NPS/001/005 - Technical Specification for Overhead Line Steelwork, Conductor Fittings, Insulator Fittings and Stay Fittings

1. Purpose

The purpose of this document is to outline the technical requirements for all overhead line steelwork, conductor fittings, insulator fittings and galvanised stay fittings for general construction works on the Northern Powergrid distribution networks.

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

Document Reference	Document Title	Version	Published Date
NPS/001/005	Technical Specification for Overhead Line Steelwork, Conductor Fittings, Insulator Fittings and Stay Fittings	7.0	April 2019

2. Scope

This specification details the technical requirements for overhead line steelwork and fittings for use on the Northern Powergrid distribution networks. This includes pole top steelwork, steelwork for ancillary equipment, brackets for terminating low voltage overhead lines and services, stay fittings and conductor/insulator fittings. This document excludes and tower steelwork or fixings which are contained in a separate document NPS/001/028.

The majority of items are detailed in Energy Networks Association Technical Specifications (ENATS) or British Standards that are listed within the relevant subsection of section 3.0.

Technical documents referenced within this specification refer to the latest versions of the relevant International Standards, British Standard Specifications and all relevant Energy Networks Association Technical Specifications (ENATS) current at the time of supply.

The following appendices form part of this technical specification:

- Appendix 1 - Schedule of Items
- Appendix 2 - Addendum of Suppliers Requirements
- Appendix 3 - Self Certification Conformance Declaration
- Appendix 4 - Technical Information Check List

2.1. Contents

3. Technical Specification

3.1. Steelwork

The following general requirements shall apply to the range of steelwork required for the construction of overhead lines on wood poles, attachments to buildings and tower lines. In general items shall comply with Energy Networks Association Technical Specification (ENA TS) 43-95 - Issue 6.

Unless otherwise specified the steel used in the manufacture of items to this standard shall be to BS EN 10 025 Grade S.275JR.

Equal and unequal angle sections shall conform to BS EN 10056 Part 1. Channel sections shall conform to BS 4, Part 1. Flat sections shall comply with BS 6722.

Bending of flat straps can be carried out cold then stress-relieved at 600°C minimum or alternatively hot bent.

All ferrous materials shall be hot dip galvanised in accordance with BS EN 1461 after fabrication.

Welding shall be carried out in accordance with BS EN 1011 Part 1. After welding and before galvanising, welds shall be thoroughly cleaned to remove slag and splatter, particular attention being paid to the toes of the welds and to the prevention of entrapment of slag and splatter. The preferred method of cleaning welds before galvanising is by sandblasting.

Dimensions are subject to the following tolerances, unless otherwise stated:

- Dimensions up to and including 50 mm - ±1 mm
- Dimensions greater than 50 mm - ± 2 mm

Limiting dimensions of holes shall be within the tolerances or the 'medium fit series' of BS EN 20273 the hole diameters shown on the drawing correspond to the 'minimum diameter' column of the 'medium fit series'.

Fasteners and washers shall be in accordance with ENA TS 43-96.

3.2. Conductor and Insulator Fittings

3.2.1. General

In general fittings should comply with BS 3288 Parts 1 and 2 and shall be designed so as to:

(i) Be of adequate strength for the intended application of the fitting and free from defects which would affect the performance of the fitting.

(ii) Be compatible with the conductor material or capable of being used with an intermediate such that there can be no deleterious effect on the conductor or fitting resulting from their association.

(iii) Not adversely affected in the long term by any coating applied for corrosion or protection.

(iv) Ensure that the conductor is unaffected by installation of the fitting, either immediately, e.g. opening or damaging of the strands, or during service, e.g. fretting, fatigue or corrosion of the strands;

(v) Withstand the design operating current including both maximum continuous and short circuit currents, without exhibiting a corresponding rise in temperature greater than that of the associated conductor;

(vi) Withstand the specified short circuit current or power arc requirements without adversely affecting the mechanical strength of the fitting.

(vii) Ensure that the voltage drop across current carrying fittings is less than that for the equivalent length of conductor.

(viii) Withstand the mechanical loads relevant to the installation-service-maintenance conditions, the service temperatures and environmental effects.

(ix) Minimise the number of parts and the possibility of incorrect assembly and installation.

(x) Ensure that individual components are secured against becoming loose in service and that all threaded fasteners are locked.

(xi) Fittings subjected to articulation or wear shall be designed, including material selection and manufacture to ensure the maximum wear resistance.

(xii) Manufactured from materials, which have sufficient strength, ductility and environmental resistance to withstand both static and dynamic loading. Where appropriate, designed such that the magnetic losses are acceptably low.

(xiii) Ferrous castings shall be manufactured in accordance with BS 3288-1 section 6.1.

(xiv) Ferrous materials shall be hot dip galvanised in accordance with BS EN 1461 after fabrication.

(xv) Fasteners and washers shall be in accordance with ENA TS 43-96.

3.2.2. Insulator Set and Earth Wire Fittings

The dimensions of insulator set fittings shall be as given in the appropriate table and figure of BS 3288 part 2.

Where fittings are provided with ball and socket couplings, the dimensions of the ball and socket shall be as given in BS EN 60372 for the appropriate size of coupling with the dimensions of ball or socket checked by means of the gauges described within the standard.

Sockets shall be provided with either “W’ type security clips, or split pin “R" clips. This locking device shall be designed for locking the minimum size pin ball in the maximum size socket. This requirement is fulfilled if the locking devices standardized in BS EN 60372 used.

3.2.3. Suspension Clamps

Suspension clamps shall be tested and inspected in accordance with BS 3288 – 1 section 9 and BS EN 61284 clause 11.4.

Clamps shall be free to pivot in the vertical plane of the conductor with a minimum range of movement of +/- 30º about the vertical centre line and with the trunnion axis of the clamp passing through the conductor centre line to within +/- 5% of the conductor diameter.

The mouth of the suspension clamp shall be rounded and slightly flared, with a minimum radius of curvature in the vertical plane of 150mm.

Clamps shall have a slipping capacity between the specified minimum and maximum slipping loads.

So that the effects of Aeolian vibration both on the conductor and on the clamp is minimised;

To avoid localised pressure or damage to the conductor, and shall have sufficient contact surface to avoid damage by fault currents.

Suspension clamps must be manufactured from materials appropriate to the size and type of line conductors. Where suspension clamps are manufactured from malleable cast iron, and used on ACSR conductors, they must be specified to be supplied with aluminium liners to protect the soft aluminium conductor.

Drawing 1091010498 sheets 1 and 2 provide typical details of clamps suitable for aluminium and copper based conductors.

3.2.4. Earth Wire Suspension Clamps

In addition to the general requirements specified above, earth wire suspension clamps and all suspension clamps for use with OPPC, OPGW and ADSS shall be capable of being used in conjunction with factory formed helical armour rods.

Earth Wire suspension clamps shall be provided with an earth bond attachment lug.

3.2.5. Insulator Protective Fittings

The ends of all arcing horns shall be formed into smooth hemispheres. The end of tubular arcing horns shall also be sealed. All tubular arcing horns shall be incorporate vent holes and shall be fitted with zinc vent plugs after galvanizing.

3.2.6. Insulator & Pilot Insulator Pins

Insulator pins shall be of the 10kN "Large Head" Design as illustrated in BS3288 part 2 Fig 4.

They shall be supplied in three versions:

a) Type 29 and 31 – 10kN, 230 and 305mm shanks – Drawing 1091010527 sheet 1

b) Wishbone Construction 10kN, 230 and 305mm shanks – Drawing 1091010509 sheet 1

c) Pilot Pin – 500mm long with 50mm or 150mm shanks – Drawing 1091010619 sheet 1

3.3. Corrosion Protection

All materials used in the manufacture of insulator and conductor fittings shall be inherently resistant to atmospheric corrosion which could affect their performance.

All ferrous materials shall either be inherently resistant to atmospheric corrosion, or be suitably protected against corrosion that can occur during transportation, storage or service. All ferrous parts which will be exposed to the atmosphere in service, except those made of the appropriate grade of stainless steel, shall be protected by hot dip galvanizing in accordance with the requirements of BS EN ISO 1461.

