NPS/001/016 – Technical Specification for Compression and Mechanical Fittings for Overhead Lines

1. Purpose

The purpose of this document is to detail the technical requirements for compression and mechanical fittings used 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/001/016	Technical specification for Compression and Mechanical Fittings for Overhead Lines	6.0	October 2017

2. Scope

This specification applies to all compression and mechanical fittings (excluding ABC IPC's) for use on the Northern Powergrid overhead line distribution network and details their range and size where applicable. The majority of items are detailed in national, international and industry standards that are listed within the technical description for each product type.

The items detailed within this specification include compression fittings, live line taps and parallel groove connectors. Fittings shall be designed to be fitted to the standard range of conductors used within Northern Powergrid and applied with existing tooling.

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 (ENA TS) current at the time of supply.

2.1. Table of Contents

3. Technical Requirements

3.1. General

ENA TS 43-92 details the standard to which overhead line compression and mechanical fittings shall generally be supplied.

Materials used to manufacture fittings shall be able to withstand the mechanical load conditions relevant to their installation and environmental conditions. They must also be compatible with and have no deleterious effect on the conductor.

All ferrous materials shall be protected against corrosion by hot dip galvanising to the requirements of BS EN 1461. The fitting material should not be adversely affected by any coating applied for corrosive protection.

Tolerances shall be in accordance with ENA TS 43-92 Section 4.2

3.2. Compression Conductor Fittings

Compression fittings shall be range taking where possible and designed to cover a range of standard overhead line conductors. The items include tension joints and anchor clamps, non-tension joints, tee-joints, bails and bi-metal configurations and are detailed in Appendix 2. Compression fittings shall be installed in accordance with Northern Powergrid guidance note NSP/004/108 – Guidance on the Installation of Compression Joints.

Fittings shall be marked in accordance with ENA TS 43-92 Sections 4.3 and 5.2

Compression fittings shall be suitable for application using the Northern Powergrid approved universal die-less versa-crimp tooling system with the exception of a number of ACSR and AAAC fittings that are applied with a Hexpress tooling system. For die-type Hexpress systems the die / tube size combination shall be common for all the fittings associated with the given conductor. In both cases the fittings shall be suitable for application with the existing tooling utilised within Northern Powergrid. For new systems offered to Northern Powergrid it is a requirement that the supplier will provide evidence of system compatibility utilising existing tooling.

All components shall be fitted with approved grit grease to prevent metal oxidisation, provide electrical conductivity and tensile holding properties. The connector orifice shall be fitted with a plastic cap or plug to prevent contamination.

3.2.1. Full Tension Mid-Span Joints, Anchor Clamps and Non-Tension Fittings

Tension joints shall be of the compression type with anchor clamps fitted with an integral ball, socket, tongue or clevis.

Non-tension tubular fittings used on PVC covered conductors shall allow the stripped end of the conductor and a quantity of insulation to be inserted into the tube. This shall be designed to reduce metal fatigue and prevent the ingress of moisture. The tube shall therefore exceed the minimum striping length required and ensure that electrical performance is maintained.

Joints for heterogeneous conductors i.e. ACSR and ACCSR shall include a longitudinal centring key, while those for homogenous conductors i.e. AAAC or HDBC shall include a central barrier stop to ensure correct centring of the joint.

3.2.2. Jumper Palms

Single holes in flat palms shall be of a medium fit series in accordance with BS EN 20273. Double hole palms shall be drilled in accordance with ENA TS 41-16, Fig. 4.

Palms for connecting jumper loops to dead ends, or tee connectors shall be compression type with either straight or 30º angle lugs. All jumper palms shall be supplied with bolt assemblies.

Bolt assemblies shall consist of bolts and nuts to grade 8.8 / 8.0 in accordance with BS 4190 complete with load spreading washers. Load spreading washers shall be 44mm diameter and 9.5mm thick for M16 bolts. To prevent loosening in service the minimum installation torque shall not be less than 90Nm.

3.2.3. Bi-Metal Fittings

Bi-metal fittings shall be designed to eliminate any effect arising from galvanic corrosion that would impair the performance of the fitting.

Where this interface involves the use of copper cable terminals i.e. on cable support platforms using terminals similar to those shown on drawing 1091010704 sheet 4 then this fittings shall be a bi-metallic compression pin terminal similar to those detailed on drawing 1091010704 sheet 3.

