

Electricity Specification 400H2

Issue 7 December 2021

Helical Fittings and Stay Markers for Overhead Lines



Amendment Summary

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1 Introduction

This Specification comprises general and technical requirements for helical fittings for overhead lines used on the electricity distribution network (Network) owned by Electricity North West Limited, as Distribution Licensee.

Current fittings are listed in [Appendices A to E](#).

2 Scope

This Specification covers the design performance and test requirements for helical fittings required for use on overhead line conductors, operating in the range LV to 132kV, and stay wires.

3 Definitions

Approval	Sanction by the Electricity North West Overhead Line Circuits Manager that specified criteria have been satisfied
Contract	The agreement between Electricity North West and the Contractor for the execution of the Works including therein all documents to which reference may properly be made in order to ascertain the rights and obligations of the parties under the said agreement.
Contractor	The person or person's firm or company, including personal representatives, successors and permitted assigns, who's Tender has been accepted by Electricity North West.
Specification	The Specifications and schedules (if any) agreed by the parties for the purpose of the Contract.
Sub-Contractor	Any person (other than the Contractor) named in the Contract for any part of the Works or any person to whom any part of the Contract has been sub-let with the consent in writing of the Electricity North West Overhead Line Circuits Manager, and the legal representatives, successors and assigns of such person.
Supplier	Any person or person's firm or company who supplies goods to Electricity North West or to its Contractor.
Tender	An offer in writing to execute work or supply goods at a fixed price.
Tenderer	The person or person's firm or company, including personal representatives, successors and permitted assigns, invited by Electricity North West to submit a Tender.

4 General Requirements for Approvals and Testing

4.1 Product not to be Changed

No change in the product, packaging or labelling shall be made after Approval has been granted without prior notice to the Electricity North West Overhead Line Circuits Manager, and receipt of a written agreement to the proposed change from the Electricity North West Overhead Line Circuits Manager.

4.2 Electricity North West Technical Approval

The Tenderer shall submit, with this Tender, proposals for testing which will demonstrate, to the satisfaction of the Electricity North West Overhead Line Circuits Manager, compliance with this Specification. Such tests shall be carried out without expense to Electricity North West.

Alternatively, technical reports and other data may be submitted that the Tenderer considers will demonstrate, to the satisfaction of the Electricity North West Overhead Line Circuits Manager, compliance with this Specification. Acceptance of this evidence shall be at the discretion of the Electricity North West Overhead Line Circuits Manager but will not be unreasonably withheld.

Approval shall be 'factory specific' and is not transferable to another factory without the written Approval of the Electricity North West Overhead Line Circuits Manager.

The Supplier and product shall comply with all the relevant requirements of Electricity North West documents EPD311 and CP311.

4.3 Quality Assurance

The Tenderer shall confirm whether or not Approval is held in accordance with a quality assurance scheme accredited under ISO 9000. If not, the Tenderer shall submit a statement of the quality assurance procedures employed to control the quality of the product, including the performance of Suppliers and Sub-Contractors.

The right is reserved for the repeat of such tests, from time to time, that the Electricity North West Overhead Line Circuits Manager may deem to be reasonably necessary to demonstrate continued compliance with the Specification.

The Tenderer shall submit, with the Tender, a list of tests and inspections which are carried out on the product prior to despatch which shall demonstrate, to the satisfaction of the Electricity North West Overhead Line Circuits Manager, fitness for installation and service.

The Tenderer shall provide free of charge to Electricity North West such samples as may, in the opinion of the Electricity North West Overhead Line Circuits Manager, be reasonably required for inspection and/or retention as quality control samples. The Electricity North West Overhead Line Circuits Manager will confirm the requirement for samples at the time of Tendering.

The right is reserved for inspections to be made of Tenderer's facilities, from time to time, as deemed reasonably necessary by the Electricity North West Overhead Line Circuits Manager to ensure compliance with this Specification and any Contract of which it forms a part.

The Tenderer shall submit, with the Tender, such details of product packaging disposal, as will enable Electricity North West to comply with the requirements of BS EN ISO 14001 - Environmental Management Systems.

4.4 Formulation

The Tenderer shall submit, with the Tender, such details of the formulation and use of the product and associated substances as will enable Electricity North West to comply with the obligations of the Health and Safety at Work Act 1974 and the Control of Substances Hazardous to Health Regulations 2002, in the use, storage and disposal of the product. The Tenderer may stipulate, prior to submission of such information, that it is to remain confidential, and the Electricity North West Overhead Line Circuits Manager will, if requested, confirm agreement to this prior to receipt of the information.

4.5 Identification Markings

The Tenderer shall submit, with the Tender, details of markings which it is proposed to apply to the product or packaging to identify manufacturing batches or items. The forms and content of such markings shall be subject to the Approval of the Electricity North West Overhead Line Circuits Manager and shall in all cases include the Electricity North West approved description and commodity code number.

The Tenderer shall submit, with the Tender, such details of marking gross weight on components, assemblies and packages, as will enable Electricity North West to comply with the Health and Safety Manual Handling Operation Regulations 1992, for components, assemblies and packages supplied with a gross weight over 1kg. The forms and content of such markings shall be subject to the Approval of the Electricity North West Overhead Line Circuits Manager.

4.6 Minimum Life Expectancy

The minimum life expectancy of all products covered by this Specification is 40 years.

