NPS/001/002 - Technical Specification for Helical Products

1. Purpose

The purpose of this document is to detail the technical requirements for helical products used on the Northern Powergrid distribution network.

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

Document Reference	Document Title	Version	Published Date
NPS/001/002	Technical Specification for Helical Products	7.0	Jan 2018

2. Scope

This specification applies to all helical fittings for use on the company's overhead line distribution networks. The majority of items are detailed in national, international and industry standards that are listed within the technical description for each product type. The following appendices are included within this specification: -

- Appendix 1 – Schedule of items
- Appendix 2 – Addendum to suppliers requirements
- Appendix 3 – Self Certification Conformance Declaration
- Appendix 4 – Technical information check list

2.1. Content List

3. Technical Requirements

3.1. General Requirements

Helical products shall be manufactured and tested in accordance with ENA TS 43-15, ENA TS 43-91 and ENA TS 43-92. Appendix 1 provides details of the sizes and types of helical products required under this specification.

Helical products shall be formed from multiple steel wires, which are generally either aluminium or copper coated for use with bare conductors and galvanised 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, protective elastomeric pads shall be provided with the ties fitting between the conductors and the insulator to prevent abrasion.

3.2. Materials

3.2.1. General Requirements

Materials used in the manufacture of conductor fittings shall:

- Withstand the mechanical loads relevant to the installation, service and 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 adversely affected by any coating applied for corrosion protection.

3.2.2. Materials and Manufacturing

Steel Wire

The steel wire to be used for helical fittings shall be manufactured to BS EN 10270 of a composition complying with that specified for type NS. The wire shall be hot dipped galvanised to Galvanising Class 'A' of BS EN 10244. The minimum tensile strength requirement is 1400 N-mm^{-2}.

Copper Covered Steel Wire

The copper covered steel wire to be used for helical fittings shall be manufactured to BS 4087. Wires with diameters smaller than 2.59 shall be a minimum of Grade 1 with 40% conductivity and wires with diameters of 2.59 and above shall be a minimum of Grade 2 with 30% conductivity.

Aluminium Covered Steel Wire

The aluminium covered steel wire to be used for helical fittings shall be manufactured to ASTM B415. It shall be composed of a steel core with a substantially uniform and continuous aluminium covering thoroughly bonded to it. The radial thickness of the aluminium coating shall be not less than 5% of the wire diameter at any point. The minimum conductivity of the wire shall be 20.3%.

Conductor 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 pad shall meet all of the requirements detailed in ENA TS 43-15 Appendix E, Clause 3.

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 to avoid damage to the insulator or fitting.

Formation of Wires

Multiple steel wires coated or galvanised as appropriate, shall be 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.

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.

3.3. Types of Fittings

3.3.1. High Voltage (HV) Conductor Tension Fittings

Conductor Dead-ends and Distribution Grip Dead-ends

Conductor Dead-ends and Distribution Grip Dead-ends shall fully meet the requirements detailed in ENA TS 43-92 and BS EN 61284**.**

The fittings shall be manufactured from material compatible with the conductor to which they are being applied. This will normally be either aluminium 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-ends shall be the same as that of the outer layer of the conductor to which it is applied.

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 repair 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 the conductors. The Armour Splice shall also restore full mechanical strength to the conductors when the damage is located under the centre of the repair fitting. ACSR fittings are only repairable if the steel cores are free from damage. Therefore they shall be designed to restore the strength to the aluminium strands.

Armour splices shall be manufactured from a material that is compatible with the conductor to which they are applied.

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

Shunt Splices

Shunt splices are designed to restore the electrical and mechanical properties of a permanent joint that has developed an abnormally high resistance. It shall provide 100% of the aluminium wires on ACSR conductors and 100% combined outer and inner layers on homogenous conductor.

3.3.2. HV Insulator Ties

Groove Formed Side Ties

Groove formed Side ties shall fully meet the requirements detailed in ENA TS 43-15 and 43-120

Groove formed side ties are intended to secure bare or insulated conductors in the side groove of vertically and horizontally mounted pin type insulators at intermediate angle positions up to the maximum angle of 60º as detailed in ENA TS 43-40. 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 ENATS 43-93.

HV Top Ties / Distribution Ties

Distribution ties shall be manufactured and tested in accordance with ENA TS 43-15 and 43-120 section 5. They shall be designed to secure bare or insulated conductors in the top grooves of vertically mounted pin type 11kV, 20kV or 33kV insulators at intermediate or intermediate angle positions. On vertically mounted insulators, distribution ties shall be suitable for line deviations up to 10 degrees.

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.

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 11kV, 20kV or 33kV insulators at intermediate or intermediate angle positions on lines designed to ENA TS 43-40. This 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.

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 11kV, 20kV and 33kV insulators at intermediate or intermediate angle positions.

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 fitting 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.

3.3.3. Low Voltage Conductor Tension Fittings

Concentric Dead-ends

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 concentric service cables designed in accordance with BS 7870 - 3.10.

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. It shall be suitable for the termination of 16mm² PVC covered conductor designed in accordance with BS 7884 Table 3.

Low Voltage Dead-End

Low voltage dead-ends shall be designed and tested in accordance with ENATS 43-92 and be suitable for the termination of single bare or insulated conductors on reel type insulators in accordance with ENA TS 43-93 Fig. 16.

3.3.4. LV Insulator Fittings

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.

3.3.5. Stay Fittings

Guy Grip Dead End

Guy Grip dead ends shall be suitable for the termination of 7/4.00mm grade 1150 galvanised steel stay wire onto an insulator or directly onto the steelwork via a stay thimble as detailed in ENA TS 43-91 Table 1. All fittings shall provide a MFL of 101kN as detailed in ENA TS 43-91 Table 2.