3.2.4. Bail Fittings

Bail fittings designed to be used in conjunction with live line taps shall be manufactured from copper or aluminium rod, in conjunction with diameters to suit the associated live line tap, subject to a range of 8 mm to 12 mm. The bail shall be compressed, welded or brazed onto a tee joint. The dimension of the bail shall be that the horizontal portion is a minimum distance of 90 mm below the main conductor, and its length shall be a minimum of 175 mm. This will enable it to accept a splash (arcing) plate.

3.3. Mechanical Fittings

Fittings shall be marked in accordance with ENA TS 43-92 Sections 4.3.

3.3.1. Parallel Groove Fittings

Parallel groove connectors shall be suitable for bi-metallic applications and the conductor range of 16mm to 120mm copper or aluminium main and tap combinations. These fixings shall utilise M8 shear bolt technology.

3.3.2. Live Line Taps

Live line taps shall be manufactured from high strength, corrosion resistant Silicon Bronze or similar. Steel pins, rivets or springs shall be manufactured from corrosion resistant stainless steel. Beaks on live line taps shall protrude from the body of the fitting to allow ease of location onto a bail fitting. The eye fitting and shank length shall be compatible with a positive grip live line head currently used within Northern Powergrid. When the fitting is fully opened it shall be designed so the moving part remains captive within the main unit and must be capable of withstanding a minimum installation torque of 32Nm.

The 400 Amp live line tap shall accommodate 14mm to 70mm Copper and the 800 Amp live line tap shall accommodate 70mm to 125mm Copper. The fitting shall have the means of conductor entry from above or below the tap.

3.3.3. Wedge Clamps

Wedge type anchor clamps complete with attachment straps for use with AAAC conductors may be used as an alternative termination method for tower line conductors. The design of wedge clamps shall incorporate the following features:-

- The body and the wedges shall be manufactured from forged aluminium alloy.
- The body shall be hinged and designed to incorporate dovetail interlocking wedges.
- The performance of the clamp shall be unaffected by manufacturing tolerances in the wedge bodies.
- The design of the conductor guide assembly shall ensure that it is possible to tighten the bolts with the wedge clamp straps assembled in their correct position.

3.4. Testing

Testing requirements for compression and mechanical conductor fittings shall be in accordance with ENA TS 43-92 and BS EN 61284.

4. References

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.

4.1. External Documentation

Reference	Title
ENA TS 43-92 Issue 5 2018	Overhead Line Fittings
BS EN 1461: 2009	Hot dipped galvanised coatings on fabricated iron or steel articles – specification and test methods
BS EN 20273: 1992	Fasteners – Clearance holes for bolts and screws
BS EN 61284: 1998	Overhead Lines – Requirements and tests for fittings

4.2. Internal documentation

Reference	Title
NSP/004/108	Guidance on the Installation of Compression Joints

4.3. Amendments from Previous Version

Reference	Description
4.1 External Documentation	Document versions updated
Appendix 2 – Schedule of Components	Several new items added to the schedule due to NPg business requirements

5. Definitions

Term	Definition
Bail	An auxiliary length of conductor connected to the main conductor, and designed to accept a live line tap fitting
Bimetallic Fitting	A fitting suitable for jointing conductors of different materials
Compression Conductor Fitting	A fitting for which the force necessary to grip the conductor is provided by permanent deformation of the fitting when applied by the appropriate tool
Live Line Tap	A mechanical partial tension tee joint designed to be applied with a live line tool
Mechanical Conductor Fitting	A fitting in which the force necessary to grip the conductor is provided by means of bolts or the action of self-tightening wedges

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
Dan Rodrigues	Governance Analyst	30/10/2019

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
Steven Salkeld	Policy and Standards Engineer	04/11/2019

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	30/10/2019
Michael Emsley	Policy and Standards Manager	31/10/2019

6.4. Authorisation

Authorisation is granted for publication of this document.

		Date
Gregg Farrell	Head of System Engineering	24/11/2019

Appendix 1 - Self Certification Conformance Declaration

Overhead line fittings covered by ENATS 43-92 shall comply with the latest issues of the relevant international and British Standards. ENATS 43-92 is intended to amplify and/or clarify the requirements of those Standards

This check sheet identifies the clauses in ENATS 43-92 and the clauses of the aforementioned Standards relevant to overhead line fittings. 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
- Provide technical data sheets and associated drawings for each product.