4.7 Product Conformity

Preference will be given to those Suppliers who can provide suitable product conformity certification to a recognised or specified standard, or an equivalent certification.

4.8 Confirmation of Conformance

The Tenderer shall complete the conformance declaration sheets in [Appendix F](#). Failure to complete these declaration sheets may result in an unacceptable bid.

5 Requirements for Type and Routine Testing

The Electricity North West Overhead Line Circuits Manager shall set out the requirement of the following tests to be carried out by the Supplier at the Supplier's cost.

5.1 Requirement for Type Tests at Suppliers Premises

These are a series of one-off type tests, which are carried out to ensure the satisfactory performance of the product design, under extremes of operating stresses, and of endurance, as may be appropriate, to be determined by the Electricity North West Overhead Line Circuits Manager.

These may or may not be destructive tests.

5.2 Requirement for Routine Tests at the Supplier's Premises

These tests may be required to be carried out on every individual unit or component, as specified, or at some regular frequency to be determined by the Electricity North West Overhead Line Circuits Manager.

The results of these tests may be required to be supplied to Electricity North West with each unit purchased or retained for inspection, at a period to be determined by the Electricity North West Overhead Line Circuits Manager.

6 Technical Requirements

6.1 General

Helical fittings shall be manufactured and tested in accordance with ENA TS 43-15, ENA TS 43-91 & ENA TS 43-92. The appendices provide details of the sizes and types of helical products required under this Specification.

Helical fittings shall be factory formed from multiple steel wires, which are generally either aluminium or copper coated for use with bare conductors and normally galvanized for use with PVC covered conductors.

Grit shall be applied to the gripping sections of the ties during manufacture to maximise their holding strength.

Where HV top and side ties are to be used with bare conductors, elastomeric pads shall be provided with the ties and shall be fitted between the conductors and the insulators to prevent abrasion.

With the exception of LV concentric cable terminations, all other LV tension terminations included in this Specification are of the failure containment type. With failure containment type fittings, pads are not normally required.

6.2 Materials – General Requirements

Materials used in the manufacture of conductor fittings shall:

- Withstand the mechanical loads relevant to the installation, service, maintenance conditions, service temperatures and environmental effects.
- Be compatible with the conductor material, or capable of being used with an intermediate material such that there can be no deleterious effect on the conductor or fitting resulting from their association.
- Not be adversely affected by any coating applied for corrosion protection.

6.3 Materials and Manufacturing

6.3.1 Wire

Steel wire shall be to BS EN 10270-1, galvanized to BS EN 10244-2.

Copper-covered wire shall be to BS 4087.

Aluminium-covered steel shall be to ASTM B415.

Copper alloy wire shall be to BS EN 12166.

6.3.2 Steel Wire Coating

Steel wire coating shall be compatible with the outer layer of the conductor to which it is to be applied. The coating, normally of either copper or aluminium when used with bare conductors, shall have a minimum thickness of 5% of the wire diameter to ensure long term protection against corrosion of the steel. The coating shall be of a quality suitable for use in known environmental conditions.

6.3.3 Pad (for use with ties)

The pad, normally of a split tube design having a nominal wall thickness of 3mm, shall have an inside diameter that will allow it to fit snugly around the diameter of conductor being used. A minimum gap of 1mm shall be left between the closing edges of the pad before application of the fitting. The elastomeric material from which the pad is manufactured shall comply with ENA TS 43-15.

6.3.4 Grit

To maximise the gripping strength of a fitting, an adhesive compound retaining a chemically inert grit shall be applied during manufacture to the inner surface of the legs where they make contact with the conductor. The loop or crown area of the fitting shall be kept free from the grit.

6.3.5 Formation of Wires

Multiple steel wires coated or galvanized as appropriate, shall be factory formed into a central crown or loop with two legs. For bare conductors, the direction of the helix shall be the same as the direction of lay of the outer strands of conductor to which it is to be applied. For PVC covered conductors, the direction of the helix shall be right hand.

The surfaces and ends of the wires, apart from where grit is applied, shall be free from sharp edges to avoid damage to the conductor or insulator during application and in service.

6.3.6 Protection Against Corrosion

All materials used in the construction of overhead line fittings shall be inherently resistant to atmospheric corrosion that could affect their performance.

All ferrous materials shall be suitably protected against corrosion such as can occur during transportation, storage or service. All ferrous parts which are exposed to the atmosphere in service, except those made of the appropriate grade of stainless steel, shall be protected by hot dip galvanising to the requirements of BS EN 1461.

6.4 Types of Fittings

6.4.1 HV Conductor Tension Fittings

6.4.1.1 Conductor Dead Ends & Distribution Grip Dead Ends

Conductor dead ends & distribution grip dead ends shall fully meet the requirements detailed in ENA TS 43-92 and BS EN 61284.

These fittings shall be designed for the termination of bare homogeneous conductors. The fittings shall be manufactured from material compatible with the conductor to which they are being applied. This will normally be either aluminium-clad or copper-clad steel. The dead ends shall be designed to achieve 100% of the rated breaking strength of the conductor.

The lay direction of the conductor dead end shall be the same as that of the outer layer of the conductor to which it is applied.

The required pitch length shall be one complete wrap.