This will typically provide minimum local and mean coating thickness values of 70µm and 85µm respectively. Actual minimum values is dependent on the thickness of the steel being protected and must be found by reference to BS EN 1461 table 3.

All external threads shall be cut or rolled before hot-dipped galvanizing. Nuts to be galvanised shall be subsequently tapped 0.4 mm oversize and the threads oiled.

3.4. Inspection and Testing

All routine and regular sample tests detailed in the standards referred to in this specification shall be carried out at each stage of manufacture.

Type, sample and routine tests shall be undertaken as appropriate on the conductor and insulator fittings in accordance with the requirements on this specification and BS3288 Part 1 and BS EN 61284

Clauses 3.4.1 to 3.4.7 detail the specific testing requirements dependant on the component type. Appendix 2 contains self-certification conformance declarations and should be completed for each product group offered.

3.4.1. Steelwork

Steelwork shall be inspected and tested in accordance with BS EN 10 025.

3.4.2. Insulator Set Fittings and Earth Conductor Fittings

Insulator fittings and earth conductor fittings shall be tested and inspected in accordance with BS 3288 – 1 section 6 and BS EN 61284.

3.4.3. Suspension Clamps

Suspension clamps shall be tested and inspected in accordance with BS 3288 – 1 section 9 and BS EN 61284 clause 11.4

3.4.4. Insulator Pins

Insulator pins shall be tested and inspected in accordance with BS 3288 – 1 section 5 and BS EN 61284.

3.4.5. Mechanical Protective Fittings

Mechanical protective fittings shall be tested and inspected in accordance with BS 3288 – 1 section 11 and BS EN 61284.

3.4.6. Electrical Control Fittings (Arc Protection Devices)

Electrical control fittings shall be tested and inspected in accordance with BS 3288 – 1 section 10.

3.4.7. Stay Fittings

In general fittings should comply with ENA TS 43-91 where applicable. All ferrous materials shall be suitably protected against corrosion such as can occur during service by hot dip galvanisation to the requirements of BS EN 1461. The tube portion of the adjustable stay rod shall be manufactured from heavy gauge steel tube in accordance with BS EN 10255. Threads shall be to BS 3643 course pitch class with a 7H/8g tolerance.

3.5. Tolerances

Tolerances in shall be in accordance with the following requirements:

For dimensions where no special tolerances apply:

Up to and including 35 mm: ± 0.7 mm

Over 35 mm: ± 20 / 1 000

Where a maximum dimension is specified: + 0, - 10 / 1 000

Where a minimum dimension is specified: - 0, + 10 / 10 000

3.6. Identification and Marking

All insulator and conductor fittings shall be marked to ensure a system of traceability. Corona free markings shall be in accordance with the requirements of BS EN 61284.

Installation torque values shall be stated in Newton-metres (Nm), and for compression die sizes the metric ‘across flats’ dimension of the die (e.g. 40.21) shall be used.

4. References

4.1. External Documentation

The products described within this specification shall comply with the latest versions of the relevant International Standards, British Standard Specifications and all relevant Energy Networks Association Technical Specifications (ENATS) current at the time of supply.

Reference	Title
BS 3288 Part 1: 2014	Insulators and Conductor Fittings for Overhead Power Lines. Performance and general requirements
BS 3288 Part 2: 2009	Insulators and Conductor Fittings for Overhead Power Lines. Specification for a range of fittings
BS 3643: 2007	ISO metric screw threads
BS 4 Part 1: 2005	Structural steel sections. Specification for hot-rolled sections
BS 6722: 1986	Recommendations for dimensions of metallic materials
BS EN 10 025: 2004	Hot rolled products of structural steel
BS EN 10056 – 1: 2017	Specification for structural steel equal and unequal angles. Dimensions
BS EN 1011 Part 1: 2009	Welding. Recommendations for welding of metallic materials. General guidance for arc welding
BS EN 10255: 2004	Non-alloy steel tubes suitable for welding and threading. Technical delivery conditions
BS EN 1461: 2022	Hot Dipped Galvanised Coating on Fabricated Iron or Steel Articles
BS EN 20273: 1992	Fasteners. Clearance holes for bolts and screws
BS EN 60372: 2004	Locking devices for ball and socket couplings of string insulator units
BS EN 61284: 1998	Overhead Lines Requirements and Tests for Fittings
ENA TS 43-91: Issue 6 2016	Stay Strands and Stay Fittings for Overhead Lines
ENA TS 43-92 Issue 5: 2018	Conductor Fittings for Overhead Lines
ENA TS 43-95 Issue 6 2021	Steelwork for Overhead Lines
ENA TS 43-96 Issue 2: 1986	Specification for fasteners and washers for wood poles overhead lines

4.2. Internal Documentation

Reference	Title
NPS/001/028	Technical Specification for Tower Steelwork and Fixings

4.3. Amendments from Previous Version

Reference	Description
4.1 External Documentation	Document versions updated
Appendix 1 – Schedule of Items	New item added

5. Definitions

Term	Definition
ENA TS	Energy Networks Association Technical Specification

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
Liz Beat	Governance Administrator	13/04/2023

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	
No	Period: 5 years	Reason: Based on the standard contract period
Should this document be displayed on the Northern Powergrid external website?		Yes
		Date
Steve Salkeld	Policy and Standards Engineer	17/04/2023

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	13/04/2023
Joe Helm	Policy and Standards Manager	13/04/2023

6.4. Authorisation

Authorisation is granted for publication of this document.