Manufacturer:

Product Reference:

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

BS EN 61284			ENA TS 43-92			
Clause/Sub-clause	Requirements	Conformance Code	Clause/Sub-clause	Requirements	Conformance Code	Remarks
4	Requirements[1]		4	General requirements[2]		
4.2	Requirements for specific fittings[3]		5 6	Compression conductor fittings[4] Mechanical conductor fittings		
5	Quality Assurance					
6	Classification of Tests[5]					

[1] Clause 4.2 of BS EN 61284 is subject to Clauses 5, 6 and 7 of ENATS 43-92. Refer to Table 1 Part 2.
[2] ENATS 43-92 calls for specific requirements in relation to;

- finish (ENATS 43-92 Clause 4.1.3)
- tolerances (ENATS 43-92 Clause 4.2)
- Packaging and protection (ENATS 43-92 Clause 4.4)
- Tension terminations (ENATS 43-92 Clause 4.5).

[3] Clause 4.2 of BS EN 61284 covers general design requirements, the requirements of which shall be complied with, where appropriate to the fitting employed.
[4] Clauses 5, 6 and 7 of ENATS 43-92 calls for specific design requirements of compression conductor fitting not called by Clause 4.2 of BS EN 61284.
[5] Clause 8.3 of ENATS 43-92 defines sampling and acceptance criteria.

BS EN 61284			ENATS 43-92			
Clause/Sub-clause	Requirements	Conformance Code	Clause/Sub-clause	Requirements	Conformance Code	Remarks
7 8 9 10 11 13	Visual examination Dimensional and material variation – hot dip galvanising Non-destructive testing Mechanical heat tests Heat cycle test		8	Quality Assurance[6]		
12	Magnetic loss tests					

[6] The appropriate clauses of BS EB 61284 apply with the following specific requirements:

- The heat cycle test for current carrying fittings shall be 1000 cycles to a maximum temperature rise of 70° above ambient.
- The heat cycle test for current carrying fittings shall be undertaken on six fittings subject to the requirements of Clause 8.1.1 of ENATS 43-92.
- Clauses 8.2.1, 8.2.2, 8.2.3, 8.2.4, of ENATS 43-92 define the conductor tensions to be applied during the mechanical tests and the holding period T.
- Clause 8.2.2 of ENATS 43-92 calls for additional requirements in terms of the reapplication of the fitting to the conductor.
- Clauses 8.2.5 and 8.2.6 of ENATS 43-92 calls for additional torque tests for split bolts, saddle fittings and live line taps.
- Clause 8.2.7 of ENATS 43-88 calls for additional tests to prove the interface integrity of the friction welded fittings.
- Clause 8.2.9 of ENATS 43-92 calls method B (vertical damage and failure load tests) for suspension clamps and defines specific application and slippage criteria.