6.4.1.2 Armour Splice

Armour splices shall fully meet the requirements detailed in ENA TS 43-92 and BS EN 61284.

These items shall be designed to provide restorative repair to severely damaged conductors, to give protection and to provide a jointing capability. Armour splices are normally used to repair conductor damage which has occurred under suspension clamps or pin insulator binds. They shall provide full electrical conductivity to homogeneous conductors and ACSR type conductors. The armour splices shall also restore full mechanical strength to homogeneous conductors when the damage is located under the centre of the repair fitting. On ACSR fittings, the strength shall be restored to all of the aluminium strands but not the steel core.

Armour splices shall be manufactured from a material that is compatible with the conductors to which they are applied. The required pitch length shall be one complete wrap

The lay direction of the armour splice shall be the same as that of the outer layer of the conductor to which it is applied.

6.4.2 HV Insulator Ties

6.4.2.1 Groove Formed Side Ties

Groove formed side ties shall fully meet the requirements detailed in ENA TS 43-15.

Groove formed side ties are intended to secure bare or jacketed distribution conductors in the side groove of vertically and horizontally mounted pin type insulators at intermediate angle positions up to the maximum angle of 60° as given in ENA TS 43-40.

All fittings shall be provided with pads to eliminate conductor abrasion at the conductor/insulator interface.

These fittings shall be designed for installation on insulators designed to ENA TS 43-93.

Fittings shall be colour coded in accordance with ENA TS 43-15.

6.4.2.2 HV Top Ties/Distribution Ties

Distribution ties shall be manufactured and tested in accordance with ENA TS 43-15. They shall be designed to secure bare or insulated conductors in the top grooves of vertically mounted pin type 11/6.6kV or 33kV insulators at intermediate or intermediate angle positions on lines designed to ENA TS 43-40. On vertically mounted insulators, distribution ties shall be suitable for line deviations up to 10 degrees.

All fittings shall be provided with elastomeric pads to eliminate conductor abrasion at the conductor/insulator interface.

These fittings shall be designed for installation on insulators designed to ENA TS 43-93.

Fittings shall be colour coded in accordance with ENA TS 43-15.

6.4.2.3 HV Double Top Tie

Double distribution ties shall be manufactured and tested in accordance with ENA TS 43-15. They shall be designed to secure bare or insulated conductors in the top grooves of vertically mounted pin type 11/6.6kV or 33kV insulators at intermediate or intermediate angle positions on lines designed to ENA TS 43-40. Each fitting shall be constructed from two elements and be designed to provide a higher degree of security especially in locations subjected to vibration or severe weather conditions.

All fittings shall be provided with neoprene pads to eliminate conductor abrasion at the conductor/insulator interface.

These fittings shall be designed for installation on insulators designed to ENA TS 43-93.

Fittings shall be colour coded in accordance with ENA TS 43-15.

6.4.2.4 Twin Grip Uplift Ties

Twin grip uplift ties shall be manufactured and tested in accordance with ENA TS 43-15. They shall be designed to secure bare conductors in the top grooves of vertically mounted pin type 11/6.6kV insulators at intermediate or intermediate angle positions on lines designed to ENA TS 43-40.

These fittings shall operate like two conductor dead ends, providing additional security to the attachment point when the structure is subjected to a limited uplift situation. Typically these fittings shall be capable of a 10 degree uplift capacity.

All fittings shall be provided with neoprene pads to eliminate conductor abrasion at the conductor/insulator interface.

These fittings shall be designed for installation on insulators designed to ENA TS 43-93.

Fittings shall be colour coded in accordance with ENA TS 43-15.

6.4.3 LV Conductor Tension Fittings

6.4.3.1 Limited Tension Concentric Dead Ends

Limited tension concentric dead ends shall be designed and tested in accordance with ENA TS 43-92. The fittings shall be designed specifically to terminate low voltage jacketed concentric service cables designed in accordance with BS 7870–3.11. These shortened fittings shall have a limited tension capability.

They shall normally be manufactured from Galvanized steel.

Fittings shall be colour coded to an agreed standard.

6.4.3.2 Service Grip Dead Ends

Service grip dead ends shall be designed and tested in accordance with ENA TS 43-92. The fittings shall be designed as limited tension dead ends specifically for the termination of low-tension service spans. They shall be suitable for the termination of 16mm PVC covered conductor designed in accordance with BS 7884 Table 3.

Fittings shall be colour coded to an agreed standard.

6.4.3.3 Low Voltage Dead End

Low voltage dead ends shall be designed and tested in accordance with ENA TS 43-92 and be suitable for the termination of single bare or insulated conductors on reel type insulators mounted in brackets in accordance with ENA TS 43-30.

Fittings shall be colour coded in accordance with ENA TS 43-15.

Labels for bare conductor fittings shall be coloured white, whilst labels for insulated fittings shall be coloured yellow.

6.4.4 LV Insulator Fittings

6.4.4.1 LV Intermediate/Angle Ties

LV intermediate/angle ties shall be designed and tested in accordance with ENA TS 43-15 and be suitable for securing conductors in the grooves of reel type LV insulators at intermediate/angle positions up to the maximum angles given in ENA TS 43-30 for the line design.

Fittings shall be colour coded in accordance with ENA TS 43-15.

Labels for bare conductor fittings shall be coloured white, whilst labels for insulated fittings shall be coloured yellow.