Insulator Link Assembly

Shall be suitable for joining two porcelain stay insulators in series on unearthed overhead line structures as detailed in ENA TS 43-91 clause 4.2.8.3

All fittings shall provide a MFL of 101kN as detailed in ENA TS 43-91 Table 2.

Pole Top Dead End

Pole top dead ends are primarily intended for low voltage pole top termination of 7/4.00mm Grade 1150 stay strand when an insulator is being used. The fitting shall be manufactured with three strands of high tensile and one strand of medium tensile galvanised 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 a MFL of 101kN as detailed in ENA TS 43-91 Table 2.

Stay Wire Line Splice

Stay Wire Line splices shall be suitable for joining sections of 7/4.00mm grade 1150 galvanised steel stay strand together. The jointed strand shall be suitable for 100% of the original stay strand MFL.

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

Stay Extension

The stay extension - 1200mm length of 7/4.00mm grade 1150 galvanised steel stay strand.

Stay Make-Off

This fitting shall be suitable for application around medium to extra stout range of pole diameters. Once installed it shall be suitable for terminating a 7/4.00mm grade 1150 galvanised stay wire to the pole. All fittings shall provide a MFL of 101kN as detailed in ENA TS 43-91 Table 2.

Stay Wire Guards

Yellow split PVC tubing suitable for application onto existing 7/4.00mm stay strands to provide a high visibility marker.

3.3.6. HV & LV Flight Diverters

HV Flight Diverters

HV flight diverters shall be suitable for application onto bare or covered HV lines that have been designed in accordance with ENA TS 43-40. The fittings shall ideally be constructed from the following items.

- An orange high visibility ball that is UV stable and suitable for attachment on to the conductor clamp type detailed below or
- A reflective white glow in the dark, UV resistant, high impact plastic disc

And

- A conductor clamp that can be applied with a live line rod and applicator shall incorporate an internal pad designed to protect the conductor from long term damage. The clamp shall be range taking and suitable for copper, aluminium and insulated conductors. When fitting the clamp to the conductor, minimal force shall be applied ensuring that there is no excessive pressure that may result in damage to the conductor or fittings.

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 bird flight diverters shall be manufactured from an insulating material and be suitable for a range of conductor sizes.

3.3.7. Other Fittings

Limited Contact Spacer

LV Limited contact spacers shall be designed to be single piece helical fittings that have been designed to prevent damage to open wire conductors arising from clashing. As a secondary benefit that can be used in areas prone to theft and prevent a cut conductor from being grounded when cut. The fitting shall be manufactured from a rigid insulating material. It shall be manufactured using a concave design profile to avoid crossing of conductors.

Spiral Wrap Vibration Damper

Spiral wrap vibration dampers shall be suitable for application onto HV XLPE Covered conductor lines manufactured in accordance with ENA TS 43-122 These shall meet the requirements of ENA TS 43-120 clause 3.19. The fitting is not placement sensitive as stated in 43-120 clause 3.7. The fitting shall be suitable for application to the conductor without the need to remove any XLPE insulation. All insulating components shall be manufactured from ultraviolet stabilised material tested in accordance with ENA TS 43-120 Clause 4.13. Additionally spiral vibration dampers must comply with the cold temperature application requirements quoted and temperature cycling required in 43-120 clause 8.2.10 and 8.2.11.

3.4. Identification and Marking

Fittings shall be marked to provide a system of traceability for each of the component parts.

Conductor fittings shall be identified by the manufacturers 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 weatherproof durable label shall be securely attached to each fitting, containing the following information:

(i) Fitting type.

(ii) Size, stranding and type of conductor.

(iii) Insulator type and size (if applicable).

(iv) Fitting identification number.

(v) Northern Powergrid commodity code.

(vi) Batch traceability details.

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

Helical fittings shall be colour coded as detailed in ENA TS 43-15 Appendix D, Clause 4 with the exception of stay fittings coded as detailed in ENA TS 43-91, Table 9.

3.5. Performance Requirements

3.5.1. HV ties

Resiliency

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

Flashover and withstand voltages

The use of ties on HV insulators shall not reduce the flashover and withstand voltage capabilities of the insulators as detailed in ENA TS 43-93.

Radio interference voltage (RIV)

The design of the ties for use on HV insulators shall provide minimum RIV levels for completed insulator/conductor tie assemblies.

3.5.2. HV Terminations

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

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.

3.5.3. 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.

3.5.4. 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.

3.5.5. 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.

3.5.6. Specific Requirements for Armour Rods

Armour rods shall be of the factory formed helical type and comprise of sets of individual rods compatible with the conductor and shall have right hand lay.

The rods shall completely enclose the conductor except for small gaps required to ensure that the rods make good contact with the conductor over its entire length.