Appendix 2 – Schedule of Components

Commodity Code	Description
Test Slug	
307322	Compression Fitting, Test Slug for Overhead die-less versa-crimp tooling system to drawing Number 1.09.145.0056 Sheet 4
300003	Compression-Equipment Over Head Test Gauge (Go / No-go), Ref 222074, To Drawing No. 1.09.145.0056 Sheet 4 Item 17
Single Hole Lug Fitting	
075226	Compression Fitting, Lug for 13/35 mm Cu with M17 Hole Ref. VPCL 1.1 (17)
075234	Compression Fitting, Lug for 13/35 mm Cu with M21 Hole Ref. VPCL 1.1 (21)
268823	Compression Fitting, Lug for 13 to 35 mm Cu with M8 Hole Ref. VPCL 1.1/2 (8) to Drawing Number 1.09.101.0237 sheet 3
075218	Compression Fitting, Lug One Hole for 13/35 mm Cu with M12 Hole Ref. VPCL 1.1/2 (12)
268838	Compression Fitting, Lug for 14 to 35 mm Cu with M14 Hole Ref. VPCL 1.1/2 (14) to Drawing Number 1.09.101.0237 sheet 3
268842	Compression Fitting, Lug for 32 to 70 mm Cu with M14 Hole Ref. VPCL 1.3 (14) to Drawing Number 1.09.101.0237 sheet 3
268857	Compression Fitting, Lug for 32 to 70 mm Cu with M17 Hole Ref. VPCL 1.3 (17) to Drawing Number 1.09.101.0237 sheet 3
075317	Compression Fitting, Single Lug Hole for 32 - 70mm Copper, M20 hole Ref: VPCL 1.3 (20)
268876	Compression Fitting, Lug for 95 - 100 mm Cu with M14 Hole Ref. VPCL 1.4 (14) to Drawing Number 1.09.101.0237 sheet 3
268880	Compression Fitting, Lug for 95 - 100 mm Cu with M18 Hole Ref. VPCL 1.4 (18) to Drawing Number 1.09.101.0237 sheet 3
268895	Compression Fitting, Lug for 95 - 100 mm Cu with M23 Hole Ref. VPCL 1.4 (23) to Drawing Number 1.09.101.0237 sheet 3
268908	Compression Fitting, Lug for 125 mm Cu with M14 Hole Ref. VPCL 1.5 (14) to Drawing Number 1.09.101.0237 sheet 3
268912	Compression Fitting, Lug for 125 mm Cu with M18 Hole Ref. VPCL 1.5 (18) to Drawing Number 1.09.101.0237 sheet 3
268927	Compression Fitting, Lug for 125 mm Cu with M23 Hole Ref. VPCL 1.5 (23) to Drawing Number 1.09.101.0237 sheet 3
268821	Compression Fitting Lug for 150mm Copper with 21mm Hole. Supplier Reference VPCL 1.6 (21)
268822	Compression Fitting Lug for 150mm Copper with 14mm Hole. Supplier Reference VPCL 1.6 (14)
Double Hole Lug Fitting	
268950	Compression Fitting, Lug Double M14 Hole for 32 mm HDBC Ref. VPCL 2.1/2C to Drawing Number 1.00.043.9203
268772	Compression Fitting, Lug Double M14 Hole for 70 mm HDBC Ref. VPCL 2.3C to Drawing Number 1.00.043.9203
268965	Compression Fitting, Lug Double M14 Hole for 100 mm HDBC Ref. VPCL 2.4C to Drawing Number 1.00.043.9203
268984	Compression Fitting, Lug Double M14 Hole for 125 mm HDBC Ref. VPCL 2.5C to Drawing Number 1.00.043.9203
Aluminium Lug Fitting	
075192	Compression Fitting, Angle Lug for 13/35 mm Cu with M17 Hole Ref. VPCL 1.1 (17) 60
075127	Compression Fitting, Angle Lug for 13/35 mm Cu with M12 Hole Ref. VPCL 1.1/2 (14) 60
075143	Compression Fitting, Angle Lug for 32 to 70 mm Cu with M14 Hole Ref. VPCL 1.3 (14) 60
075374	Compression Fitting, Angle Lug for 32 to 70 mm Cu with M17 Hole Ref. VPCL 1.3 (17) 60
367588	Compression Fitting, Angle lug for 13/35 mm Cu with M17.5 Hole to Drawing Number 1.09.101.0237 Sheet 2

Commodity Code	Description