		Date
Paul Black	System Engineering Manager	25/04/2023

Appendix 1 – Schedule of Items

ITEM	DESCRIPTION
171191	CABLE SUPPORT BRACKET, POLE MOUNTED 11/20/33KV TERMINATION: TO DRAWING NUMBER 1.18.113.0009 SHEET 6
219501	STEELWORK, DOUBLE BRACING FOR CE/C/37 PORTAL POLES: TO DRAWING NUMBER Y204L0905
219519	STEELWORK, SINGLE BRACING FOR CE/C/37 PORTAL POLES: TO DRAWING NUMBER Y204L0905
219642	STEELWORK, LV FITTING, "D" IRON PIN & SPLIT PIN (PRE-ASSEMBLED): TO DRAWING NUMBER Y604L0104
220343	STAY BRACKET, COMPLETE, FOR CE/C/37 OVERHEAD LINES: TO DRAWING NUMBER Y204L0503
220459	STEELWORK, MOUNTING BRACKET FOR TRIGGERED SPARK GAP: TO DRAWING NUMBER Y203L0913
220608	STEELWORK, CABLE SUPPORT FOR 33KV AND 66KV CABLE TERMINATION FOR CE/C/37-CE/OM/DC1 CONSTRUCTION: TO DRAWING NUMBER Y204L0917
222455	STEELWORK, CROSSARM ANGLE 0 TO 10 DEGREES FOR CE/C/37 CONSTRUCTION WITH GUSSET PLATES: TO DRAWING NUMBER Y204L0902
222463	STEELWORK, CROSSARM ANGLE 10 TO 60 DEGREES FOR CE/C/37 CONSTRUCTION WITH GUSSET PLATES: TO DRAWING NUMBER Y204L0903
222844	STEELWORK, CROSSARM INTERMEDIATE FOR CE/C/37 CONSTRUCTION: TO DRAWING NUMBER Y204L0901
223669	STEELWORK, CROSSARM TERMINAL FOR CE/C/37 CONSTRUCTION WITH GUSSET PLATES: TO DRAWING NUMBER Y204L0904
224253	EYE LINK, BALL ENDED 125KN MFL: TO DRAWING NUMBER 1.09.101.0455 SHEET 1
224535	STEELWORK, GALVANISED 33/66KV CABLE GUARD: TO DRAWING NUMBER 1.09.101.0753 SHEET 1
224840	ARCING HORN, 66KV 125KN TENSION SET EARTH END, PIN FITTING: TO DRAWING NUMBER Y204L0708
224949	ARCING HORN, 66KV 125KN TENSION SET EARTH END, FLAG FITTING: TO DRAWING NUMBER Y204L0708
224972	ARCING HORN, 66KV SUSPENSION SET EARTH END, FLAG FITTING: TO DRAWING NUMBER Y204L0709
225003	ARCING HORN, 33/66KV SUSPENSION SET LINE END, FLAG FITTING: TO DRAWING NUMBER Y204L0709
225029	ARCING HORN, 132KV TENSION SET EARTH END FOR APPROACH SET: TO DRAWING NUMBER 1.09.101.0497 SHEET 4
225078	ARCING HORN, 132KV SUSPENSION EARTH END, SINGLE CONDUCTOR: TO DRAWING NUMBER 1.09.101.0497 SHEET 3
225086	ARCING HORN, 132KV SUSPENSION LINE END, SINGLE CONDUCTOR: TO DRAWING NUMBER 1.09.101.0497 SHEET 2
225102	SINGLE LINK, FOR INSULATOR ASSEMBLY: TO DRAWING NUMBER 1.09.101.0471 SHEET 2
225110	EYE LINK, BALL ENDED 70KN MFL: TO DRAWING NUMBER 1.09.101.0455 SHEET 2
225128	BALL TENSION LINK, MFL 120KN: TO YE/M/BPC 220
225938	LANDING PLATES, 125KN MFL: TO DRAWING NUMBER 1.09.101.0466 SHEET 1
225946	SAG ADJUSTER, LANDING PLATE 125KN MFL: TO DRAWING NUMBER 1.09.101.0483 SHEET 5
226225	MISCELLANEOUS ITEMS - ROD TIE FOR STRUT POLES TO DRAWING NO EB/L3/E22 6' X 3/4'' THREADED 18'' BOTH ENDS
226316	SHACKLE, MFL 125KN: TO DRAWING NUMBER Y204L0707
226365	SHACKLE, 125KN TO BS3288 28/29
227009	ESI 43-40 TRANSFORMER MOUNT UP TO 1400KG 1830MM-POLE CENTRES DRAWING NO Y203L0917, COMPLETE WITH TWO TRANSFORMER CLAMPING PLATES DRAWING NO EATS 439529, TO COMPLY WITH YE SPECIFICATION BPC 45.048(99) DATED 20 JULY 1999
227041	STEELWORK, CROSSARM 33KV CABLE TERMINATION WITH SURGE DIVERTORS FOR CE/C/36(M) CONSTRUCTION: TO DRAWING NUMBER Y208L0901
227553	STEELWORK, LIGHT CONSTRUCTION FLAT CROSSARM TIE STRAP: TO DRAWING NUMBER EATS 439505
228031	LANDING PLATES, LIGHT LINE TERMINATING STRAP 20KN MFL: TO DRAWING NUMBER 1.09.101.0477 SHEET 3
228395	STEELWORK, PLATFORM FOR 66KV POLYMERIC CABLE TERMINATION & SURGE DIVERTOR FOR CE/C/37(M) CONSTRUCTION: TO DRAWING NUMBER Y204L0918
228585	STEELWORK, AIR BREAK SWITCH DIS-CONNECTOR PLATFORM (2 EACH OF ITEMS 1 & 2): TO DRAWING NUMBER Y203L0916
228932	STEELWORK, TRANSFORMER & POLE SET, MAXIMUM 1760KG FOR 1830 CENTERS 'H' TERMINAL: TO DRAWING NUMBER 1091010612 SHEET 10
228940	STEELWORK SET FOR 66KV WOOD POLE SURGE DIVERTORS. DRAWING NUMBER 1.09.101.0650 SHEET 7.
231477	STAY ROD, TUBULAR 22MM: TO DRAWING NUMBER 1.00.043.9101 SHEET 2
232732	IRONWORK, FLAT 625 X 60 X 12 SMALL HOLE 66KV TERMINAL: TO DRAWING NUMBER 1.09.101.0308 SHEET 12 ITEM 47
232747	IRONWORK, FLAT 625 X 60 X 12 LARGE HOLE 66KV TERMINAL: TO DRAWING NUMBER 1.09.101.0308 SHEET 12 ITEM 48
237134	STAY PLATE: SINGLE MAKE-OFF: TO DRAWING NO. 1.00.043.9110 SHT 1
237524	IRONWORK, CROSSARM BRACE FOR HV LINES: TO DRAWING NUMBER 1.00.043.9515 SHEET 1
237539	IRONWORK, INSULATOR PIN BRACKET/STOOL: TO DRAWING NUMBER 1.00.043.9518 SHEET 1
237558	IRONWORK, CROSSARM MEMBER, 2900MM 3 PHASE SECTION: TO DRAWING NUMBER 1.00.043.9520 SHEET 1
237562	IRONWORK, CROSSARM MEMBER, 4100MM 'H' S/LINE SECTION OR SECTION ANGLE: DRAWING NUMBER 1.00.043.9521 SHEET 1
237577	IRONWORK, CROSSARM MEMBER, 2600MM 3 PHASE TERMINAL: TO DRAWING NUMBER 1.00.043.9522 SHEET 1
237581	IRONWORK, CROSSARM STRUT/STRAP: TO DRAWING NUMBER 1.00.043.9526 SHEET 1
237596	IRONWORK, HALF SECTION STRAP/PLATE: TO DRAWING NUMBER 1.00.043.9528 SHEET 1
237609	IRONWORK, SECTION STRAP/PLATE: TO DRAWING NUMBER 1.00.043.9525 SHEET 1
237702	IRONWORK, CROSSARM 2500 X 100 X 75 FOR HEAVY CONSTRUCTION 'A' POLES: TO DRAWING NO. 1.09.101.0654 SHEET 1
237717	IRONWORK, CROSSARM 2900 X 100 X 75 FOR SECTION 'A' POLES: TO DRAWING NO. 1.09.101.0655 SHEET 1
237721	IRONWORK, CROSSARM 2900 X 100 X 75 X 12 'A' POLE SECTION: TO DRAWING NO. 1.09.101.0651 SHEET 1
237736	IRONWORK, ANGLE, 60 X 50 X 8 X 1044 FOR 'A' POLE STRAP/STRUT: TO DRAWING NO. 1.09.101.0656 SHEET 1 ITEM 1
237740	IRONWORK, ANGLE, 65 X 50 X 8 X 1238 FOR 'A' POLE STRAP/STRUT: TO DRAWING NO. 1.09.101.0656 SHEET 1 ITEM 2
237755	IRONWORK, ANGLE, 65 X 50 X 8 X 1251 FOR 'A' POLE STRAP/STRUT: TO DRAWING NO. 1.09.101.0656 SHEET 1 ITEM 3
240103	ARC HORN, 1 POINT, ROUND END, FOR TENSION SET: TO DRAWING NUMBER 1.09.101.0494 SHEET 1 ITEM 5

