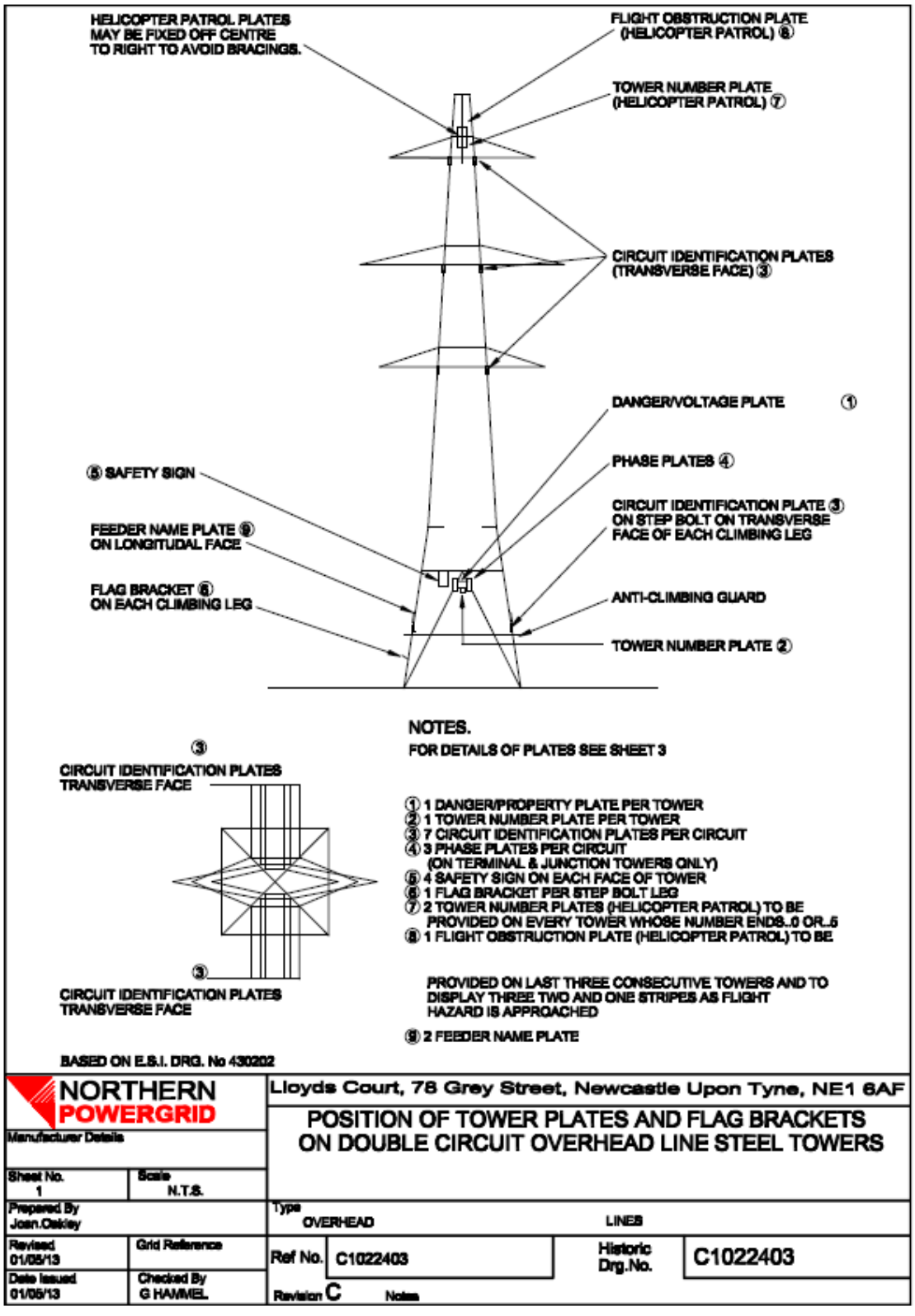


ITEM	DESCRIPTION	QTY.	CAT.No.
1	SUPPORT ANGLE 80x50x6	4	
2	SUPPORT ANGLE 50x50x6	4	
3	NOTCHED ANGLE CLAMP PLATE 125x75x8	8	
4	PRE-WIRED AND GALVANISED GATE,40x5 FLAT	4	
5	5mm.THICK x 14mm.DIA.GALVANISED PACK WASHER	24	SEE NOTE 2 (CAT.No.241337)
6	M12x80 GLD.HIGH TENSILE SET SCREW,NUT & WASHER	16	
7	M12x35 GLD.BOLT + NYLOC NUT & FLAT WASHER	4	
8	M12x35 GLD.BOLT + FULL NUT,LOCK NUT & FLAT WASHER	4	
9	M12x35 GLD.DOME HEAD BOLT + FULL NUT & FLAT WASHER	4	
10	M12x40 GLD.BOLT + 2 FULL NUTS,LOCKNUT & FLAT WASHER	4	