367573	Compression Fitting, Angle lug for 13/35 mm Cu with M14.3 Hole to Drawing Number 1.09.101.0237 Sheet 2
Bi-metal Lug Fitting	
260107	Compression Fitting, Lug Bi-metal 50 - 95 mm ABC, 12.5 mm Hole Ref. VPBL 1.2 to Drawing Number 1 09 119 3157 sheet 3
240372	Compression Fitting, Lug Bi-metal 120 mm ABC, 12.5 mm Hole Ref. VPBL 1.3 to Drawing Number 1 09 119 3157 sheet 4
240375	Bi Metal Compression Lug, 50-120mm, ABC (palm size suitable for 16.0 hole) To Drawing No. 1.09.119.3157 SHT 3 Manu Ref. 224412 (16)
Copper Tension Fitting	
268397	Compression Fitting, Mid Span Tension for 13 - 32 mm Cu Ref. VPCT 1.2 to Drawing Number 1.09.101.0102 Sheet 3
072363	Compression Fitting, Mid Span Tension for 50 - 70 mm Cu Ref. VPCT 1.3 Drawing Number 1.09.101.0102 Sheet 3)
268429	Compression Fitting, Mid Span Tension for 70 - 100 mm Cu Ref. VPCT 1.4 to Drawing Number 1.09.101.0102 Sheet 3
268325	Compression Fitting, Mid Span Tension for 70 - 100 mm Cu Ref. VPCT 1.4 to Drawing Number 1.09.101.0102 Sheet 3
Aluminium Tension Fitting	
072405	Compression Fitting, Tension for 7.4mm - 11.3 mm Al Ref. VPAT 1.3
268363	Compression Fitting, Tension for 100 mm ACSR Ref. VPAT 1.3 to Drawing Number 1 09 101 0102 sheet 4
268378	Compression Fitting, Tension for 150 mm ACSR Ref. VPAT 1.4 to Drawing Number 1 09 101 0102 sheet 4
245741	Compression Fitting - Midspan Hexpress Connector for 175mm AAAC Elm to 150mm ACSR Dingo
Copper Non-tension Fitting	
268452	Compression Fitting, Non-tension for 13 mm to 32 mm Cu Ref. VPCN 1.2 to Drawing Number 1.00.043.9203
072603	Compression Fitting, Non-tension for 32 mm to 70 mm Cu Ref. VPCN 1.3 to Drawing Number 1.00.043.9204
260624	Compression Fitting, Non-tension for 70 mm to 100 mm HDBC Ref. VPCN 1.4 to Drawing Number 1.00.043.9203
268471	Compression Fitting, Non-tension for 95 mm to 125 mm HDBC Ref. VPCN 1.5 to Drawing Number 1.00.043.9203
Pin Connector Fitting	
230637	Compression Fitting, Termination Kit for 35mm² Copper Flexible Conductor - Comprises of 6 Compression Pin Terminals and Associated Stress Sleeves
260622	Compression Fitting, Non-tension Set 6 x 70 mm Flexible Cu Jumper to Nulec Reclosers (c/w 2 x Heat Shrink Tubes/fitting) Ref. VPCN 1.8 to Drawing Number 1.09.101.0102 Sheet 13
260620	Compression Fitting, Set 6 x 32 mm HDBC to 70 MM Cu Flexible Ref. VPCN 1.9 to Drawing Number 1.00.043 9202 Sheet 4
260618	Compression Fitting: For 70mm Flexible Covered Conductor Connections To Live Line Taps: VPPT 1:4
260619	Heatshrink Tube: 155mm: For Stress Relief On 70mm Flexible Covered Compression Fittings
260635	Compression Fitting, Termination Kit for 120mm² Copper Flexible Conductor
230636	Compression Fitting, Termination Kit for 120mm² Copper Flexible Conductor - Comprises of 6 Compression Pin Terminals and Associated Stress Sleeves
Aluminium Non-tension Fitting	
072652	Compression Fitting, Non-Tension for 4mm to 25 mm Al Ref. VPAN 1.2
268433	Compression Fitting, Non-Tension for 50 mm ACSR and AAAC Ref. VPAN 1.2 to Drawing Number 1 00 043 9204 sheet 2
268448	Compression Fitting, Non-Tension for 100 mm ACSR and AAAC Ref. VPAN 1.3 to Drawing Number 1 00 043 9204 sheet 3