240175	LINK CRANKED, 125KN MFL: TO DRAWING NUMBER 1.09.101.0469 SHEET 1 ITEM 2
240245	LINK CRANKED, 125KN MFL: TO DRAWING NUMBER 1.09.101.0469 SHEET 1 ITEM 3
240264	ARC HORN, 1 POINT, ROUND END, FOR TENSION SET: TO DRAWING NUMBER 1.09.101.0494 SHEET 1 ITEM 6
220228	STAY OUTRIGGER BRACKET: AS PER DRAWING EB/L3/E20.
240279	ARC HORN, 66KV UPPER POST INSULATOR: TO DRAWING NUMBER 1.09.101.0589 SHEET 4 ITEM 6
240283	ARC HORN, 66KV LOWER POST INSULATOR: TO DRAWING NUMBER 1.09.101.0589 SHEET 4 ITEM 7
240298	IRONWORK CHANNEL SUPPORT, TO DRAWING NO. 1.09.101.0650, SHT 4, ITEM 13
240315	IRONWORK, FOUNDATION STEELWORK FOR 66KV PORTAL CONSTRUCTION: DRAWING NUMBER 1.09.101.0650 SHEET 3 ITEM 9
240423	ARC HORN, 1 POINT, ROUND END, FOR TENSION SET: TO DRAWING NUMBER 1.09.101.0494 SHEET 1 ITEM 1
240476	IRONWORK, ANGLE SURGE DIVERTOR BRACKETS 50 X 50 X 6: TO DRAWING NUMBER 1.09.101.0161 SHEET 3
240480	ARC HORN, 1 POINT, ROUND END, FOR TENSION SET: TO DRAWING NUMBER 1.09.101.0494 SHEET 1 ITEM 4
240508	IRONWORK CHANNEL, CABLE TERM SUPPORT, TO DRAWING NO. 1.09.101.0650, SHT4, ITEM 11
240512	IRONWORK CHANNEL, SURGE, ARREST SUPPORT, TO DRAWING NO. 1.09.101.0650, SHT4, ITEM 12
240527	ARC HORN, 1 POINT SMOOTH TIP FOR TENSION ASSEMBLIES: TO DRAWING NUMBER 1.09.101.0492 SHEET 1 ITEM 7
240531	ARC HORN, 1 POINT SMOOTH TIP FOR TENSION ASSEMBLIES: TO DRAWING NUMBER 1.09.101.0492 SHEET 1 ITEM 8
240546	ARC HORN, 1 POINT SMOOTH TIP FOR TENSION ASSEMBLIES: TO DRAWING NUMBER 1.09.101.0492 SHEET 1 ITEM 10
240550	STEELPOLE, NEUTRAL BAR: TO DRAWING NO. 1.09.119.3505 SHEET 1 ITEM 1
240565	STEELPOLE, NEUTRAL BAR EXTENTION: TO DRAWING NO. 1.09.119.3505 SHEET 1 ITEM 2
240584	ARC HORN, 1 POINT, RING END: TO DRAWING NUMBER 1.09.101.0495 SHEET 1 ITEM 1
240601	ARC HORN, 2 POINT, ROUND END, FOR SUSPENSION SET: TO DRAWING NUMBER 1.09.101.0493 SHEET 1 ITEM 1
240616	ARC HORN, 2 POINT, ROUND END: TO DRAWING NUMBER 1.09.101.0495 SHEET 1
240635	ARC HORN, 2 POINT, SMOOTH ROUND TIP: TO DRAWING NUMBER 1.09.101.0489 SHEET 1 ITEM 1
240654	BALL CLEVIS, 125KN MFL: TO DRAWING NUMBER 1.09.101.0470 SHEET 1
240739	IRONWORK, PLATE 150 X 150 X 15MM 66KV PORTAL STEELWORK COMPONANT: DRAWING 1.09.101.0650 SHEET 1 ITEM 5
240847	SHACKLE, 70KN MFL COMPLETE WITH PIN AND SPLIT PIN: TO DRAWING NUMBER 1.09.101.0444 SHEET 1
240902	SOCKET CLEVIS, 125KN MFL (WITH ARCING HORN FIXING): TO DRAWING NUMBER 1.09.101.0463 SHEET 1
240974	LINK CRANKED, 70KN MFL: TO DRAWING NUMBER 1.09.101.0452 SHEET 1 ITEM 1
240989	LINK CRANKED, 125KN MFL: TO DRAWING NUMBER 1.09.101.0469 SHEET 1 ITEM 1
241002	SOCKET TONGUE, 125KN MFL: TO DRAWING NUMBER 1.09.101.0465 SHEET 1
241017	SOCKET CLEVIS, 125KN MFL: TO DRAWING NUMBER 1.09.101.0464 SHEET 1
241074	U-BOLT, CONDUCTOR, SUSPENSION, J.L. EVE TOWER - DRAWING 1091010641 ITEM2
241089	U-BOLT, E/WIRE, SUSPENSION, J.L. EVE TOWER - DRAWING 1091010641 ITEM1
241303	SERVICE BRACKET, CHIMNEY SET: TO DRAWING NO. 1.09.119.3200 SHEET 1
241341	SERVICE BRACKET, CORNER: TO DRAWING NUMBER 1.00.043.9510 SHEET 1
241430	SERVICE BRACKET, EAVES EXTENTION: TO DRAWING NUMBER 1.00.043.9511 SHEET 1
241515	LINK CRANKED, 70KN MFL: TO DRAWING NUMBER 1.09.101.0452 SHEET 1 ITEM 2
241623	SAFETY SIGN (TOWER) SUPPORT FIXING KIT: COMPRISE OF ALL ITEMS FOR EACH FACE OF ONE TOWER: DRAWING NO.1.09.101.0229 SHEET 4
242005	STAY PLATE, DOUBLE MAKE-OFF: TO DRAWING NUMBER 1.09.101.0207 SHEET 2 ITEM 1
242236	SERVICE BRACKET, FOR CONCENTRIC CABLE: TO DRAWING NUMBER 1.00.043.9510 SHEET 1
242274	SERVICE BRACKET, WALL STAND OFF 200MM: TO DRAWING NUMBER 1.00.043.9509 SHEET 1
242679	LINK CRANKED, 70KN MFL: TO DRAWING NUMBER 1.09.101.0452 SHEET 1 ITEM 3
243084	IRONWORK, CABLE CASING, SWG16 FOR 66KV TERMINAL POLE: TO DRAWING NUMBER 1.09.101.0308 SHEET 5 ITEM 40
243192	IRONWORK, FLAT ANTI CLIMB 40 X 12 X 1955 FOR 66KV CABLE TRUNKING: DRAWING NUMBER 1.09.101.0408 SHEET 11 ITEM 7
243421	IRONWORK, CHANNEL, DRAWING NO. 1.09.101.0551, SHEET 4, ITEM 10
243493	IRONWORK, CHANNEL, DRAWING NO. 1.09.101.0551, SHEET 4, ITEM 11
243686	SERVICE BRACKET, FOR ABC: AS PER DRAWING NO. 1.00.043.1226, SHEET 2
243811	SERVICE BRACKET, CORNER FOR ABC: TO DRAWING NO. 1.00.043.1226, SHEET 1
243883	BRACKET, LOW VOLTAGE OUTRIGGER FOR 300MM SPACING 5-WIRE NETWORK, 1 METER OFFSET TO DRAWING NUMBER 1.00.043.9508 SHEET 2
243987	IRONWORK, SUPPORT PLATE FOR 66KV SURGE ARRESTOR: TO DRAWING NUMBER 1.09.101.0308 SHEET 11 ITEM 46
244208	IRONWORK, FOUNDATION BAR FOR 66KV PORTAL CONSTRUCTION: TO DRAWING NO. 1.09.101.0650 SHEET 3 ITEM 10
244424	ARC HORN, 1 POINT, ROUND END, FOR TENSION SET: TO DRAWING NUMBER 1.09.101.0494 SHEET 1 ITEM 7
244566	IRONWORK, ANGLE, 60 X 60 X 6900 FOR 13 M POLE 66KV CABLE SUPPORT: TO DRAWING NUMBER 1.09.101.0550 SHEET 2
244922	STAY THIMBLE, FOR 7/4MM STAY WIRE: TO DRAWING NO. 1.00.043.9109 SHEET 1
245268	CABLE CLEAT AND MOUNTING PLATE, DRAWING NO. 1.09.101.0309, ITEM 7
245304	IRONWORK, CROSSARM SINGLE PHASE TERMINAL: TO DRAWING NUMBER 1.09.101.0369 SHEET 2
245305	IRONWORK, TRANSFORMER PLATFORM SET FOR 1830 CENTRES 'H' POLES MAX LOAD 1400KGS: TO DRAWING NUMBER 1.09.101.0612 SHEET 7
245306	IRONWORK, TRANSFORMER PLATFORM SET FOR SINGLE POLES: TO DRAWING NUMBER 1.09.101.0612 SHEET 8
245307	IRONWORK, FUSE ISOLATOR PLATFORM SET FOR 'H' POLE OR STUB POLE SUBSTATION: DRAWING NUMBER 1.09.101.0612 SHEET 9
245308	IRONWORK, FUSE ISOLATOR SET FOR SINGLE SUPPORT WOOD POLES: TO DRAWING NUMBER 1.09.101.0612 SHEET 6
245309	IRONWORK, SET FOR FUSE ISOLATORS ON SINGLE SUPPORT WOOD POLE: DRAWING NUMBER 1.09.101.0085 SHEET 1 ITEM 1,5,6
245766	STEELPOLE, NEUTRAL BAR ANGLE CONDUCTOR CLAMP FOR 32MM HDBC: TO DRAWING NUMBER 1.09.119.3508 SHEET 1 ITEM 4
245770	STEELPOLE, NEUTRAL BAR ANGLE CONDUCTOR CLAMP FOR 70MM HDBC: TO DRAWING NUMBER 1.09.119.3508 SHEET 1 ITEM 5
245785	STEELPOLE, NEUTRAL BAR ANGLE CONDUCTOR CLAMP FOR 100MM HDBC: TO DRAWING NUMBER 1.09.119.3508 SHEET 1 ITEM 6
245802	STEELPOLE, NEUTRAL BAR ANGLE CONDUCTOR CLAMP FOR 100MM ALUMINIUM: DRAWING 1.09.119.3508 SHEET 1 ITEM 2