Appendix 5 – Anti Climbing Guards for Riley and Neate Masts and A Poles

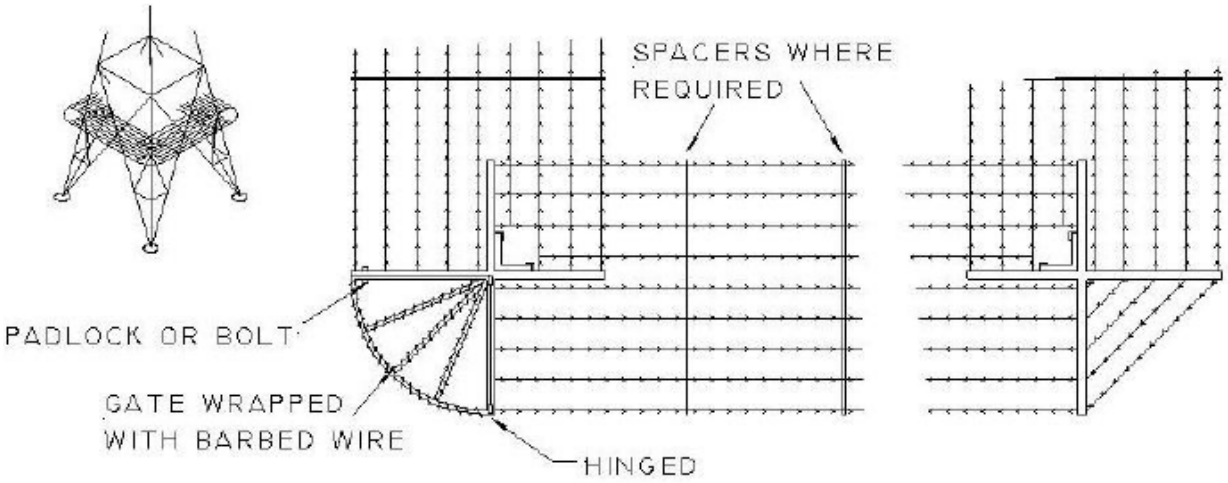


Appendix 6 – Type and Positioning of Tower Signage

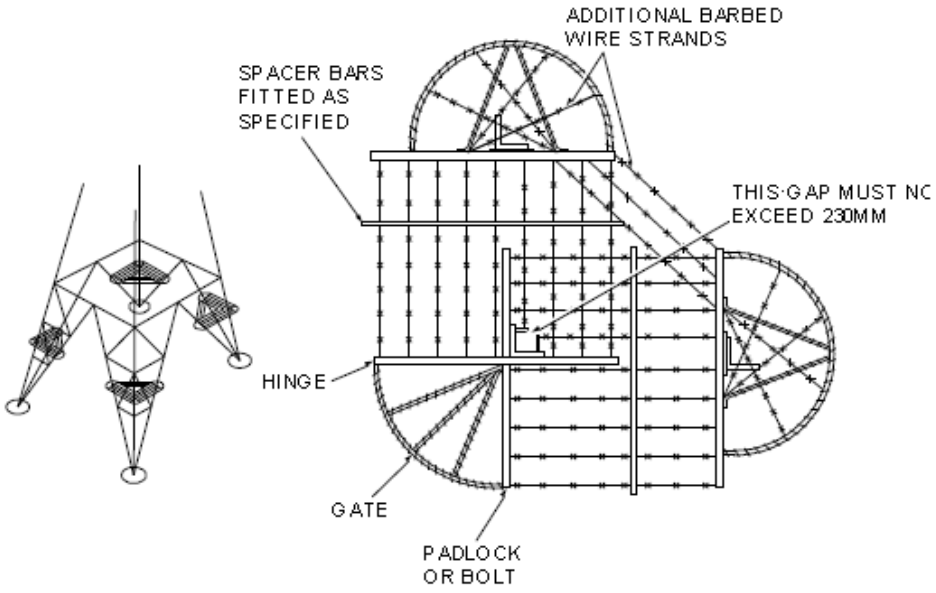


Appendix 7- Typical tower ACD arrangements

Example of anti-climbing measure for lattice tower – arrangement for attachment to towers at the level of the main horizontal member

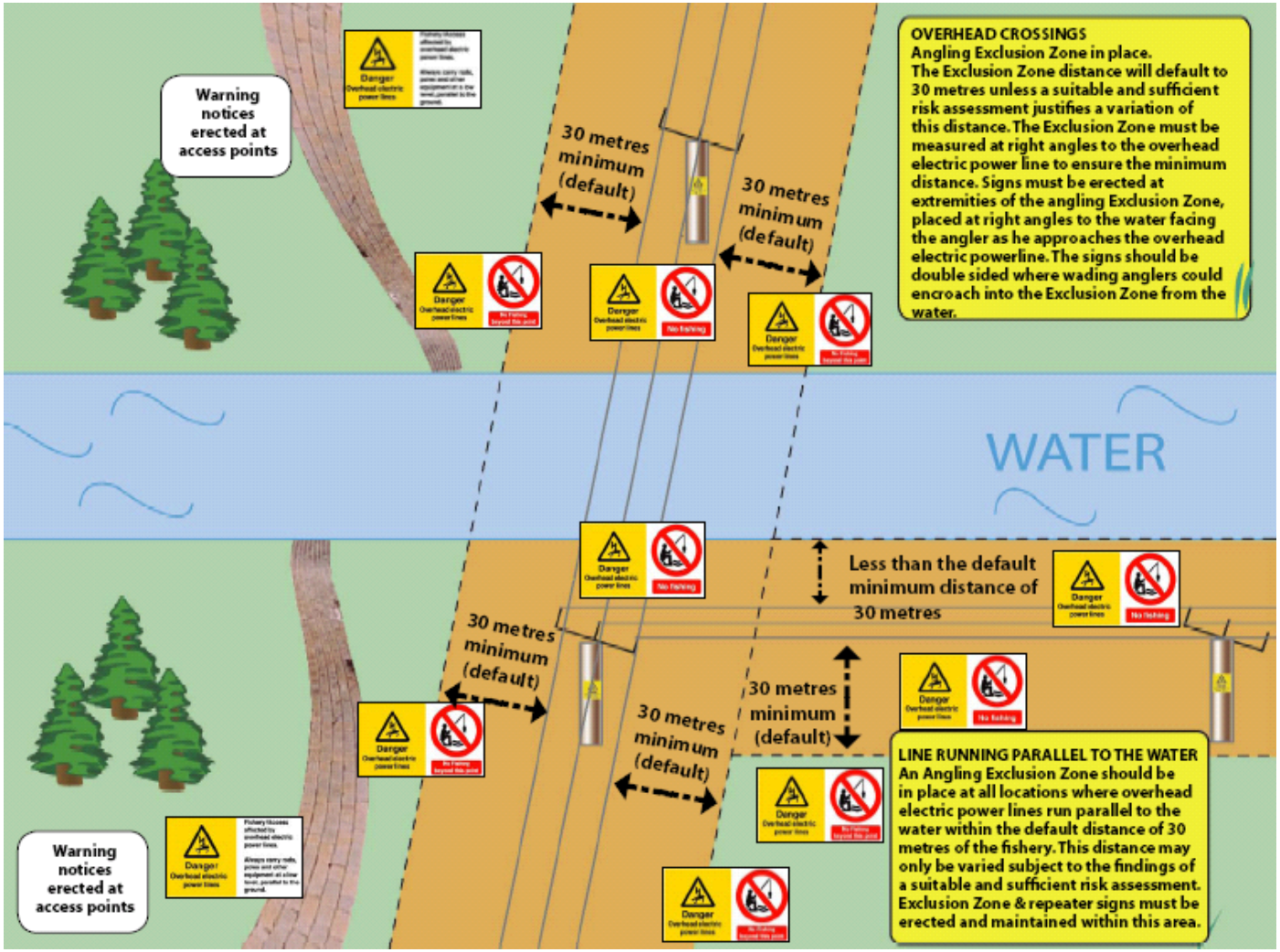


Detail of corner type guard



Note: Climbing leg only shown.

Appendix 8 – Application of Exclusion Zone Signage for Fishing



Appendix 9 - Application of Exclusion Zone Signage for Fishing (continued)