6.4.5 Stay Fittings

6.4.5.1 General

Stay fittings shall meet the requirements of ENA TS 43-91. Specific requirements are given below.

6.4.5.2 Stay Wire Dead End

Stay wire dead ends shall be suitable for the termination of 7/4.00mm grade 1150 galvanized steel stay wire as detailed in ENA TS 43-91 Table 4.1. All fittings shall provide an MFL of 101kN as detailed in the last two rows of ENA TS 43-91 Table 4.2.

6.4.5.3 Insulator Link Assembly

Insulator link assemblies shall be suitable for joining two porcelain stay insulators in series on unearthed overhead line structures as detailed in ENA TS 43-91 Clause 4.2.6.3. All fittings shall provide an MFL of 101kN as detailed in the last two rows of ENA TS 43-91 Table 4.2.

6.4.5.4 Pole Top Make Off

Pole top make offs are intended for pole top termination of 7/4.00mm Grade 1150 stay strand when an insulator is being used. Each fitting shall be manufactured from three strands of high tensile and one strand of medium tensile galvanized steel wire.

When applied at the pole top the completed tail end shall form a stay strand equivalent to the 7/4.00mm stay wire.

The medium tensile quality strand shall be suitable for bonding the helical fitting to the pole top steelwork.

All fittings shall provide an MFL of 101kN as detailed in the last two rows of ENA TS 43-91 Table 4.2.

6.4.5.5 Stay Wire Line Splice

Stay wire line splices shall be suitable for joining sections of 7/4.00mm grade 1150 galvanized steel stay strand together. The MFL of the jointed strand shall be no less than that of the original stay strand.

Splices shall be made of material compatible with the galvanized stay strand.

6.4.5.6 Stay Extension

The stay extension is 1200mm length of 7/4.00mm grade 1150 galvanized steel stay strand.

6.4.5.7 Pole Top Dead End

This fitting shall be suitable for application around a range of pole diameters. Once installed it shall be suitable for terminating a 7/4.00mm grade 1150 galvanized stay wire to the pole. All fittings shall provide an MFL of 101kN as detailed in the last two rows of ENA TS 43-91 Table 4.2.

6.4.6 Stay Markers

An example stay marker is shown opposite.

The purpose of a stay marker is to bring attention to the presence of a stay. Stay markers are typically used in places such as footways, golf courses, etc.

Stay markers shall be coloured to bring attention to the stay (typically yellow and black) and shall be easy to fit over the stay, for example, clip on.

Stay markers shall meet any other relevant requirements of this Specification.



6.4.7 HV & LV Flight Diverters

6.4.7.1 HV Flight Diverters

HV flight diverters shall be suitable for application on to bare or covered HV lines that have been built in accordance with ENA TS 43-40. The fittings shall ideally be constructed from two separate items.

- Orange high visibility ball that is UV resistant and suitable for attachment on to a helical conductor fitting.
- A helical conductor fitting designed to be attached to the overhead conductors.

NOTE: There are no requirements for these items within this Specification.

6.4.7.2 LV Bird Flight Diverter

LV bird flight diverters shall be suitable for application to LV open wire networks designed in accordance with ENA TS 43-30. The fittings shall be secured to the conductors using a helix rather than fixed point contacts.

The diverters shall be manufactured from UV resistant high impact PVC and be suitable for a range of conductor sizes.

Manufacturers shall provide an agreed colour code system to ease identification of these items.

NOTE: There are no requirements for these items within this Specification.

6.4.8 Other Fittings

6.4.8.1 Limited Contact Spacer

Limited contact spacers shall be single piece helical fittings that have been designed to prevent damage to conductors arising from conductor clashing. They shall be manufactured using a rigid solid PVC material that is UV stable. It shall be manufactured using a concave design profile to avoid crossing of conductors.

6.4.8.2 Semi-Conducting Spiral Tape

Semi-conducting spiral tape shall be supplied for use with helical fittings applied to PVC covered conductors. It shall have the value of resistivity, and be applied to the dimensions, as specified in Post Office Memorandum A231 (b) (issued under ENA ER PO2). The tape shall comply with the requirements of Section 3.6.4 of this Specification.

6.4.8.3 Shunt Splice

Shunt splices shall be designed to restore electrical and mechanical strengths of existing joints that have developed abnormally high resistances. The rods shall perform this function by shunting current around the installed joint and shall provide additional heat radiation surface.

6.4.8.4 Spiral Wrap Vibration Damper

Manufacturers shall supply spiral wrap vibration dampers that are suitable for application on to HV XLPE Covered conductor lines. The dampers shall be suitable for application to the conductor without the need to remove any XLPE insulation.

They shall be manufactured from rigid plastic high impact PVC, with good UV and extreme temperature properties.

6.5 Identification and Marking

Marking shall ensure that each of the component parts of a fitting is fully traceable.

Conductor fittings shall be identified by the manufacturer's identification mark and fitting reference. This marking shall also be applied to any component of a fitting where the component is separate from the fitting when dispatched by the manufacturer.

A durable label shall be securely attached to each fitting, containing the following information:

- Fitting type.
- Size, stranding and type of conductor.
- Insulator type (if applicable).
- Fitting identification number.