Commodity Code	Description
268439	Compression Fitting; Non-tension for 175mm to 200mm Aluminium Conductor. Reference VPAN 1:4
243241	Compression Fitting, Non Tension joint -suitable for Poplar, Elm or Lynx to Drawing Number 1.09.101.0653 sht 4 (Ref HPN-160-200AL) requires A9 die
243242	Compression Fitting, Full Tension joint -suitable for 200mm Poplar conductor to Drawing Number 1.09.101.0653 sht 6 (Ref 226619) requires A9 die
Bi-metal Non-tension Fitting	
246932	Compression Fitting, Non-tension Bi-metal 50/100 mm AAAC to 13/32 mm Cu Ref. VPBN 1.1 to Drawing Number 1 09 101 0649 sheet 2
246934	Compression Fitting, 50mm/100mm2 Al Alloy to 65/70mm2 Flexible Cu, Bi-Metal Non-tension, As Per Drawing No. 1.09.101.0649 Sht2, Ref. VPBN 1.11
268518	Compression Fitting, Non-tension Bi-metal 50/100 mm Al to 35/70 mm HDBC Ref. VPBN 1.2 to Drawing Number 1 09 101 0649 sheet 2
268503	Compression Fitting, Non-tension Bi-metal 100/175 mm Al to 70/100 mm HDBC Ref. VPBN 1.3 to Drawing Number 1 09 101 0649 sheet 2
243244	Compression Fitting, Full Tension joint -suitable for 200mm Poplar conductor to Drawing Number 1.09.101.0653 sht 6 (Ref 226619) requires A9 die
071365	Compression Fitting, Non-tension Bi-metal 100/175 mm Al to 100/120 mm HDBC Ref. VPBN 1.5
071381	Compression Fitting, Non-tension Bi-metal, 120 deg. 35/70 mm Cu to 70 mm Al Ref. VPBN 3.10
245732	Compression Fitting, Lug Bi-metal for 125 mm Cu to Drawing Number 1.09.101.0653 Sheet 1
Tap Connector Fitting	
077370	Compression Fitting, Tap Connector Main 10 - 35 mm, Tap 10 - 35 mm Ref. VPCTC 2.3
077347	Compression Fitting, T Connector for 10 - 38 mm Cu Main to 32 - 150 mm Cu Tap Ref. VPCTC 3.2
077354	Compression Fitting, T Connector for 25 - 70 mm Cu Main to 25 - 70 mm Cu Tap Ref. VPCTC 3.3
268804	Compression Fitting, T Connector for 32 - 150 mm Cu Main to 50/95 mm ABC or 95 mm HDBC Tap Ref. VPCTC 3.2 to Drawing Number 1.09.119.3151 Sheet 3
247579	Compression Fitting, Tee with Jumper Lug for 70 - 125mm HDBC Ref. VPCTC 4.4 to Drawing Number 1.09.101.0102 Sheet 10
077362	Compression Fitting, Tap Connector for 25 - 70 mm Cu Main, 10 - 35 mm Cu Tap Ref. VPCSC 2.2
268787	Compression Fitting, Tee Connector for 10 - 60 mm Al Main to 10 - 60 mm Al Tap. Ref. VPATC 3.1 to Drawing Number 1 09 119 3151 sheet 2
268791	Compression Fitting, Tee Connector for 22 - 100 mm Al Main to 22 - 100 mm Al Tap. Ref. VPATC 3.3 to Drawing Number 1 09 119 3151 sheet 2
077453	Compression Fitting, Service Connector for 22 - 100 mm Main to 10 - 60 mm Tap Al. Ref. VPASC 2.2
077438	Compression Fitting, Bi-metal Tap for 32 - 95 mm Cu Main to 22 - 100 mm Al Tap Ref. VPBT 1.2
077461	Compression Fitting, Bi-metal for 22 - 100 mm Al Main to 10 - 35 mm Cu Tap Ref. VPBT 2.2
Bail Fittings	
268630	Compression Fitting, Stirrup Bail Clamp for 13 to 32 mm Cu Ref. VPCS 1.1 to Drawing Number 1.09.120.0013
268645	Compression Fitting, Stirrup Bail Clamp for 70 to 125 mm HDBC Ref. VPCS 1.2 to Drawing Number 1.09.120.0013
268537	Compression Fitting, Stirrup Bail Clamp for 50 mm ACSR and AAAC Ref. VPAS 1.2
268541	Compression Fitting, Stirrup Bail Clamp for 100 mm ACSR and AAAC Ref. VPAS 1.3
241892	Compression Fitting, Stirrup Bail Clamp for 150 - 175 mm ACSR and AAAC Ref. VPAS 1.4
246951	Compression Fitting, Spill Take Off, Bi-metal for Heat Shrink Cable Connections Ref. VPST 1.1 to Drawing Number 1.09.101.0649
241854	Bail-Clamp, IPC, 50/120mm, For HV XLPE, To Drawing No. 1.09.101.0667
ACSR Fitting	
245747	Compression Fitting, Anchor Clamp for 60/70 mm ACSR to Drawing Number 1.09.101.0653 Sheet 1
245728	Compression Fitting, Tension for 150/175 mm ACSR to Drawing Number 1 09 101 0653 sheet 1
245925	Compression Fitting, Tension for 60/70 mm ACSR to Drawing Number 1 09 101 0653 sheet 1
245713	Compression Fitting, Angle Lug for 150/175 mm ACSR to Drawing Number 1 09 101 0653 sheet 1

Commodity Code	Description
246504	Clamp, Comp., Term. 1 Jumper, 175mm, ACSR, Drawing No. 1.09.101.0420, Sheet 1
245836	Compression Fitting, Jumper Lug for 60/70 mm ACSR to Drawing Number 1.09.101.0653 Sheet 1
076380	Compression Fitting - Angle Jumper Lug for 150/175mm ACSR
AAAC Fitting	
243240	Compression Fitting, Anchor Clamp for 200mm AAAC with Bolt Plate to Drawing Number 1 09 101 0653 sheet 3
243255	Compression Fitting, Anchor Clamp for 175 mm AAAC, with Eye Termination End Fitting to Drawing Number 1 09 101 0653 sheet 2
243239	Compression Fitting, Anchor Clamp for 175 mm AAAC, Slotted Palm and Bolt Plate to Drawing Number 1 09 101 0653 sheet 2
243224	Compression Fitting, Tension for 175 mm AAAC to Drawing Number 1 09 101 0653 sheet 2
243243	Compression Fitting, Angle Lug for 175 mm AAAC to Drawing Number 1 09 101 0653 sheet 2
243245	Compression Fitting, 30 Deg Cranked Lug for use with the 200mm Poplar Comp Dead End cat 243240 to Drawing Number 1.09.101.0653 sht3 requires A9 die
240781	Compression Fitting, Lug for 175 mm AAAC to Drawing Number 1 09 101 0653 sheet 2
243281	Compression Fitting, Lug Angle Bi-metal for 125 mm HDBC 175 mm AAAC to Drawing Number 1 09 101 0653 sheet 2
240885	Compression Fitting, Lug for 125 mm HDBC - 175 AAAC to Drawing Number 1.09.101.0653 Sheet 2
Anchor Clamp and Lug Fitting	
247827	Compression Fitting, Anchor Clamp for 50 mm AAAC/ACSR Ref. VPAA 2.2 (S) SL, to Drawing Number 1 09 101 0102 sheet 10
268274	Compression Fitting, Lug Angle with Bolt Plate for 50 mm ACSR/AAAC Ref. VPAL 2.2 (A)N to Drawing Number 1 09 1010102 sheet 9
247899	Compression Fitting, Anchor Clamp for 100 mm AAAC/ACSR Ref. VPAA 2.3(S) SL, to Drawing Number 1 09 101 0102 sheet 9
268293	Compression Fitting, Lug Angle with Bolt Plate for 100 mm AAAC and 100/150/175 ACSR Ref. VPAL 2.4 (A) N to Drawing Number 1 09 101 0102 sheet 5
248162	Compression Fitting, Anchor Clamp for 150 mm ACSR Ref. VPAA 2.4 (S) SL, to Drawing Number 1 09 101 0102 sheet 9
247935	Compression Fitting, Anchor Clamp for 13 mm Cad and 32 mm HDBC Ref. VPCA 2.2 (S)SL to Drawing Number 1.09.101.0102 Sheet 9
248444	Compression Fitting, Lug Angle with Bolt Plate for 13mm Cad and 32 mm HDBC Ref. VPAL 2.1/2 (A) N to Drawing Number 1 09 101 0102 sheet 5
245710	Compression Fitting, Anchor Clamp, Clevis ended, 150/175mm ACSR (wolf/lynx), Drawing No. 1.09.101.0653 sht3 (man ref 226707)
247920	Compression Fitting, Anchor Clamp for 70 to 100 mm HDBC Ref. VPCA 2.4(S)SL to Drawing Number 1.09.101.0102 Sheet 9
248529	Compression Fitting, Lug Double M14 Hole for 100 mm HDBC Ref. VPCL 2.4(A)N to Drawing Number 1.09.101.102 Sheet 9
247916	Compression Fitting, Anchor Clamp for 125 mm HDBC Ref. VPCA 2.5 (S)SL to Drawing Number 1.09.101.0102 Sheet 9
248393	Compression Fitting, Lug Double M14 Hole for 125 mm HDBC Ref. VPCL 2.5(A)N to Drawing Number 1.09.101.102 Sheet 9
247831	Compression Fitting, Lug Angle for 100 mm AAAC and 100/150/175 ACSR Ref. to Drawing Number 1 09 101 0102 sheet 5
261951	Compression Fitting, Lug Double Hole for 32 mm HDBC/50 mm AAAC Ref. VPAL 2.2 (A) to Drawing Number 1 09 101 0102 sheet 5
261966	Compression Fitting, Lug for 70-100 mm Cu PVC and 100 mm AAAC Ref. VPAL 2.4(C) to Drawing Number 1 09 101 0102 sheet 9