3.6. Type and Sample Testing

Fittings shall be tested in accordance with the requirements of: -

ENA TS 43-15 - Appendix E

ENA TS 43-91 - Clause 9.2 and Clause 9.3

ENA TS 43-92 - Clause 8.2 and Clause 8.3

ENA TS 43-120 - Clause 5.2 and Clause 5.3

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
ASTM B415	American Society for Testing and Materials – B415
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
BS EN 10244 Issue 2: 2009	Specification for testing zinc coatings on steel wire and for quality requirements.
BS EN 10270 – 1: 2011	Steel wire for mechanical springs. Patented cold drawn unalloyed spring steel wire
BS EN 7870 3.10	LV and MV polymeric insulated cables for use by distribution and generation utilities. Specification for distribution cables of rated voltage 0.6/1 kV. PVC insulated combined neutral and earth copper wire concentric cables with copper or aluminium conductors
BS EN 61284	Overhead Lines - Requirements and tests for fittings.
ENA TS 43-120	Fittings for covered conductors for overhead lines (having rated voltages U0/U greater than 0.6/1 kV up to and including 19/33 kV)
ENA TS 43-122	XLPE covered-conductors for overhead lines (having rated voltages Uo/U greater than 0.6/1 kV up to and including 19/33 kV)
ENA TS 43-15	Insulator Binds & Equivalent Helical Fittings for Overhead Lines
ENA TS 43-30 Issue 2: 1981 (No Longer Maintained)	Low Voltage Overhead Lines on Wood Poles
ENA TS 43-40	Specification for single circuit overhead lines on wood poles for use at high voltage up to and including 33 kV
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.
ER L38	ENA Engineering Recommendation for - Overhead Line Conductors – protection against corrosion by the application of anti-corrosive grease during manufacture

4.2. Internal Documentation

Reference	Title
n/a	

4.3. Amendments from Previous Version

Clause	Subject	Amendments
3.3.3, 3.3.5, 3.3.7	Types of Fittings	Reference documents clause updated
3.6	Type and Sample Testing	Reference documents clause updated
4.1	External Documentation	Reference documents clause updated

5. Definitions

Term	Definition
ACSR	Aluminium conductor steel-reinforced
EHV	Extra High Voltage – 22,000V and above
HV	High Voltage – in excess of 1,000V and less than 22,000V
LV	Low Voltage – up to 1,000V
MFL	Minimum Failing Load
PVC	Polyvinyl chloride
RIV	Radio interference voltage
XLPE	Cross-linked polyethylene

6. Authority for Issue

6.1. CDS Assurance

I sign to confirm that this document has been assured for issue on to the CDS system

		Date
Liz Beat	Governance Administrator	03/04/2023

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: Update will be dictated by contact renewal date or any significant changes in the specification or documents referenced
Should this document be displayed on the Northern Powergrid external website?		Yes

		Date
Aaron Chung	Policy and Standards Engineer	11/04/2023

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	04/04/2023

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 No.	Northern Powergrid product code	Description of tie type	Cond. Size	Insulator neck diameter	Description provided	Northern Powergrid drawing Ref.
1	263177	ARMOUR SPLICE	175mm		Preformed Repair Splice for 175mm AAAC (Elm) to Drawing Number 1.09.101.0657 Sheet 2	1.09.101.0657 Sht 2
2	263196	ARMOUR SPLICE	50mm		Preformed Repair Splice for 50mm AAAC (Hazel) to Drawing Number 1.09.101.0657 Sheet 2	1.09.101.0657 Sht 2
3	263213	ARMOUR SPLICE	100mm		Preformed Repair Splice for 100mm AAAC (Oak) to Drawing Number 1.09.101.0657 Sheet 2	1.09.101.0657 Sht 2
4	263228	ARMOUR SPLICE	175mm		Preformed Repair Splice for 175mm ACSR (Lynx) to Drawing Number 1.09.101.0657 Sheet 2	1.09.101.0657 Sht 2
5	265045	ARMOUR SPLICE	0.1"		Preformed Repair Splice for 1" segmental ACSR to Drawing Number 1.09.101.0657 Sheet 2	1.09.101.0657 Sht 2
6	265030	ARMOUR SPLICE	0.5"		Preformed Repair Splice for 0.05" segmental ACSR to Drawing Number 1.09.101.0657 Sheet 2	1.09.101.0657 Sht 2
7	263209	ARMOUR SPLICE	60mm		Preformed Repair splice for 60mm ACSR (Skunk) to Drawing Number 1.09.101.0657 Sheet 2	1.09.101.0657 Sht 2
8	263232	ARMOUR SPLICE	150mm		Preformed Repair Splice for 150mm ACSR (Wolf) to Drawing Number 1.09.101.0657 Sheet 2	1.09.101.0657 Sht 2
9	263285	ARMOUR SPLICE	0.2"		Preformed Repair Splice for 125mm HDBC to Drawing Number 1.09.101.0657 Sheet 1	1.09.101.0657 Sh 1
10	263251	ARMOUR SPLICE	0.1"		Preformed Repair Splice for 0.1" HDBC to Drawing Number 1.09.101.0657 Sheet 1	1.09.101.0657 Sh 1
11	263270	ARMOUR SPLICE	100mm		Preformed Repair Splice for 100mm HDBC to Drawing Number 1.09.101.0657 Sheet 1	1.09.101.0657 Sh 1
12	263340	ARMOUR SPLICE	32mm		Preformed Repair Splice for 0.05" HDBC (7/.097") to Drawing Number 1.09.101.0657 Sheet 1	1.09.101.0657 Sh 1
13	263355	ARMOUR SPLICE	32mm		Preformed Repair Splice for 32mm HDBC to Drawing Number 1.09.101.0657 Sheet 1	1.09.101.0657 Sh 1
14	263266	ARMOUR SPLICE	70mm		Repair Splice for70mm HDBC to Drawing Number 1.09.101.0657 Sheet 1	1.09.101.0657 Sh 1
15	263336	ARMOUR SPLICE	13.15mm		Preformed Repair Splice for 0.017" Cadmium Copper to Drawing Number 1.09.101.0657 Sheet 1	1.09.101.0657 Sh 1
16	251146	LV bird flight diverter	4.45 – 6.34 mm		Preformed LV Bird Flight diverter for 4.45 to 6.34mm Conductor to Drawing Number 1.09.101.0036 Sheet 1	1.09.101.0036 sht1
17	251131	LV bird flight diverter	6.35 – 8.88 mm		Preformed LV Bird Flight diverter for 6.35 to 8.88mm Conductor to Drawing Number 1.09.101.0036 Sheet 1	1.09.101.0036 sht1
18	251201	LV bird flight diverter	8.89 – 11.43 mm		Preformed LV Bird Flight Diverter for 8.89 to 11.43mm Conductor to Drawing Number 1.09.101.0036 Sheet 1	1.09.101.0036 sht1
19	255202	Concentric dead end	25mm	45mm	Limited Tension Preformed Dead End, for 25mm Split Concentric to Drawing Number 1.09.101.3152	1.09.119.3152