See also the requirements of Section 4.5 **Error! Reference source not found..**

The labels attached to all LV fittings shall state in bold letters: 'ONLY TO BE USED ON LV LINES'.

In addition, each fitting shall have discrete painted colour marking in accordance with ENA TS 43-15.

6.6 Performance Requirements

6.6.1 HV Ties

6.6.1.1 Resiliency

Ties shall permit controlled movement of the conductors over the insulators under unbalanced load conditions resulting from impact loads on the conductors or support, conductor oscillation, galloping, ice unloading or in the extreme case, broken conductors.

6.6.1.2 Flashover and Withstand Voltages

The use of ties on HV insulators shall not reduce the flashover and withstand voltage capabilities of the insulators as published by the manufacturer or ENA TS 43-93.

6.6.1.3 Radio Interference Voltage

The design of the ties for use on HV insulators shall aim at minimum radio interference voltage (RIV) levels for completed insulator/conductor tie assemblies.

6.6.2 HV Terminations

HV terminations shall meet the requirements of ENA TS 43-92 and BS EN 61284.

6.6.2.1 Reapplication of Fittings

Factory formed helical tension terminations shall be capable of being removed and reapplied to the conductor twice after the original application for the purpose of adjustment during construction procedures.

6.6.3 LV Intermediate/Angle Ties

No movement of the conductors through the ties is permitted for out of balance tensions less than 200kgf.

Under broken wire conditions, controlled movement of bare or PVC covered conductors through the ties is permitted, provided that the out of balance tensions exceed 200kgf.

6.6.4 LV Tension Terminations

No movement of the conductors through the terminations is permitted if tensions up to twice the maximum design working tension are applied.

Under impact or ice loading conditions, controlled movement of bare or PVC covered conductors through the terminations is permitted, provided that the resultant tensions exceed twice the maximum working tension.

Once controlled movement has occurred, the terminations must not permit further movement of the conductors if tensions up to the maximum erection tensions are reapplied.

6.6.5 LV Concentric Cable Tension Terminations

No movement of the cables through the terminations is permitted, if tensions up to the maximum working tension of 132kgf are applied.

6.7 Type Tests

Fittings shall be tested in accordance with the requirements of:

ENA TS 43-15 - Clause E.1.3 - E.1.8.

ENA TS 43-91 - Clause 9.2.

ENA TS 43-92 - Clause 8.2.2.

Manufacturers shall provide documentary evidence of completion of all tests.

6.8 Additional Information

The annual usage figures quoted in the tables included in [Appendices A to E](#) are there as a guide for Tenderers when submitting their Tenders.

7 Documents Referenced

DOCUMENTS REFERENCED	
Health and Safety at Work Act 1974	
Control of Substances Hazardous to Health Regulations 2002	
Manual Handling Operations Regulations 1992	
BS EN ISO 9000:	Quality management systems.
BS EN 1461:	Hot dip galvanized coatings on fabricated iron and steel articles. Specifications and test methods.
BS 7870-3.11:	LV and MV polymeric insulated cables for use by distribution and generation utilities. Specification for distribution cables of rated voltage 0.6/1 kV. XLPE insulated combined neutral and earth copper wire concentric cables with copper or aluminium conductors

BS EN 10244-2:	Steel wire and wire products. Non-ferrous metallic coatings on steel wire. Zinc or zinc alloy coatings
BS EN 10270-1:	Steel wire for mechanical springs. Patented cold drawn unalloyed spring steel wire
BS EN 12166:	Copper and copper alloys. Wire for general purposes.
BS EN ISO 14001:	Environmental management systems. Requirements with guidance for use.
BS EN 61284:	Overhead Lines - Requirements and tests for fittings.
BS 4087:	Specification for copper-covered steel wire for telephone and telegraph purposes.
BS 7884:	Specification for copper and copper-cadmium stranded conductors for overhead electric traction and power transmission systems.
ASTM B415:	Standard specification for hard-drawn aluminium-clad steel wire.
ENA TS 43-15:	Insulator binds and equivalent helical fittings for overhead lines.
ENA ER PO2	Post Office Memorandum A231(b): Protection of Post Office lines for high voltage power lines
ENA TS 43-30:	Low voltage overhead lines on wood poles.
ENA TS 43-40:	High voltage single circuit overhead lines on wood poles.
ENA TS 43-91:	Stay strands and stay fittings for overhead lines.
ENA TS 43-92:	Overhead Line Fittings
ENA TS 43-93:	Line insulators.
CP311:	Equipment Approval Policy and Process.

ES400C3:	Wood Pole Overhead Line Conductors (up to and including 132kV).
ES400O2:	Overhead-Lines of Compact-Covered-Construction for 6.6, 11 & 33kV.
ES400O3:	Bare-Wire Overhead-Lines on Wood Poles for 11/6.6 and 33kV.
ES400O4:	LV Overhead-lines of Aerial Bundled Conductor.

8 Keywords

Conductor; distribution; fitting; stay.