245817	STEELPOLE, NEUTRAL BAR ANGLE CONDUCTOR CLAMP FOR 150MM ALUMINIUM: TO DRAWING 1.09.119.3508 SHEET 1 ITEM 3
245821	STEELPOLE, NEUTRAL BAR ANGLE CONDUCTOR CLAMP FOR 50MM ALUMINIUM: TO DRAWING 1.09.119.3508 SHEET 1 ITEM 1
246010	SUSPENSION CLAMP, FOR ALUMINIUM CONDUCTOR: TO DRAWING NUMBER 1.09.101.0498 SHEET 1
246044	ARC HORN, EARTH END FOR POST INSULATORS: TO DRAWING NUMBER 1.09.101.0490 SHEET 18
246186	ARC HORN, LIVE END FOR POST INSULATORS: TO DRAWING NUMBER 1.09.101.0490 SHEET 19
246449	CLEVIS CONNECTOR, 60MM, ACSR EARTHWIRE: TO DRAWING NUMBER 1.09.101.0420 SHEET 6
246453	CLEVIS CONNECTOR, 70MM, ACSR EARTHWIRE: TO DRAWING NUMBER 1.09.101.0420 SHEET 6
246538	IRONWORK, CHANNEL CROSSARM COMPONENT FOR 66KV PORTAL POLES: TO DRAWING NO. 1.09.101.0664 SHEET 1 ITEM 1
246542	IRONWORK, FLAT CROSSARM COMPONENT FOR 66KV PORTAL POLES: TO DRAWING NO. 1.09.101.0664 SHEET 1 ITEM 2
247225	IRONWORK, CHANNEL 127 X 64 X 2570 3 PHASE S/S: TO DRAWING NUMBER 1.09.101.0131 SHEET 2 ITEM 4
247278	CHANNEL, IRONWORK, 102 X 51 X 1900, TO DRAWING NO. 1.09.101.0131 SHEET 1C ITEM 2
247600	SOCKET TONGUE, 125KN MFL: TO DRAWING NUMBER 1.09.101.0465 SHEET 1
247653	LANDING PLATE, 70KN MFL: TO DRAWING NUMBER 1.09.101.0460 SHEET 1
248586	BALL CLEVIS, 70KN MFL: TO DRAWING NUMBER 1.09.101.0456 SHEET 1
248590	SOCKET CLEVIS, 70KN MFL: TO DRAWING NUMBER 1.09.101.0457 SHEET 1
248603	OBSOLETE -BALL CLEVIS, 70KN MFL (WITH ARCING HORN FIXING): TO DRAWING NUMBER 1.09.101.0447 SHEET 1
248942	STEELPOLE, COLLAR CLAMP (PAIR) POLE DIAMETER 7.63: TO DRAWING NUMBER 1.09.119.3510 SHEET 1 ITEM 3
249220	STEELPOLE, COLLAR CLAMP (PAIR) POLE DIAMETER 8.63: TO DRAWING NUMBER 1.09.119.3510 SHEET 1 ITEM 4
249269	STEELPOLE, COLLAR CLAMP (PAIR) POLE DIAMETER 9: TO DRAWING NUMBER 1.09.119.3510 SHEET 1 ITEM 5
249343	STEEPOLE, COLLAR CLAMP (PAIR) POLE DIAMETER 10.75: TO DRAWING NUMBER 1.09.119.3510 SHEET 1 ITEM 7
249381	IRONWORK, ANGLE 60 X 60 X 8 X 983 DIAGONAL FOR SURGE DIVERTOR PLATFORM: DRAWING 1.09.101.0612 SHEET 4 ITEM 7
249409	ARC HORN, 2 POINT, ROUND END, FOR SUSPENSION SET: TO DRAWING NUMBER 1.09.101.0493 SHEET 1 ITEM 2
249413	ARC HORN, 2 POINT, ROUND END, FOR SUSPENSION SET: TO DRAWING NUMBER 1.09.101.0493 SHEET 1 ITEM 3
249428	ARC HORN, 2 POINT, ROUND END, FOR SUSPENSION SET: TO DRAWING NUMBER 1.09.101.0493 SHEET 1 ITEM 5
249432	ARC HORN, 2 POINT, ROUND END, FOR SUSPENSION SET: TO DRAWING NUMBER 1.09.101.0493 SHEET 1 ITEM 4
249659	STEELPOLE, ABC COLLAR CLAMP (PAIR) 194.00MM DIA: TO DRAWING NUMBER 1.09.119.3510 SHEET 2 ITEM 1
249663	STEELPOLE, ABC COLLAR CLAMP (PAIR) 140MM DIA: TO DRAWING NUMBER 1.09.119.3510 SHEET 2 ITEM 2
249678	STEELPOLE, ABC COLLAR CLAMP (PAIR) 219MM DIA: TO DRAWING NUMBER 1.09.119.3510 SHEET 2 ITEM 3
250514	SINGLE LINK, FOR INSULATOR ASSEMBLY: TO DRAWING NUMBER 1.09.101.0609 SHEET 1
250622	SOCKET CLEVIS, 70KN MFL (WITH ARCING HORN FIXING): TO DRAWING NUMBER 1.09.101.0448 SHEET 1
250764	SOCKET TONGUE, 70KN: TO DRAWING NUMBER 1.09.101.0458 SHEET 1
250779	SOCKET TONGUE, 70KN MFL (WITH ARCING HORN FIXING): TO DRAWING NUMBER 1.09.101.0449 SHEET
250919	SAG ADJUSTER PLATE SET, 190KN MFL: TO DRAWING NUMBER 1.09.101.0483 SHEET 3
250923	SAG ADJUSTER LINKS, 190KN MFL: TO DRAWING NUMBER 1.09.101.0483 SHEET 3
250938	SAG ADJUSTER SHACKLE, 190KN MFL: TO DRAWING NUMBER 1.09.101.0483 SHEET 3
250942	SAG ADJUSTER PLATE, 70KN MFL: TO DRAWING NUMBER 1.09.101.0483 SHEET 4
251451	OBSOLETE - IRONWORK, CROSSARM STRUT/STRAP, LIGHT LINE: TO DRAWING NUMBER 1.00.043.9555 SHEET 1
251466	IRONWORK, CROSSARM SINGLE PHASE INTER AND PIN ANGLE: TO DRAWING NUMBER 1.00.043.9556 SHEET 1
251470	IRONWORK, CROSSARM 2500 3 PHASE INTER AND PIN ANGLE: TO DRAWING NUMBER 1.00.043.9557 SHEET 1
251475	COVERED CONDUCTOR: INTERMEDIATE AND ANGLE/SECTION CROSSARM: AS PER DRAWING 1.00.043.9562 SHEET 1.
251476	COVERED CONDUCTOR: TERMINAL CROSSARM (SINGLE POLE) AS PER DRAWING 1.00.043.9563 SHEET 1
251477	COVERED CONDUCTOR: ANGLE / SECTION CROSSARM ("H" POLE); AS PER DRAWING 1.00.043.9564 SHEET 1
251478	COVERED CONDUCTOR: TERMINAL CROSSARM ("H" POLE) AS PER DRAWING 1.00.043.9565 SHEET 1
251485	IRONWORK, FLAT TOP FOR FAILURE CONTAINMENT: TO DRAWING NUMBER 1.00.043.9560 SHEET 1 ITEM 1
251502	IRONWORK, FLAT BOTTOM FOR FAILURE CONTAINMENT: TO DRAWING NUMBER 1.00.043.9560 SHEET 1 ITEM 2
251663	LINK SINGLE, 70KN MFL: TO DRAWING NUMBER 1.09.101.0458 SHEET 1 TYPE 1
251678	LINK SINGLE, 70KN MFL: TO DRAWING NUMBER 1.09.101.0458 SHEET 1 TYPE 2
251682	LINK, SINGLE MFL 70KN: TO DRAWING NUMBER 1.09.101.0609 SHEET 1 TYPE 3
251907	EYE LINK, BALL ENDED, 70KN MFL: TO DRAWING NUMBER 1.09.101.0455 SHEET 1
252647	STAY STRAPS, 66KV SINGLE CIRCUIT LINES: TO DRAWING NUMBER 1.00.043.9113 SHEET 1
252651	IRONWORK, CHANNEL CROSSARM FOR 66KV PORTAL CONSTRUCTION: TO DRAWING NUMBER 1.09.101.0650 SHEET 1 ITEM 1
252666	IRONWORK, SECTION PLATE FOR 66KV PORTAL TERMINAL CONSTRUCTION: DRAWING NUMBER 1.09.101.0650 SHEET 1 ITEM 2
252670	IRONWORK, CHANNEL SPACER FOR 66KV PORTAL CONSTRUCTION: TO DRAWING NUMBER 1.09.101.0650 SHEET 1 ITEM 4
252685	IRONWORK, VERTICAL CHANNEL COMPONANT FOR 66KV SINGLE CIRCUIT WOOD POLE CONSTRUCTION: TO DRAWING NO. 1.09.101.0652 SHEET 1 ITEM 1
252702	IRONWORK, POST ANGLE COMPONANT FOR 66KV SINGLE CIRCUIT WOOD POLE CONSTRUCTION: 1.09.101.0652 SHEET 1 ITEM 2
252717	IRONWORK, ROUND SPACER COMPONANT FOR 66KV SINGLE CIRCUIT WOOD POLE CONSTRUCTION: .09.101.0652 SHEET 1 ITEM 3
252721	IRONWORK, TIE STRAP COMPONANT FOR 66KV SINGLE CIRCUIT WOOD POLE CONSTRUCTION: 1.09.101.0652 SHEET 1 ITEM 4
252736	IRONWORK, OBLONG SPACER COMPONANT FOR 66KV SINGLE CIRCUIT WOOD POLE CONSTRUCTION: TO DRAWING NO. 1.09.101.0652 SHEET 1 ITEM 5
252740	IRONWORK, SQUARE SPACER COMPONANT FOR 66KV SINGLE CIRCUIT WOOD POLE CONSTRUCTION: TO DRAWING NO. 1.09.101.0652 SHEET 1 ITEM 6
252755	IRONWORK, LARGE SQUARE SPACER COMPONANT FOR 66KV SINGLE CIRCUIT WOOD POLE CONSTRUCTION: TO DRAWING NO. 1.09.101.0652 SHEET 1 ITEM 7
252948	HOOK, BALL ENDED PIGTAIL 20KN MFL: TO DRAWING NUMBER 1.09.101.0502 SHEET 1
253071	HOOK, BALL ENDED, 70KN MFL: TO DRAWING NUMBER 1.09.101.0454 SHEET 1
253086	HOOK, BALL ENDED 70KN MFL (WITH ARCING HORN FIXING): TO DRAWING NUMBER 1.09.101.0445 SHEET 1
253921	FAILURE CONTAINMENT, SHEAR-PIN CARRIER: TO DRAWING NUMBER 1.00.043.9561 SHEET 1 ITEM 1

253993	FAILURE CONTAINMENT, SHEAR-PIN CARRIER: TO DRAWING NUMBER 1.00.043.9561 SHEET 1 ITEM 2
254515	ARC HORN, 1 POINT SMOOTH TIP FOR TENSION ASSEMBLIES: TO DRAWING NUMBER 1.09.101.0492 SHEET 1 ITEM 1
254534	ARC HORN, 1 POINT SMOOTH TIP FOR TENSION ASSEMBLIES: TO DRAWING NUMBER 1.09.101.0492 SHEET 1 ITEM 2
254549	ARC HORN, 1 POINT SMOOTH TIP FOR TENSION ASSEMBLIES: TO DRAWING NUMBER 1.09.101.0492 SHEET 1 ITEM 3
254553	ARC HORN, 1 POINT SMOOTH TIP FOR TENSION ASSEMBLIES: TO DRAWING NUMBER 1.09.101.0492 SHEET 1 ITEM 5
254568	ARC HORN, 1 POINT SMOOTH TIP FOR TENSION ASSEMBLIES: TO DRAWING NUMBER 1.09.101.0492 SHEET 1 ITEM 9
254572	ARC HORN, 1 POINT, RING END: TO DRAWING NUMBER 1.09.101.0428 SHEET 1 ITEM 2
254591	ARC HORN, 2 POINT SMOOTH ROUND TIP: TO DRAWING NUMBER 1.09.101.0489 SHEET 1 ITEM 2
254657	IRONWORK, FOUNDATION FOR 1830 CENTRES "H": TO DRAWING NUMBER 1.00.043.9558 SHEET 1
254661	ARC HORN, 1 POINT SMOOTH TIP FOR TENSION ASSEMBLIES: TO DRAWING NUMBER 1.09.101.0492 SHEET 1 ITEM 4
254676	ARC HORN, 1 POINT SMOOTH TIP FOR TENSION ASSEMBLIES: TO DRAWING NUMBER 1.09.101.0492 SHEET 1 ITEM 6
254680	IRONWORK, FOUNDATION FOR 2500 CENTRES "H": TO DRAWING NUMBER 1.00.043.9559 SHEET 1
256012	IRONWORK, CHANNEL PLATE 102 X 51: TO DRAWING NUMBER 1.09.101.0006 SHEET 3 ITEM 6
256027	IRONWORK, CHANNEL PLATE 76 X 51: TO DRAWING NUMBER 1.09.101.0006 SHEET 3 ITEM 7
256065	IRONWORK, SINGLE PILOT PIN BRACKET: TO DRAWING NUMBER 1.09.101.0006 SHEET 3 ITEM 5
256737	IRONWORK, SINGLE PHASE JUMPER CHANNEL: TO DRAWING NUMBER 1.09.101.0006 SHEET 3 ITEM 4
256900	IRONWORK CHANNEL 76 X 38 X 2000, TO DRAWING NO. 1.09.101.0085-1
256915	IRONWORK, FLAT CRANK 70 X 10 X 1625: TO DRAWING NUMBER 1.09.101.0085 SHEET 1 ITEM 2
256949	IRONWORK, FLAT 70 X 10 X 685: TO DRAWING NUMBER 1.09.101.0085 SHEET 1 ITEM 5
256953	IRONWORK, FLAT CRANK 60 X 8 X 710: TO DRAWING NUMBER 1.09.101.0085 SHEET 1 ITEM 6
256972	IRONWORK, FLAT 70 X 10 X 1201: TO DRAWING NUMBER 1.09.101.0085 SHEET 1 ITEM 3
257299	IRONWORK, JUMPER CHANNEL 76 X 51 X 1950: TO DRAWING NUMBER 1.09.101.0128 SHEET 2 ITEM 4
257689	IRONWORK, CHANNEL 102 X 51 X 1370 FOR SURGE DIVERTOR MOUNTING: TO DRAWING NUMBER 1.09.101.0612 SHEET 3 ITEM 1
257693	IRONWORK, CHANNEL 76 X 51 X 1830 FOR 'H' POLE SURGE DIVERTOR MOUNTING: DRAWING 1.09.101.0612 SHEET 3 ITEM 2
257725	IRONWORK, ANGLE 75 X 50 X 6 X 780 HORIZONTAL FOR SURGE DIVERTOR PLATFORM: DRAWING 1.09.101.0612 SHEET 4 ITEM 5
257903	IRONWORK, CHANNEL 50 X 10 X 846 FOR 'H' 1830 ROCKING AERIAL SWITCH: DRAWING NUMBER 1.09.101.0506 SHEET 1 ITEM 6
257937	IRONWORK, ANGLE 75 X 50 X 6 X 1200 FOR SURGE DIVERTOR PLATFORM: TO DRAWING NUMBER 1.09.101.0612 SHEET 3 ITEM 3
258145	STEELPOLE, MOUNTING BAR FOR LV FUSES: TO DRAWING NUMBER 1.09.119.3524 SHEET 1
258709	IRONWORK, FLAT BAR 60 X 20 X 217 FOR 66KV PORTAL CONSTRUCTION: TO DRAWING NUMBER 1.09.101.0650 SHEET 1 ITEM 3
258893	IRONWORK, TIE BAR BRACE 70 X 70 X 5000: TO DRAWING NUMBER 1.09.101.0169 SHEET 1 ITEM 1
259792	IRONWORK, FLAT WELDED CABLE CLEAT PLATE 70 X 10 X 160: TO DRAWING NUMBER 1.09.101.0174 SHEET 3 ITEM 6
260022	CLAMP ADAPTOR, 70KN MFL TO SUIT ALCANGRIP DEAD END ASSEMBLY: TO DRAWING NUMBER 1.09.101.0476 SHEET 1
260179	IRONWORK, FLAT 70 X 70 X 10: TO DRAWING NUMBER 1.09.101.0085 SHEET 1 ITEM 9
261222	IRONWORK, FLAT STRAP LV EXTENSION FOR NEUTRAL BAR: TO DRAWING NUMBER 1.00.043.9504 SHEET 1
261824	INSULATOR PIN, 10KN MFL WITH 230MM STALK: TO DRAWING NUMBER 1.09.101.0527 SHEET 1 ITEM 1
261839	INSULATOR PIN; 10KN MFL FOR WISHBONE CONSTRUCTION: TO DRAWING NO 1.09.101.0509 SHEET 1, ITEM 3
261843	INSULATOR PIN, 10KN MFL WITH 305MM STALK: TO DRAWING NUMBER 1.09.101.0527 SHEET 1 ITEM 2
261858	INSULATOR PIN; 10KN MFL, FOR WISHBONE CONSTRUCTION TO DRAWING NO. 1.09.101.0509 SHEET 1, ITEM 4
261896	PIN INSULATOR, PILOT MFL 0.7KN SHANK 150MM: TO DRAWING NUMBER 1.09.101.0619 SHEET 1 ITEM 2
261909	PIN INSULATOR, PILOT MFL 0.7KN SHANK 50MM: TO DRAWING NUMBER 1.09.101.0619 SHEET 1 ITEM 1
171690	INSULATOR PILOT PIN. COACH SCREW TYPE (MFL 0.7KN)
262032	ABC-FITTING, WEAK LINK: TO DRAWING. 1.00.043.1405 SHEET 1.
262206	STEELPOLE, NEUTRAL BAR STRAIGHT LINE CONDUCTOR CLAMP FOR 32MM HDBC: DRAWING NO. 1.09.119.3506 SHEET 1 ITEM 1
262278	STEELPOLE, NEUTRAL BAR STRAIGHT LINE CONDUCTOR CLAMP FOR 70MM HDBC: DRAWING NO. 1.09.119.3506 SHEET 1 ITEM 2
262282	STEELPOLE, NEUTRAL BAR STRAIGHT LINE CONDUCTOR CLAMP FOR 100MM HDBC OR 50MM PLAIN ALUMINIUM: TO DRAWING NO. 1.09.119.3506 SHEET 1 ITEM 3
262390	OBSOLETE - STEELPOLE, NEUTRAL BAR CONDUCTOR CLAMP BOTTOM: TO DRAWING NO. 1.09.119.3506 SHEET 1 ITEM 4
262403	STEELPOLE, NEUTRAL BAR STRAIGHT LINE CONDUCTOR CLAMP FOR 100MM ALUMINIUM: TO DRAWING NO. 1.09.119.3506 SHEET 2 ITEM 5
262418	STEELPOLE, NEUTRAL BAR STRAIGHT LINE CLAMP FOR 150MM ALUMINIUM: DRAWING 1.09.119.3506 SHEET 2 ITEM 6
262615	STEELPOLE, NEUTRAL TERMINATING SHACKLE PLATES: TO DRAWING NUMBER 1.09.119.3513 SHEET 1
264428	SHACKLE, 70KN MFL COMPLETE WITH PIN AND SPLIT PIN: TO DRAWING NUMBER 1.09.101.0443 SHEET 1
264610	SOCKET THIMBLE, LARGE RADIUS, 70KN FOR 16MM BALL: TO DRAWING NUMBER 1.09.101.0426 SHEET 3
264682	SOCKET THIMBLE, 70KN MFL FOR 16MM BALL: TO DRAWING NUMBER 1.09.101.0426 SHEET 1
265098	POLE STEP, FOR WOOD POLE TYPE 1: TO DRAWING NUMBER 1.09.101.0082 SHEET 1
267252	TURNBUCKLE, GALVANISED 20MM: TO DRAWING NUMBER 1.09.101.0178 SHEET 1
267271	TURNBUCKLE, GALVANISED 24MM: TO DRAWING NUMBER 1.09.101.0178 SHEET 1
298123	IRONWORK, TIE BAR BRACE 70 X 70 X 6000: TO DRAWING NUMBER 1.09.101.0169 SHEET 1 ITEM 2
342760	DUAL LOCKING BAR - TO FIT STANDARD HASP AND STAPLE TYPE TO DRAWING NUMBER 102.105.0042 SHEET 1.
342761	DUAL LOCKING BAR - HIGH SECURITY TYPE TO DRAWING NUMBER 102.105.0042 SHEET 1.
346473	IRONWORK, CROSSARM CHANNEL COMPONENT FOR 132KV SINGLE CIRCUIT POLES: TO DRAWING NO. 1.09.101.0670 SHEET 3
346488	IRONWORK, CROSSARM FLAT FOR 132KV SINGLE CIRCUIT POLES: TO DRAWING NO. 1.09.101.0670 SHEET 2
346492	IRONWORK, CROSSARM CHANNEL FOR 132KV SINGLE CIRCUIT POLES: TO DRAWING NO. 1.09.101.0670 SHEET 1
346505	IRONWORK, CROSSARM SMALL CHANNEL COMPONENT FOR 132KV SINGLE CIRCUIT POLES: DRAWING 1.09.101.0670 SHEET 4
346524	IRONWORK, CROSSARM THICK PLATE FOR 132KV SINGLE CIRCUIT POLES: TO DRAWING NO. 1.09.101.0670 SHEET 5
346539	IRONWORK, CROSSARM STEEL PLATE FOR 132KV SINGLE CIRCUIT POLES: TO DRAWING NO. 1.09.101.0670 SHEET 6
346543	IRONWORK, CROSSARM INSULATOR SUPPORT STRAP FOR 132KV SINGLE CIRCUIT POLES: DRAWING NO. 1.09.101.0670 SHEET 7