20	255344	Concentric dead end	35mm	45mm	Limited Tension Preformed Dead End, for 35mm Split Concentric to Drawing Number 1.09.101.3152	1.09.119.3152
21	260431	Concentric dead end	25mm	45mm	Limited Tension Preformed Dead End, Limited Tension for 25/35mm CNE Concentric to Drawing Number 1.09.101.3152	1.09.119.3152
22	223941	Concentric dead end	16mm	44mm	Limited Tension Preformed Dead End, Limited Tension for 16mm CNE Concentric	1.09.119.3152
23	252882	Concentric dead end	35mm	45mm	Limited Tension Preformed Dead End, Limited Tension for 35mm 3 Phase CNE Concentric to Drawing Number 1.09.101.3152	1.09.119.3152
24	251343	Service grip dead end	16mm	45mm	Preformed LV Dead End for 16mm PVC Cu to Drawing Number 1.09.119.3155	1.09.119.3155
25	223859	Low voltage dead end	32mm	45mm	Preformed LV Dead End for 32mm PVC Copper	N/A
26	223867	Low voltage dead end	70mm	45mm	Preformed LV Dead End for 70mm PVC Copper	N/A
27	251324	Low voltage dead end	50mm	45mm	Preformed LV Dead End for 50mm Aluminium to Drawing Number 1.09.119.3155	1.09.119.3155
28	251339	Low voltage dead end	100mm	45mm	Preformed LV Dead End for 100mm Aluminium to Drawing Number 1.09.119.3155	1.09.119.3155
29	251292	Low voltage dead end	32mm	45mm	Preformed LV Dead End for 32mm HDBC to Drawing Number 1.09.119.3155	1.09.119.3155
30	251305	Low voltage dead end	70mm	45mm	Preformed LV Dead End for 70mm HDBC to Drawing Number 1.09.119.3155	1.09.119.3155
31	223883	Conductor dead end	0.025"	42mm	Preformed Dead End for 0.025 sq. inch Solid Copper Conductor	N/A
32	255306	Distribution grip dead end	13.15mm		Preformed Distribution Dead End for 13mm Cadmium Copper to Drawing Number 1.09.101.0425	1.09.101.0425
33	223966	Distribution grip dead end	16mm	42mm	Preformed Distribution Dead End for 16mm HDBC	N/A
34	223891	Distribution grip dead end	0.05"	42mm	Preformed Distribution Dead End for 0.05" Solid Copper	N/A
35	255325	Distribution grip dead end	32mm		Preformed Distribution Dead End for 32mm HDBC to Drawing Number 1.09.101.0425	1.09.101.0425
36	255359	Distribution grip dead end	0.1"		Preformed Distribution Dead End for 0.1" HDBC to Drawing Number 1.09.101.0425	1.09.101.0425
37	255363	Distribution grip dead end	70mm		Preformed Distribution Dead End for 70mm HDBC to Drawing Number 1.09.101.0425	1.09.101.0425
38	243277	Distribution grip dead end	100mm		Preformed Distribution Dead End for 100mm HDBC to Drawing Number 1.09.101.0425	1.09.101.0425
39	255383	Distribution grip dead end	0.2"		Preformed Distribution Dead End for 0.2" HDBC to Drawing Number 1.09.101.0425	1.09.101.0425
40	255414	Distribution grip dead end	50mm		Preformed Distribution Dead End for 50mm AAAC (Hazel) to Drawing Number 1.09.101.0425	1.09.101.0425
41	255429	Distribution grip dead end	100mm		Preformed Distribution Dead End for 100mm AAAC (Oak) to Drawing Number 1.09.101.0425	1.09.101.0425
42	255433	Distribution grip dead end	175mm		Preformed Distribution Dead End for 175mm AAAC (Elm) to Drawing Number 1.09.101.0425	1.09.101.0425
43	229153	HV double Top tie	100mm	78mm	Preformed Double Tie 11 kV 100 mm AAAC (Oak)	N/A