Appendix A – ES400O2 – Conductor Fittings Covered Conductor Lines

DESCRIPTION	CC NO	MANUFACTURERS CODE	PRICE	ANNUAL USAGE
Conductor fitting, helical dead end, compacted covered conductor, 50mm ²	121437			
Conductor fitting, helical dead end, compacted covered conductor, 120mm ²	121438			
Conductor fitting, helical dead end, compacted covered conductor, 185mm ²	121439			
Conductor fitting, helical intermediate tie (11kV), compacted covered conductor, 50mm ²	139100			
Conductor fitting, helical intermediate tie (11kV), compacted covered conductor, 120mm ²	139101			
Conductor fitting, helical intermediate tie (11kV), compacted covered conductor, 185mm ²	139102			
Conductor fitting, helical intermediate tie (33kV), compacted covered conductor, 120mm ²	139103			
Conductor fitting, helical intermediate tie (33kV), compacted covered conductor, 185mm ²	139104			
Conductor fitting, helical side tie (11kV), compacted covered conductor, 50mm ²	139105			
Conductor fitting, helical side tie (11kV), compacted covered conductor, 120mm ²	139106			
Conductor fitting, helical side tie (11kV), compacted covered conductor, 185mm ²	139107			
Conductor fitting, helical side tie (33kV), compacted covered conductor, 120mm ²	139108			
Conductor fitting, helical side tie (33kV), compacted covered conductor, 185mm ²	139109			
Conductor fitting, helical vibration damper, compacted covered conductor, 50mm ²	139115			

Appendix B – ES40003 – Conductor Fittings Bare Wire Lines

DESCRIPTION	CC NO	MANUFACTURERS CODE	PRICE	ANNUAL USAGE
Conductor fitting, helical dead end, AAAC, 50mm ²	121029			
Conductor fitting, helical dead end, AAAC, 100mm ²	121401			
Conductor fitting, helical dead end, AAAC, 150mm ²	138156			
Conductor fitting, helical dead end, AAAC, 200mm ²	138158			
Conductor fitting, helical dead end, HDCu, 38mm ²	121061			
Conductor fitting, helical dead end, HDCu, 70mm ²	121088			
Conductor fitting, helical dead end, HDCu, 100mm ²	138154			
Conductor fitting, helical intermediate tie (11kV), AAAC, 50mm ²	138927			
Conductor fitting, helical intermediate tie (11kV), HDCu, 38mm ²	138215			
Conductor fitting, helical intermediate tie (11kV), HDCu, 70mm ²	138924			
Conductor fitting, helical intermediate tie, double (11kV), AAAC, 100mm ²	138932			
Conductor fitting, helical intermediate tie, double (11kV), AAAC, 150mm ²	138928			
Conductor fitting, helical intermediate tie, double (11kV), HDCu, 100mm ²	138926			
Conductor fitting, helical intermediate tie, double (33kV), AAAC, 150mm ²	138312			
Conductor fitting, helical intermediate tie, double (33kV), AAAC, 200mm ²	138479			
Conductor fitting, helical intermediate tie, double (33kV), HDCu, 100mm ²	138495			
Conductor fitting, helical side tie (11kV), AAAC, 50mm ²	138037			
Conductor fitting, helical side tie (11kV), AAAC, 100mm ²	138045			
Conductor fitting, helical side tie (11kV), AAAC, 150mm ²	138132			
Conductor fitting, helical side tie (11kV), HDCu, 38mm ²	138010			
Conductor fitting, helical side tie (11kV), HDCu, 70mm ²	138029			
Conductor fitting, helical side tie (11kV), HDCu, 100mm ²	138130			
Conductor fitting, helical side tie (33kV), AAAC, 150mm ²	138150			

Conductor fitting, helical side tie (33kV), AAAC, 200mm ²	138160			
Conductor fitting, helical side tie (33kV), HDCu, 100mm ²	138140			
Conductor fitting, helical side tie (11kV) conductor, flexible, 65mm ²	139110			
Conductor fitting, helical side tie (33kV), conductor, flexible, 65mm ²	121402			

Appendix C – ES40004 – Conductor Fittings ABC Lines

DESCRIPTION	CC NO	MANUFACTURERS CODE	PRICE	ANNUAL USAGE
Conductor fitting, helical dead end, CNE, 3ph, 25/35mm ²	121193			
Conductor fitting, helical dead end, Cu, CNE, 25/35mm ²	121177			
Conductor fitting, helical dead end, Cu, SCNE, 25mm ²	121185			
Conductor fitting, helical dead end, SAC, SCNE, 35mm ²	121363			

Appendix D – Conductor Fittings used on Existing Overhead Lines and for Refurbishment