Commodity Code	Description
235764	Compression Fitting, Anchor Clamp for 50 - 120 mm XLPE Ref. VPAA 7.3 SDCC to Drawing Number 1.09.101.0667 Sheet 1
245982	Compression Fitting, Socket Anchor Clamp for 175 mm AAAC to Drawing Number 1.09.101.0653 Sheet 3
245709	Compression Fitting, Anchor Clamp for 150/175 mm ACSR to Drawing Number 1 09 101 0653 sheet 1
246059	Compression Fitting, Ball Anchor Clamp for 175 mm AAAC to Drawing Number 1.09.101.0653 Sheet 3
Jumper Lugs for ACSR and HDBC Fittings – Alcan Pattern	
246415	Compression Fitting, Alcan Male Lug for 150 mm ACSR to Drawing Number 1.09.101.0420 Sheet 4
246434	Compression Fitting, Alcan Male Lug for 175 mm ACSR to Drawing Number 1.09.101.0420 Sheet 4
246379	Compression Fitting, Alcan Female Lug for 60 mm ACSR to Drawing Number 1.09.101.0420 Sheet 4
246383	Compression Fitting, Alcan Female Lug for 70 mm ACSR to Drawing Number 1.09.101.0420 Sheet 4
246398	Compression Fitting, Alcan Female Lug for 150 mm ACSR to Drawing Number 1.09.101.0420 Sheet 4
246400	Compression Fitting, Alcan Female Lug, for 175 mm ACSR to Drawing Number 1.09.101.0420 Sheet 4
266620	Compression Fitting, Alcan Female Lug, Bi-metal for 125 mm HDBC to Drawing Number 1.09.101.0420 Sheet 4
241182	Compression Fitting, Alcan Female Lug, Bi-metal for 125mm PVC HDBC to Drawing Number 1.09.101.0420 Sheet 4
248783	Compression Fitting, Alcan Female Angle Lug, for 150 mm ACSR to Drawing Number 1.09.101.0420 Sheet 4
248798	Compression Fitting, Alcan Female Angle Lug, Non Bi-metal for 175 mm ACSR to Drawing Number 1.09.101.0420 Sheet 4
266635	Compression Fitting, Alcan Female Angle Lug, Bi-metal for 125 mm HDBC to Drawing Number 1.09.101.0420 Sheet 4
241178	Compression Fitting, Angle Lug, Bi-metal for 125 mm PVC HDBC to Drawing Number 1.09.101.0420 Sheet 4
246472	Compression Fitting, Jumper Dead End for 60/70 mm ACSR to Drawing Number 1 09 101 0420 sheet 9
246925	Compression Fitting, Tension Joint for 60/70 mm ACSR to Drawing Number 1.09.101.0653 Sheet 2
245715	Compression Lug, Angle, 150/175mm ACSR, Drawing No. 1.09.101.0653 sht4 (man ref 226279)
247545	Compression Fitting, Tee with Jumper Lug for 13 - 32 mm Cu Ref. VPCTC 4.1 to Drawing Number 1.09.101.0102 Sheet 10
247597	Compression Fitting, Tee with Jumper Lug for 70, 100 and 125 mm HDBC Ref. VPCTC 4.4 to Drawing Number 1.09.101.0102 Sheet 10
247530	Compression Fitting, Tee for 175 mm AAAC and 150 mm ACSR Ref. VPATC 4.5 to Drawing Number 1.09.101.0102 Sheet 10
247333	Compression Fitting, Tee for 50 - 100 mm AAAC and ACSR Ref. VPATC 4.3 to Drawing Number 1.09.101.0102 Sheet 10
246364	Compression Fitting, Tee Connector for 175 mm ACSR to Drawing Number 1.09.101.0420 Sheet 4 or 0102 Sheet 10
241159	Compression Fitting, Tension for Double Jumper 150 mm ACSR to Drawing Number 1.09.101.0420 Sheet 11
241125	Compression Fitting, Tension for Double Jumper 175 mm ACSR to Drawing Number 1.09.101.0420 Sheet 11
Clamp Adapter	
240669	Clamp-Adaptor BS 3288 ref (15/27B), 70kn MFL: To Drawing Number 1.09.101.0450 Sheet 1
Parallel Groove Connector	
266490	Parallel Grove Connector Suitable for Bi-metallic Applications on the Conductor Range of 16mm to 120mm copper or aluminium Main and Tap Combinations. Only to be used for Temporary Connections
Live Line Tap Fittings	
268999	Live Line Tap, 400 Amp utilised at 200 Amp to Drawing Number 1.09.121.0024
269008	Live Line Tap, 800 Amp utilised at 400 Amp to Drawing Number 1.09.121.0024
Neutral earth Stirrup	
354340	Neutral and LV Earth Connection Stirrup for Pole Mounted Substations, to Drawing Number 1.09.119.3161

Appendix 3 - Logistical Requirements

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

Details should be provided where relevant in respect to the minimum and maximum exposure levels, frequency of exposure and duration of exposure of the packaged item with respect to;

- Ambient temperature
- Humidity
- Water
- Dust
- Atmospheric corrosion
- Impact
- Vibration
- Solar radiation

The Tenderer shall ensure that each item is suitably packaged and protection to maintain the product and packaging as "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 product packages tendered are made up of sub packages all the sub packages shall unless varied by this specification, be supplied securely packaged together. Where items are provided in bagged/boxed form the material from which the bags are manufactured shall be capable of sustaining the package weight and resisting puncture by the materials within. Tenderer shall submit at the time of tendering the details of the proposed packaging (i.e. materials composition and structure) to be used for each product. Where the Tenderer is unable to provide packaging suitable for outdoor storage then this should be stated at the time of tender.

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 products packages tendered are made up of sub packages each sub packages shall be marked. As a minimum requirement the following shall be included;

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

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 1 – completed self-certification conformance declaration	
Complete set of drawings for each item	
Type test evidence	
Manufacturing routine test/quality plan	
Packaging information	
Installation Instructions	
ISO:9001, ISO:14001 and ISO:18001 certificates	