346558	IRONWORK, SECTION ANGLE CROSSARM FOR 132KV SINGLE CIRCUIT POLES: TO DRAWING NO. 1.09.101.0670 SHEET 8
346562	IRONWORK, CROSSARM STRUT FOR 132KV SINGLE CIRCUIT POLES: TO DRAWING NO. 1.09.101.0670 SHEET 9
346577	IRONWORK, CROSSARM SUPPORT CHANNEL FOR 132KV SINGLE CIRCUIT POLES: TO DRAWING NO. 1.09.101.0670 SHEET 10
368025	EYENUT M20
374346	STAPLE GALV WIRE 2.75" X 3G
346474	132KV WOODHOUSE STEELWORK - POST INSULATOR & TENSION PLATE DETAIL 565 LONG X 220 X 15 TO DGN 1091010675 SHT1
346476	132KV WOODHOUSE STEELWORK - CROSSARM BRACE 518 LONG X 50 X 50 X 5 ANGLE TO DGN 1091010675 SHT 4
346477	132KV WOODHOUSE STEELWORK - CROSSARM SUPPORT CHANNEL 1118 X 230 X 75 TO DGN 1091010675 SHT 5
346478	132KV WOODHOUSE STEELWORK - SECTION POLE CROSSARM 0-40 DEGREES 4860 LONG X 150 X 90 X 15 ANGLE TO DGN 1091010675 SHT 6
346479	132KV WOODHOUSE STEELWORK - SHORT CROSSARM FOR IN-LINE POLES 650LONG X 150 X 90 X 12 TO DGN 1091010675 SHT 7
346480	132KV WOODHOUSE STEELWORK - SIDE INSULATOR SUPPORT PLATE FOR IN-LINE POLES 409 LONG X 250 X 12 TO DGN 1091010675 SHT 8
346481	132KV WOODHOUSE STEELWORK - INSULATOR SUPPORT PLATE BRACKET 250 LONG X 150 X 90 X 12 FOR IN-LINE POLES DGN 1091010675 SHT 9
346482	132KV WOODHOUSE STEELWORK - SHORT CROSSARM SUPPORT CHANNEL FOR IN-LINE POLES 1263 LONG X 230 X 75 TO DGN 1091010675 SHT 10
346483	132KV WOODHOUSE STEELWORK - STAY YOKE LEG DETAIL 1000 LONG X 65 X 8 BAR TO DGN 1091010675 SHT 16
346487	132KV WOODHOUSE STEELWORK - TIE RODS, M20 X 360 SCREWED 95MM TO DGN 1091010675 SHT29 ITEM 4
346493	132KV WOODHOUSE STEELWORK - TIE RODS, M20 X 700 SCREWED 250MM TO DGN 1091010675 SHT29 ITEM 5
346496	132KV WOODHOUSE STEELWORK - TIE RODS, M16 X 474 SCREWED 107MM TO DGN 1091010675 SHT29 ITEM 8
346500	132KV WOODHOUSE STEELWORK - RUTTER SECTION POLE CROSSARM 0-2 DEGREES 4860 LONG X 150 X 90 X 15 ANGLE TO DGN 1091010675 SHT 31
346501	132KV WOODHOUSE STEELWORK - HORIZONTAL INSULATOR SUPPORT ANGLE 250 LONG X 100 X 75 X 12 DGN 1091010675 SHT 32
346502	132KV WOODHOUSE STEELWORK - CROSSARM STRUT 1460 LONG X 50 X 50 X 5 ANGLE TO DGN 1091010675 SHT 40
346503	132KV WOODHOUSE STEELWORK - 10 DEGREE CRANKED STAY STRAP 355 LONG X 65 X 20 BAR TO DGN 1091010675 SHT 46
346504	132KV WOODHOUSE STEELWORK - 45 DEGREE CRANKED STAY STRAP 355 LONG X 65 X 20 BAR TO DGN 1091010675 SHT 47
346508	132KV WOODHOUSE STEELWORK - SECTION PLATE 565 LONG X 220 X 15 TO DGN 1091010675 SHT 50 ITEM 2
346510	132KV WOODHOUSE STEELWORK - CROSSARM CHANNEL INSERT 1060 LONG X 203 X 76 TO DGN 1091010675 SHT 50 ITEM 6
371225	TIE RODS M20MM DIA, 600MM LONG TO DRAWING 1.00.043.9608 SHEET 1 ITEM 6
237725	IRONWORK XARM, 3740 X 100 X 75 X 12 TO DRAWING NO. 1.09.101.0651 SHEET 3 ITEM 1
237728	IRONWORK XARM, 1540 X 100 X 75 X 12 TO DRAWING NO. 1.09.101.0651 SHEET 3 ITEM 2
346507	132KV WOODHOUSE STEELWORK - CROSSARM CHANNEL 5660 LONG X 152 X 76 TO DGN 1091010675 SHT 50 ITEM 1

Appendix 2 – Addendum of Supplier Requirements

To enable Northern Powergrid to store the product(s) in accordance with the manufacturer's recommendations the suppliers should provide details of the recommended storage environment with respect to each product type.

The supplier shall ensure that each item is suitably packaged ensuring it is "fit for service" prior to installation taking account of the potential for an outdoor storage environment. All packaging shall be sufficiently durable giving regard to the function, reasonable use and contents of the packaging. Where steelwork sets are required they shall be supplied securely packaged together.

Palletised goods shall be supplied on standard 1200mm x 1000mm pallets.

Clearly legible, easily identifiable, durable and unambiguous labelling shall be applied to each individual and where relevant multiple package of like products. Where product packages tendered are made up of sub packages, each sub package shall be marked. As a minimum requirement the following shall be included.

* Manufacturer's trademark or name
* Supplier's trademark or name
* Description of item
* Date of packaging and/or batch number
* Northern Powergrid product code
* Weight

Appendix 3 - SELF CERTIFICATION CONFORMANCE DECLARATION

Steelwork, Conductor fittings, insulator fittings and stay fittings shall comply with the latest issues of the relevant international and international standards.

This check sheet identifies the clauses of the standard relevant to steelwork, Conductor fittings, insulator fittings and stay fittings for use on the Northern Powergrid distribution network. The manufacturer shall declare conformance or otherwise, clause by clause, using the following levels of conformance declaration codes.

Conformance declaration codes
N/A = Clause is not applicable/ appropriate to the product
Cs1 = The product conforms fully with the requirements of this clause
Cs2 = The product conforms partially with the requirements of this clause
Cs3 = The product does not conform to the requirements of this clause
Cs4 = The product does not currently conform to the requirements of this clause, but the manufacturer proposes to modify and test the product in order to conform.

Instructions for Completion
- When Cs1 code is entered no remark is necessary
- When any other code is entered the reason for non-conformance shall be entered
- Prefix each remark with the relevant 'BS EN' 'IEC' or 'ENATS' as appropriate.

Manufacturer:

Product Reference:

Name:

Signature:

Date:

Steelwork

• ENATS 43-95			
Clause/Sub-clause	Requirement	Conformance Code	Remarks and Evidence Reference
3.0 4.0 5.0	Materials and finish Welding Tolerances		

• BS EN 1461: Galvanising of Components			
Clause/Sub-clause	Requirement	Conformance Code	Remarks and Evidence Reference
5.0 6.1 6.2 6.3 6.4 6.5	Sampling Appearance Thickness Renovation Adhesion Acceptance criteria		

Steelwork

• BS EN 10025 – 3: Type S.275JR			
Clause/Sub-clause	Requirement	Conformance Code	Remarks and Evidence Reference
4.0	Classification and designation		
6.0	Manufacturing process		
7.1	General requirements		
7.2	Chemical composition		
7.3	Mechanical properties		
7.4	Technological properties		
7.5	Surface properties		
7.6	Internal soundness		
8.0	Inspection		
10.0	Test methods		

Conductor and Insulator Fittings

- BS 3288 Part 1 and BS EN 61284

Clause/Sub-clause	Requirement	Conformance Code	Remarks and Evidence Reference
BS 3288 Part 1 4.0 5.0 6.0 10.0 BS EN 61284 Section 7 Section 8 Section 9 Clause 11.4.1 clause 11.4.2 Clause 11.4.3 Clause 12.1 Clause 14.5	 General Requirements Requirements for insulator pins Insulator set and earth conductor fittings Electrical control fittings (arc control devices) <u>Suspension clamps</u> Visual Examination Dimensional & Material Verification Galvanising Finish tests Mechanical tests Vertical damage and failure load test Slip tests Clamp Bolt tightening test Electrical Tests Magnetic losses Corona		

- BS 3288 Part 2

Clause/Sub-clause	Requirement	Conformance Code	Remarks and Evidence Reference
3.0	Dimensions and tolerances		

4.0 7.0	Insulator pins Insulator set fittings		

Stay Fittings

• ENA TS 43-91 Issue 4			
Clause/Sub-clause	Requirement	Conformance Code	Remarks and Evidence Reference
4.1.2 4.2.1 4.2.13 5.1 5.2 8.0	Ferrous components General requirements for Stay Assemblies Stay thimbles Stay rod material requirements Test requirements Stay attachments and thimbles		

Appendix 4 - Technical Information Check List

The following information shall be provided by the supplier for review by Northern Powergrid. Additional information shall be provided if requested.

Requirement	Provided (Y/N)
Full product descriptions and part number/reference	
Appendix 3 – completed self-certification conformance declaration	
Complete set of drawings for each item	
Type test evidence	
Manufacturing routine test plan or product quality plan	
Packaging information	