DESCRIPTION	CC NO	MANUFACTURERS CODE	PRICE	ANNUAL USAGE
Conductor fitting, helical armour splice, AA, 100mm ² /ACSR 70mm ² /100mm ² , Horse/Dog	132837			
Conductor fitting, helical armour splice, AA, 25mm ²	132691			
Conductor fitting, helical armour splice, AA, 50mm ²	132705			
Conductor fitting, helical armour splice, AAAC, 300mm ²	121403			
Conductor fitting, helical armour splice, AAAC, 500mm ²	121404			
Conductor fitting, helical armour splice, ACSR 175mm ² , Lynx	132845			
Conductor fitting, helical armour splice, ACSR, 0.075sq ins, Racoon	132713			
Conductor fitting, helical armour splice, ACSR, 150mm ² /175mm ² , Wolf/Caracal	132756			
Conductor fitting, helical armour splice, ACSR, 175mm ² , compacted	132748			
Conductor fitting, helical armour splice, HDCu, 0.025sq ins/16mm ²	132764			
Conductor fitting, helical armour splice, HDCu, 0.05sq ins/0.058sq ins/32mm ²	132934			
Conductor fitting, helical armour splice, HDCu, 0.15sq ins/100mm ²	121405			
Conductor fitting, helical armour splice, HDCu, 0.1sq ins/70mm ²	132942			
Conductor fitting, helical bird diverter, AA, 25mm ² , AL 22 mm ² , HDCu, 0.05/0.058sq ins, 32mm ²	120235			
Conductor fitting, helical bird diverter, AA, AL, 100mm ² , ACSR 70mm ² , HDCu, 0.15sq ins	120251			
Conductor fitting, helical bird diverter, AA, AL, 50 mm ² /HDCu, 0.1sq ins-70mm ²	120243			
Conductor fitting, helical bird diverter, ACSR, 150/175mm ² , Wolf/Caracal	120286			
Conductor fitting, helical bird diverter, HDCu, 0.025sq ins/16mm ²	120278			
Conductor fitting, helical dead end (LV), AL, 100mm ²	120472			
Conductor fitting, helical dead end (LV), AL, 50mm ²	120456			

Conductor fitting, helical dead end (LV), HDCu, 0.05sq ins/32mm ²	121215			
Conductor fitting, helical dead end (LV), HDCu, 0.1sq ins/70mm ²	121231			
Conductor fitting, helical dead end (LV), PVC, AL, 50mm ²	120464			
Conductor fitting, helical dead end (LV), PVC, AL,100mm ²	120480			
Conductor fitting, helical dead end (LV), PVC, HDCu, 0.05sq ins/32mm ²	120499			
Conductor fitting, helical dead end (LV), PVC, HDCu, 0.1sq ins/70mm ²	120502			
Conductor fitting, helical dead end, AA, 25mm ²	121398			
Conductor fitting, helical dead end, Cad Copper 22mm ² /HDCu, 0.025sq ins/16mm ²	121428			
Conductor fitting, helical double top tie (33kV), ACSR 150/175mm ² , Wolf/Caracal	138517			
Conductor fitting, helical double top tie (33kV), HDCu, 0.15 sq ins	138541			
Conductor fitting, helical double top tie (33kV), HDCu, 0.1sq ins/70mm ²	138533			
Conductor fitting, helical guy guard	128406			
Conductor fitting, helical intermediate tie (11kV), (PVC), AL, 100mm ²	138843			
Conductor fitting, helical intermediate tie (11kV), (PVC), AL, 50mm ²	138827			
Conductor fitting, helical intermediate tie (11kV), (PVC), HDCu, 0.05sq ins/32mm ²	138851			
Conductor fitting, helical intermediate tie (11kV), (PVC), HDCU, 0.1sq ins/70mm ²	138878			
Conductor fitting, helical intermediate tie (11kV), AA, 25mm ²	138282			
Conductor fitting, helical intermediate tie (11kV), AA, 50mm ²	138223			
Conductor fitting, helical intermediate tie (11kV), AL, 100mm ²	138835			
Conductor fitting, helical intermediate tie (11kV), AL, 50mm ²	138819			
Conductor fitting, helical intermediate tie (11kV), HDCu, 0.025/16mm ²	138940			
Conductor fitting, helical intermediate tie (11kV), HDCu, 0.05sq ins/32mm ²	138258			
Conductor fitting, helical intermediate tie (11kV), HDCu, 0.15sq ins	138347			
Conductor fitting, helical intermediate tie (11kV), HDCu, 0.1sq ins/70mm ²	138266			

Conductor fitting, helical intermediate tie (33kV), ACSR, 100mm ²	138290			
Conductor fitting, helical intermediate tie (33kV), ACSR, 175mm ² , Caracal	138320			
Conductor fitting, helical intermediate tie (33kV), ACSR, 175mm ² , compacted	138304			
Conductor fitting, helical intermediate tie (33kV), HDCu, 0.022sq ins	138339			
Conductor fitting, helical intermediate tie (33kV), HDCu, 0.15sq ins	138355			
Conductor fitting, helical intermediate tie, double (11kV), ACSR, 100mm ² , Dog	138509			
Conductor fitting, helical intermediate tie, double (11kV), ACSR, 175mm ² , Caracal	138464			
Conductor fitting, helical intermediate tie, double (11kV), ACSR, 175mm ² , Lynx	138463			
Conductor fitting, helical intermediate tie, double (33kV), ACSR, 175mm ² , compacted	138525			
Conductor fitting, helical intermediate tie, double (33kV), ACSR, 100mm ²	138842			
Conductor fitting, helical intermediate tie, double (33kV), ACSR, 150/175mm ²	138460			
Conductor fitting, helical intermediate tie, single (11kV), ACSR, 175mm ² , Caracal	138462			
Conductor fitting, helical intermediate tie, single (11kV), ACSR, 175mm ² , Lynx	138461			
Conductor fitting, helical limited contact spacer, conductor range 5.08mm – 8.88mm	TBA			
Conductor fitting, helical limited contact spacer, conductor range 8.89mm – 12.08mm	TBA			
Conductor fitting, helical repair sleeve, ACSR, 0.075 sq ins, Racoon	131601			
Conductor fitting, helical repair sleeve, ACSR, 150mm ² /175mm ² , Wolf/Caracal	131644			
Conductor fitting, helical repair sleeve, ACSR, 175 mm ² , Lynx	131717			
Conductor fitting, helical repair sleeve, ACSR, 175mm, compacted	131636			
Conductor fitting, helical repair sleeve, ACSR, 400mm ² , Zebra	131725			
Conductor fitting, helical repair sleeve, ACSR, 70/100mm ² , Dog/Horse	131628			
Conductor fitting, helical side tie (11kV), AA, 25mm ²	138126			