44	229161	HV double Top tie	175mm	120mm	Preformed Double Tie 33 kV 175 mm ACSR (Lynx)	N/A
45	228783	HV double Top tie	70mm	78mm	Preformed Double Tie 11 kV 70 mm HDBC	N/A
46	228791	HV double Top tie	70mm	120mm	Preformed Double Tie 33 kV 70 mm HDBC	N/A
47	228817	HV double Top tie	100mm	120mm	Preformed Double Tie 33 kV 100 mm HDBC	N/A
48	249521	HV Top tie	50mm	78mm	Preformed Distribution Tie for 50mm AAAC and ACSR with 78mm neck to Drawing Number 1.09.101.0660	1.09.101.0660
49	250590	HV Top tie	100mm	78mm	Preformed Distribution Tie for 100mm AAAC (Oak) or 50mm XLPE Covered Conductor with 78mm neck to Drawing Number 1.09.101.0660For use on 50mm XLPE covered conductor.	1.09.101.0660
50	249589	HV Top tie	175mm	78mm	Preformed Distribution Tie for 175mm AAAC (Elm) or 120mm XLPE Covered Conductor with 78mm neck to Drawing Number 1.09.101.0660. For use on 120mm	1.09.101.0660
51	250603	HV Top tie	100mm	120mm	Pre-formed Distribution Tie for 100mm AAAC (Oak) or 50mm XLPE Covered Conductor with 120mm neck to Drawing Number 1.09.101.0660.	1.09.101.0660
52	250694	HV Top tie	150mm	120mm	Preformed Distribution Tie for 150mm ACSR (Wolf) with 120mm neck to Drawing Number 1.09.101.0660. For use on 120mm.	1.09.101.0660
53	250675	HV Top tie	175mm	120mm	Preformed Distribution Tie for 175mm AAAC (Elm) or 120mm XLPE covered conductor with 120mm neck to Drawing Number 1.09.101.0660	1.09.101.0660
55	228841	HV Top tie	0.025"	78mm	Preformed Distribution Tie for 0.025" Solid HDBC with 78mm neck	N/A
56	249502	HV Top tie	13.15mm	78mm	Preformed Distribution Tie for 13mm Cadmium Copper with 78mm neck to Drawing Number 1.09.101.0660	1.09.101.0660
57	249447	HV Top tie	16mm	78mm	Preformed Distribution Tie for 16mm HDBC with 78mm neck to Drawing Number 1.09.101.0660	1.09.101.0660
58	228874	HV Top tie	0.05"	78mm	Preformed Distribution Tie for 0.05" Solid HDBC with 78mm neck	N/A
59	249451	HV Top tie	32mm	78mm	Preformed Distribution Tie for 32mm (7 x 2.46) HDBC with 78mm neck to Drawing Number 1.09.101.0660	1.09.101.0660
60	249470	HV Top tie	32mm	78mm	Preformed Distribution Tie for 32mm (3 x 3.75) HDBC with 78mm neck to Drawing Number 1.09.101.0660	1.09.101.0660
61	249536	HV Top tie	70mm	78mm	Preformed Distribution Tie for 70mm HDBC with 78mm neck to Drawing Number 1.09.101.0660	1.09.101.0660
62	249540	HV Top tie	100mm	78mm	Preformed Distribution Tie for 100mm HDBC with 78mm neck to Drawing Number 1.09.101.0660	1.09.101.0660 sht 4
63	249574	HV Top tie	125mm	78mm	Preformed Distribution Tie for 125mm HDBC with 78mm neck to Drawing Number 1.09.101.0660	1.09.101.0660
64	250641	HV Top tie	70mm	120mm	Preformed Distribution Tie for 70mm HDBC with 120mm neck to Drawing Number 1.09.101.0660	1.09.101.0660
65	255217	Guy grip dead end			Preformed Guy Grip Dead End for 7/4.00mm Stay Wire to Drawing Number 1.09.101.0541	1.09.101.0541
66	261970	Guy guard			Stay Wire Guard, 1.830mm (Yellow) for 7/4.00mm Stay Wire	N/A

67	260183	Insulator link			Preformed Stay Insulator Link Assembly for 7/4.00mm Stay Wire to Drawing Number 1.00.043.9107 Sheet 3	1.00.043.9107 Sht 3
68	225367	Stay make off			Preformed Shackled Stay Make-Off	N/A
69	254089	Line splice			Preformed Armour Splice for 7/4.00 Stay Wire to Drawing Number 1.09.101.0657	1.09.101.0657 Sh 1
70	224311	Stay extension			Preformed Stay Extension for 7/8.0mm Stay Wire	N/A
71	250209	Pole top dead end			Preformed Pole Top Dead End Stay Wrap for 7/4.0mm Stay Wire	N/A
72	225342	LV Pole top make off			Preformed Pole Top Make- Off for 7/4.0mm Stay Wire	N/A
73	257049	Groove Formed Side Tie	50mm	78mm	Preformed Groove Side Tie for 50mm AAAC and ACSR with 78mm neck to Drawing Number 1.09.101.0662	1.09.101.0662 Sht 1
74	257068	Groove Formed Side Tie	100mm	78mm	Preformed Side tie for 100mm AAAC (Oak) or 50mm XLPE Covered Conductor with 78mm neck to Drawing Number 1.09.101.0662.	1.09.101.0662
75	257053	Groove Formed Side Tie	175mm	78mm	Preformed Side Tie for 175mm AAAC and ACSR or 120mm XLPE covered conductor with 78mm neck to Drawing Number 1.09.101.0662.	1.09.101.0662
76	241375	Groove Formed Side Tie	100mm	120mm	Preformed Side Tie for 100mm AAAC (Oak) or 50mm XLPE covered conductor with 120mm neck to Drawing Number 1.09.101.0662.	1.09.101.0662
77	257072	Groove Formed Side Tie	175mm	120mm	Preformed Side Tie for 175mm AAAC and ACSR or 120mm XLPE covered conductor with 120mm neck to Drawing Number 1.09.101.0662.	1.09.101.0662
78	228833	Groove Formed Side Tie	175mm	120mm	Preformed Side Tie for 175mm ACSR (Lynx) with 120mm neck	N/A
79	241549	Groove Formed Side Tie	13.15mm	78mm	Preformed Side Tie for 13mm Cadmium Copper with 78mm neck to Drawing Number 1.09.101.0662	1.09.101.0662
80	228700	Groove Formed Side Tie	16mm	78mm	Preformed Side Tie for 16mm HDBC with 78mm neck	N/A
81	228890	Groove Formed Side Tie	0.05"	78mm	Preformed Side Tie for 0.05" Solid Copper with 78mm neck	N/A
82	241873	Groove Formed Side Tie	32mm	78mm	Preformed Side Tie for 32mm HDBC (7/2.46mm Strands) with 78mm neck to Drawing Number 1.09.101.0662	1.09.101.0662
83	257104	Groove Formed Side Tie	32mm	78mm	Preformed Side Tie for 32mm HDBC (3/3.75mm Strands) with 78mm neck to Drawing Number 1.09.101.0662	1.09.101.0662 Sht 1
84	241568	Groove Formed Side Tie	70mm	78mm	Preformed Side Tie for 70mm HDBC with 78mm neck to Drawing Number 1.09.101.0662	1.09.101.0662
85	245910	Groove Formed Side Tie	100mm	78mm	Preformed Side Tie for 100mm HDBC with 78mm neck to Drawing Number 1.09.101.0662	1.09.101.0662
86	241874	Groove Formed Side Tie	125mm	78mm	Preformed Side Tie for 125mm HDBC with 78mm neck to Drawing Number 1.09.101.0662	1.09.101.0662
87	228809	Groove Formed Side Tie	70mm	120mm	Preformed Side Tie for 70mm HDBC with 120mm neck	N/A
88	228825	Groove Formed Side Tie	100mm	120mm	Preformed Side Tie for 100mm HDBC with 120mm neck	N/A
89	243296	Limited Contact Spacer	UPTO 32mm		Spacer, Limited Contact for 32mm, HDBC to Drawing Number 1.09.101.0681	1.09.101.0681 sht 1

90	251288	LV Intermediate / angle tie	50mm	45mm	Preformed LV Intermediate tie for 50mm Aluminium to Drawing Number 1.09.119.3156	1.09.119.3156
91	251269	LV Intermediate / angle tie	100mm	45mm	Preformed LV Intermediate tie for 100mm Aluminium to Drawing Number 1.09.119.3156	1.09.119.3156
92	251254	LV Intermediate / angle tie	32mm	45mm	Preformed LV Intermediate tie for 32mm HDBC to Drawing Number 1.09.119.3156	1.09.119.3156
93	251235	LV Intermediate / angle tie	70mm	45mm	Preformed LV Intermediate tie for 70mm HDBC to Drawing Number 1.09.119.3156	1.09.119.3156
94	229088	LV Intermediate / angle tie	32mm	45mm	Preformed LV Intermediate tie for 32mm HD PVC Copper	N/A
95	229096	LV Intermediate / angle tie	70mm	45mm	Preformed LV Intermediate tie for 70mm HD PVC Copper	N/A
96	079319	Repair Sleeve	70mm		Preformed Repair Sleeve for 70mm ACSR (Horse)	N/A
97	079327	Repair Sleeve	175mm		Preformed Repair Sleeve 175mm ACSR (Lynx)	N/A
98	251381	TWINGRIP UPLIFT TIES	50mm	78mm	Preformed Twingrip Uplift Tie for 50mm AAAC (Hazel) with 78mm Neck to Drawing Number 1.09.101.0142	1.09.101.0142
99	250834	TWINGRIP UPLIFT TIES	13.15mm	78mm	Preformed Twingrip Uplift Tie for 13mm Cadmium Copper with 78mm Neck to Drawing Number 1.09.101.0142	1.09.101.0142
100	251220	TWINGRIP UPLIFT TIES	32mm	78mm	Preformed Twingrip Uplift Tie for 32mm HDBC with 78mm Neck to Drawing Number 1.09.101.0142	1.09.101.0142
101	250727	HV bird flight diverter	Various		Bird Flight Diverter - HV Type with Buoy for Conductors up to and Including 125mm Cu, 175mm ACSR, 200mm AAAC and 185mm ALPE. To drawing number 1091010036 sheet 4.	109.101.0036 Sht4
102	250735	HV Flight Diverter – Disc Type	Various up to 70mm Dia		Bird Flight Diverter. HV Disc Type for all Conductors up to and Including 125mm Cu, 175mm ACSR, 200mm AAAC and 185mm XLPE . Fitting includes Conductor Clamp and Disc	N/A
103	241904	Spiral wrap Vibration dampers	50mm		Preformed Spiral Wrap Vibration Dampers for 50mm XLPE to Drawing Number 1.09.101.0667 Sheet 6	109.101.0667 sht 6
104	241903	Spiral wrap Vibration dampers	120mm		Preformed Spiral Wrap Vibration Dampers for 120mm XLPE to Drawing Number 1.09.101.0667 Sheet 6	109.101.0667 sht 6
105	241902	Spiral wrap Vibration dampers	185mm		Preformed Spiral Wrap Vibration Dampers for 185mm XLPE to Drawing Number 1.09.101.0667 Sheet 6	109.101.0667 sht 6
106	079046	Shunt Splice	70mm		Preformed shunt splice for 70mm ACSR (Horse)	
107	079053	Shunt Splice	175mm		Preformed shunt splice for 175mm ACSR (Lynx)	
108	249460	HV Top tie	200mm	78mm	Preformed Distribution Tie for 200mm AAAC (Poplar) with 78mm Neck to Drawing Number 1.09.101.0660 sheet 2	1.09.101.0660 sheet 2
109	249461	HV Top tie	200mm	120mm	Preformed Distribution Tie for 200mm AAAC (Poplar) with 120mm Neck to Drawing Number 1.09.101.0660 sheet 2	1.09.101.0660 sheet 2
110	250730	HV bird flight diverter			Bird Flight Divertor Application Tool	

111	250738	HV bird flight diverter			Bird Flight Diverter Application Tool for HV Disc Type Fitting	
112	254445	LV Helical Spacer	6.55-8.88MM		LV HELICAL SPACER FOR CONDUCTOR RANGE 6.55-8.88MM - 12 INCH SPACING (PS5225403R) App drawing 1091193154 sht2	1091193154 sht2
113	254464	LV Helical Spacer	6.55-8.88MM		LV HELICAL SPACER FOR CONDUCTOR RANGE 6.55-8.88MM - 9 INCH SPACING (PS3710405R) App drawing 1091193154 sht2	1091193154 sht2
114	254479	LV Helical Spacer	8.89-12.06MM		LV HELICAL SPACER FOR CONDUCTOR RANGE 8.89-12.06MM - 12 INCH SPACING (PS5225404R) App drawing 1091193154 sht2	1091193154 sht2
115	254483	LV Helical Spacer	8.89-12.06MM		LV HELICAL SPACER FOR CONDUCTOR RANGE 8.89-12.06MM - 9 INCH SPACING (PS3710406R) App drawing 1091193154 sht2	1091193154 sht2
116	254490	LV Helical Spacer	12.07-16.35MM		LV HELICAL SPACER FOR CONDUCTOR RANGE 12.07-16.35MM - 12 INCH SPACING (PS5225408R) App drawing 1091193154 sht2	1091193154 sht2
117	254495	LV Helical Spacer	12.07-16.35MM		LV HELICAL SPACER FOR CONDUCTOR RANGE 12.07-16.35MM - 9 INCH SPACING (PS3710407R) App drawing 1091193154 sht2	1091193154 sht2
118	263220	ARMOUR SPLICE	150mm		Preformed Repair Splice for 150mm ACSR (Dingo)	
119	263247	ARMOUR SPLICE	.175"/ 175MM		reformed Armour Splice .175"/175MM (30+7/2.79) - (Lynx)	

Appendix 2 – Addendum to Suppliers Requirements

Appendix 3 contains self-certification conformance declarations that shall be completed by suppliers tendering products for this contract with one set completed for each variant offered. Type test evidence shall be submitted with samples when requested.

Fittings shall be supplied in protective weatherproof packaging and secured to a standard Euro pallet. The fitting and container shall be clearly labelled to allow identification of the product including the Northern Powergrid commodity code, conductor and insulator size and batch number to allow traceability.

The weight of each package shall not exceed 25kG.

Appendix 3 – Self Certification Conformance Declaration

Helical Ties covered by ENA TS 43-15, 43-92 and 43-120 shall comply with the latest issues of the relevant international and British Standards.

ENA TS 43-15, 43-92 and 43-120 are intended to amplify and/or clarify the requirements of those Standards.
This check sheet identifies the clauses in ENA TS 43-15, 43-120 and BS EN 61284 & 43-92 and the clauses of the aforementioned Standards relevant to helical Ties for use on current United Kingdom designs of wood pole overhead lines.
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 the supplier shall provide evidence of conformance
- When any other code is entered the reason and supporting evidence for non-Conformance shall be entered
- Prefix each remark with the relevant 'BS EN' or 'ENATS' as appropriate

Manufacturer:

Product Reference:

Name: **Signature:** **Date:**

Table 1 – Helical Fittings for Insulators

ENA TS 43–15				
Clause / Sub-clause	Requirement	Conformance Code	Evidence Reference	Remarks / Comments
4.3	Materials & Manufacture			
Section 4.3.1	Steel Wire manufactured to BS 10270; composition type NS & Hot Dip Galvanised to Class 'A' of BS EN 10244			
Section 4.3.2	Copper Covered Steel Wire manufactured to BS4087			
Section 4.3.3	Aluminium Covered Steel Wire manufactured to ASTM B415			
Section 4.3.4	Copper Alloy Wire manufactured to BS EN 12166			
Section 4.3.5	Pad (For Use with Ties) - See also the requirements of and Appendix A of ENA TS 43-15			
Section 4.3.6	Grit			
Section 4.3.7	Formation of Wires			
Section 4.3.8	Markings			
Section 4.3.9	Semi Conducting Tape			
Section 4.3.10	Grease in accordance with L38			

Table 2 – Helical Fittings for Insulators

	ENA TS 43–15			
Clause / Sub-clause	Requirement	Conformance Code	Evidence Reference	Remarks/Comments
Section 4.4	Performance Requirements			
Section 4.4.1	HV Ties			
Section 4.4.4.1 Section 4.4.1.2 Section 4.4.1.3	Resiliency Flashover and withstand voltages Radio Interference Voltage			
Section 4.4.3	LV Intermediate/angle ties			
Section 4.4.4	LV Tension terminations			
Section 4.4.5	LV Concentric cable tension terminations			

Table 3 – Helical Fittings for Insulators

	ENA TS 43–15			
Clause / Sub-clause	Requirement	Conformance Code	Evidence Reference	Remarks/Comments
D1	Appendix D - Helical Fittings - Application and Colour Marking			
D2	Fittings for HV Conductors			
D3	Fittings for LV Conductors			
D4	Colour Marking Table			

Table 4 – Helical Fittings for Insulators

	ENA TS 43–15			
Clause / Sub-clause	Requirement	Conformance Code	Evidence Reference	Remarks/Comments
E1.2 & 1.3.1	HV Fittings test assemblies			
E1.3.2	Transverse and pull-off tests (Applicable to all Ties)			
E1.3.3	Pull-through withstand tests (Only applicable to Angle Ties)			
E1.3.4	Swinging Conductor tests (Normally only applied to Hazel, Elm & Lynx)			
E1.4	Test Requirements for HV Fittings			

Table 5 – Helical Fittings for Insulators

		ENATS 43–15		
Clause / Sub-clause	Requirement	Conformance Code	Evidence Reference	Remarks/Comments
	Type Tests			
E1.7	Test Requirements for LV Fittings			
E1.7.1.1	Failure containment test (Applied to terminations on bare conductors)			
E1.7.1.2	Pull-through withstand test (applied to intermediate fittings on bare conductors)			
E1.7.2.1	Failure containment test (Applied to terminations on PVC covered conductors)			
E1.7.2.2	Pull-through withstand test (applied to intermediate fittings on PVC covered conductors)			
E1.7.3	Minimum hold test (applied to concentric cables)			

Table 6 – Helical Fittings for Insulators

ENATS 43–15				
Clause / Sub-clause	Requirement	Conformance Code	Evidence Reference	Remarks/Comments
E2.2	Inspection Tests - Applicable to all fittings			
E3	Semi-Conducting Tape and Pad Material			
E3.2	Electrochemical test			

Table 7 - Helical Conductor Fittings

BS EN 61284				
Clause / Sub-clause	Requirement	Conformance Code	Evidence Reference	Remarks/Comments
4	Requirements (see note 1)			
4.2	Requirements for specific fittings (see note 3)			
5	Quality Assurance			
6	Classification of Tests (see note 5)			
7 8 9 10 11 13	Visual Examination Dimensional and Material Variation Hot Dip Galvanising Non-destructive Testing Mechanical Tests Heat Cycle Tests			
12	Magnetic Loss Test			
	ENA TS 43-92			
4	General requirements (see note 2)			
5 6 7	Compression Conductor Fittings (see note 4) Mechanical Conductor Fittings Factory formed Helical Conductor Fittings			
8	Quality Assurance (See note 6)			

Notes

Note 1 - Clause 4.2 of BS EN 61284 is subject to clauses 5,6 & 7 of ENA TS 43-92.
Note 2 – ENA TS 43-92 calls for specific requirements in relation to:

- finish (ENA TS 43-92 Clause 4.1.3)
- tolerances (ENA TS 43-92 Clause 4.2)
- markings applied to factory formed helical conductor fittings (ENA TS 43-92 Clause 4.3)
- packaging and protection (ENA TS 43-92 clause 4.4)
- tension terminations (ENA TS 43-92 Clause 4.5)

Notes continued…..

Note 3 - Clause 4.2 of BS EN 61284 covers general design requirements of which shall be complied with, where appropriate to the fittings employed.
Note 4 - Clauses 5,6 & 7 of ENA TS 43-92 call for specific design requirements of compression conductor fitting not called by clause 4.2 of BS EN 61284.
Note 5 - Clause 8.3 of ENA TS 43-92 defines sampling and acceptance criteria.
Note 6 - The appropriate clauses of BS 61284 apply with the following specific requirements:

- Heat cycle test for current carrying fittings shall be 1000 cycles to a temperature rise of 70° above ambient.
- The heat cycle test for current carrying fitting's shall be undertaken on six fittings subject to the requirements of clause 8.1.1 of ENA TS 43-92.
- Clauses 8.2.1, 8.2.2. 8.2.3, 8.2.4 of ENA TS define the conductor tensions to be applied during the mechanical tests and the holding period T.
- Clauses 8.2.2 of ENA TS 43-92 call for additional requirements in terms of the re-application of the fitting to the conductor.
- Clauses 8.2.5 of ENA TS 43-92 calls for additional torque tests for split bolt, saddle fittings, and live line taps.
- Clauses 8.2.7 of ENA TS 43-92 calls for additional tests to prove the interface integrity of friction welded fittings.
- Clause 8.2.9 of ENA TS 43-92 calls method B (vertical damage and failure load tests) for suspension clamps and defines specific application and slippage criteria.

Table 8 – Tests for Stay Fittings

BS EN 61284				
Clause / Sub-clause	Requirement	Conformance Code	Evidence Reference	Remarks/Comments
5 7 8 9	Quality Assurance Visual Examination Dimensional and Material Variation Hot Dip Galvanising			
	ENA TS 43-91			
9	Factory formed Helical Stay Fittings (See note 1)			

Note 1 - The appropriate clauses of BS 61284 apply with the following specific requirements:

- Clauses 9.2 of ENA TS 43-91 define the conductor tensions to be applied during the mechanical tests and the holding period T.
- Clauses 9.2 of ENA TS 43-91 call for additional requirements in terms of the re-application of the fitting to the conductor.

Clauses 9.2 of ENATS 43-91 define Sampling and Acceptance Criteria.

Table 9 – Tests for XLPE Fittings

ENA TS 43-120	Tests for helical fittings used on XLPE covered conductor			
Clause / Sub-clause	Requirement	Conformance Code	Evidence Reference	Remarks/Comments
5.2	Type Tests			
8.3.1	Visual Examination			
8.2.6	Unbalanced Load Test (Ties Only)			
8.2.7	Transverse and pull off – load test (Ties Only)			
8.2.11	Temperature cycling			
8.2.14	UV stability test (non-metallic material only)			
8.3	Sample tests			
8.3.1	Visual examination			
8.3.2	Dimensional inspection and material verification			
8.4	Routine tests			

Appendix 4 - Technical Information Check List

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

Requirement	Provided (Y/N)
Appendix 1 - Copy of pricing schedule template populated with product names, commodity codes and supplier part reference numbers	
Appendix 3 – Completed logistics requirements - Packaging/delivery information	
Appendix 4 – Completed self-certification conformance declaration	
Complete set of drawings for each family of fittings with relevant data sheets	
Declaration of technical non-conformances	
Type test evidence	
Routine test plan (example)	