Conductor fitting, helical side tie (11kV), Cu, 0.022sq ins	138192			
Conductor fitting, helical side tie (11kV), HDCu, 0.025sq ins/16mm ²	138002			
Conductor fitting, helical side tie (11kV), HDCu, 0.15sq ins	138207			
Conductor fitting, helical side tie (33kV), ACSR, 100mm ²	138134			
Conductor fitting, helical side tie (33kV), ACSR, 150/175mm ²	138142			
Conductor fitting, helical side tie (33kV), ACSR, 175mm ² , compacted	138169			
Conductor fitting, helical side tie (33kV), HDCu, 0.15sq ins	138371			
Conductor fitting, helical spacer (plastic), AL, 100mm ² , 305mm	128422			
Conductor fitting, helical spacer (plastic), AL, 50mm ² /HDCu, 0.1sq ins/70mm ²	128414			
Conductor fitting, helical spacer (plastic), AL, 22mm ² /HDCu, 0.025sq ins /16mm ² , 305mm	128456			
Conductor fitting, helical spacer (plastic), HDCu, 0.022sq ins, 305mm	138942			
Conductor fitting, helical spacer (plastic), HDCu, 0.05/0.058sq ins/32mm ² , 305mm	128449			
Conductor fitting, helical splice shunt, ACSR, 175mm ² , Caracal	131512			
Conductor fitting, helical splice shunt, ACSR, 400mm ² , Zebra	131520			
Conductor fitting, helical suspension clamp, AGS Repair Unit, ACSR, 0.075sq ins, Racoon	113514			
Conductor fitting, helical suspension clamp, AGS Repair Unit, ACSR, 100mm ² , Dog	113522			
Conductor fitting, helical suspension clamp, AGS Repair Unit, ACSR, 150/175mm ² , Wolf/Caracal	113549			
Conductor fitting, helical suspension clamp, AGS Repair Unit, ACSR, 175mm ² , Lynx	130036			
Conductor fitting, helical suspension clamp, AGS Repair Unit, ACSR, 175mm ² , compacted	113530			
Conductor fitting, helical suspension clamp, AGS Repair Unit, ACSR, 400mm ² , Zebra	130044			
Conductor fitting, helical suspension clamp, AGS Repair Unit, ACSR, 70mm ² , Horse	130001			
Conductor fitting, helical suspension clamp, AGS Support Unit, ACSR, 175mm ² , Lynx	113557			

Conductor fitting, helical suspension clamp, AGS Unit, 175 ACSR, compacted	113492			
Conductor fitting, helical suspension clamp, AGS Unit, 400 ACSR, Zebra	113441			
Conductor fitting, helical suspension clamp, AGS Unit, ACSR	113409			
Conductor fitting, helical suspension clamp, AGS Unit, ACSR, 0.075sq ins, Racoon	113395			
Conductor fitting, helical suspension clamp, AGS Unit, ACSR, 100mm ² , Dog	113484			
Conductor fitting, helical suspension clamp, AGS Unit, ACSR, 150/175mm ² , Wolf/Caracal	113506			
Conductor fitting, helical suspension clamp, AGS Unit, ACSR, 175mm ² , Lynx	113417			
Conductor fitting, helical, support rod, ACSR,175mm ² ,Lynx	121406			
Conductor fitting, helical, support rod, pilot, ACSR,175mm ² ,Lynx	121407			

Appendix E – Stay Wire Helical Fittings and Stay Markers

DESCRIPTION	CC NO	MANUFACTURERS CODE	PRICE	ANNUAL USAGE
Stay marker, yellow/black	129200			
Stay wire fitting, helical dead end, 7/4.00mm	121053			
Stay wire fitting, helical insulator link assembly	127221			
Stay wire fitting, helical pole top make off, 7/400mm	121045			
Stay wire fitting, helical pole top dead end, 7/4.00mm medium/stout	138941			
Stay wire fitting, helical splice	132896			

Appendix F – Conformance Declaration

SECTION-BY-SECTION CONFORMANCE WITH SPECIFICATION

The Tenderer shall declare conformance or otherwise for each product/service or range of products/services, section-by-section, using the following Conformance Declaration Codes.

Conformance Declaration Codes:

N/A =	Clause is not applicable/appropriate to the product/service.
C1 =	The product/service conforms fully with the requirements of this clause.
C2 =	The product/service conforms partially with the requirements of this clause.
C3 =	The product/service does not conform to the requirements of this clause.
C4 =	The product/service does not currently conform to the requirements of this clause, but the manufacturer proposes to modify and test the product in order to conform.

Manufacturer:

Product/Service Description:

Product/Service Reference:

Name:

Company:

Signature:

SECTION-BY-SECTION CONFORMANCE

Section	Section Topic	Conformance Declaration Code	Remarks * (must be completed if code is not C1)
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Additional Notes: