NPS/002/005 - Technical Specification for Industrial Service Units

1. Purpose

The purpose of this document is to detail the requirements of Northern Powergrid (the Company) in relation to the technical requirements for Industrial Service Units for three phase systems operating at voltages up to 400V.

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

Document Reference	Document Title	Version	Published Date
NPS/002/005	Technical Specification for Industrial Service Units	5.0	December 2018

2. Scope

This document refers to the specification requirements of the Company with respect to Industrial Service Units (ISU) used to provide power supplies to commercial and industrial premises with loads between 100 and 500 amps per phase.

The ISU shall include, pre-installed:

- an integral heavy duty cut-out,
- a link fitted for the neutral / earth,
- pre-wired metering voltage fuses fitted to phases, and
- provision for metering current transformers (CT's) (CT's not supplied with this ISU).

ISU's are to be suitable for internal wall mounting in public locations, but shall only allow access to internal components by appropriately authorised persons.

Suppliers shall provide details of any periodic inspection and maintenance information requirements as required in in Appendix 6.

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

The following appendices form part of this technical specification:

- Appendix 1 – Product requirements,
- Appendix 2 - Logistical requirements,
- Appendix 3 - Self certification conformance declaration,
- Appendix 4 - Addendum to Supplier Requirements,
- Appendix 5 – Routine inspection and maintenance requirements, and,
- Appendix 6 - Technical information check List.

2.1. Table of Contents

3. Technical Requirements

Industrial service units (ISU's) shall meet the requirement of BS EN 61439 (parts 1 and 2) and those options selected within this standard, unless specified otherwise.

3.1. Industrial service unit enclosure

The ISU shall be finished in a subtle colour e.g. BS 381C - Shade 632.

The unit shall have a removable lift off front panel or hinged door arrangement which is covered in further detail in section 3.3 Front access.

The inner panel shall be secured with captive screws, which shall be capable of being sealed in the closed position using standard galvanised sealing wire of maximum diameter of 2mm.

The construction of the assembly shall be such that the possibility of deliberate damage and the removal of fastenings from the outside are minimised. The assembly shall be intruder resistant, and provide protection to IP41B in accordance with BS EN 60529. Ferrous metallic parts shall be protected against corrosion, sufficient to pass the tests set out in sub clause 10.2.2 of BS EN 61439-5 and 8.1.2 of BS EN 61439-1 (severity test A).

All metalwork that forms part of the enclosure construction shall be suitably earth bonded as required.

All fastenings, nuts bolts etc. shall have corrosion-proof locking features.

Typical dimensions for the industrial service unit enclosure are nominally:

- Height = 915mm,
- Width = 500mm for the main enclosure and width = 530mm where an external earth bolt is located to the side of the main enclosure.
- Depth = 240mm,

3.2. Fixing

The unit shall be suitable for wall mounting by means of a mounting bracket using a minimum of 2 x M8 fixing bolts. A further 2 x M8 fixing bolts located towards the bottom of the enclosure shall secure the unit to the wall. All fixing holes shall be punched proud of the enclosure to allow for installation to an uneven wall surface. The upper two fixing holes in the enclosure shall be designed to allow for hanging on the wall bracket with 10mm tolerance to allow for uneven surfaces. All fixing bolts shall be located such that easy access is achievable. When installed the fixing bolts shall only be accessible from inside the enclosure.

3.3. Front access

Access to internal components of the ISU shall be via a removable lift off front panel or a single hinged door, which shall normally be hinged on the left-hand side and opening to a minimum of 180^0. Additionally, a captive arm shall be installed to hold the door in place at 180^o and 135^o nominally. However, if the need arises at the time of installation it shall be capable of being changed to hinging on the right hand side.

The panel or door shall be secured with captive screws, which shall be capable of being sealed in the closed position using standard galvanised sealing wire of maximum diameter of 2mm.

3.4. Metering cable access points

2 x pre-punched knockouts of 25mm diameter shall be provided in each side panel of the unit. The knockouts are to provide access via a flexible conduit (supplied by purchaser) between the CTs, metering voltage fuses and the meter operator's panel.

3.5. Cable enclosure entry / exit

Incoming and outgoing cables shall enter the enclosure at the bottom and top of the enclosure, respectively.

To aid the installation of the incoming cable a removable gland plate complete with a cable cleat suitable for 3 or 4 core PVC covered cables ranging in size from 95mm^2 to 300mm^2 shall be provided. The cable cleat shall be so located to provide the terminating distance specified in BS 5372 or greater, and shall provide adequate support to the cables both in normal service and when subject to the short circuit duty.

Outgoing single core cables (up to 2 x cables per termination) in the range 35mm^2 to 185mm^2 for stranded copper conductor or 35mm^2 to 150mm^2 for tri-rated copper conductor shall exit the enclosure via a hardwood or similar material top plate.

This plate shall be removable to enable fitting of cable trunking if so required.

3.6. Fuse-ways within the cut out

Fixed contacts shall be accurately positioned and securely located so as to prevent misalignment during normal use. Each phase shall include a means of ensuring the fuse link is correctly aligned with the fixed contacts when closing the circuit.

Operation and alignment of the fuse links and fixed contacts shall be achieved by ensuring the fuse handle can be inserted in the distributor unit by a hinged action pivoted on the lower contact, and withdrawn by snatch action. Appropriate contact shall be made on insertion of the fuse handle so that current can be safely carried prior to tightening of the contact tightening thumbscrews. The level of protection shall meet the requirements of IP2X of BS EN 60529 with all fuse links/handles inserted or by suitably insulated contact covers, to be provided, when withdrawn. Where fuse links/handles or contact covers are not in place, maintenance of IP XXB is not mandatory, but the design shall be such that it meets the requirements of BS EN 50274 and minimises the possibility of inadvertent contact with live conductors by the operator.

Access shall be provided for the use of test probes. They shall be able to make contact with the top and bottom fuse link terminals when fuse carriers are installed and top and bottom contacts when the fuse carrier is removed.

3.7. Fuse carriers

Each phase of the fuse way shall be capable of independent operation. The fuse carriers shall be of a through grip shrouded type, manufactured from a suitable insulating material that provides a secure connection to the fuse link by means of wedge connections and insulated contact tightening thumbscrews. The design of the thumbscrews must ensure that when in position, the whole fuse assembly cannot be dismantled when the thumbscrews are released to their full extremities. The fuse carrier shall be suitable for accommodating fuse links with 82mm or 92mm fixing centres in accordance with BS HD 60269-2:2013, BS 88-2:2013.

Fuse links are **not** to be supplied with fuse carriers.

The following additional tests shall be carried out on the fuse carriers:-

The test shall be carried out on each design of fuse carrier including its wedge mechanism, if any.

The test shall be made at an ambient temperature between 15°C and 25°C.

The test voltage of 3.75 kV (rms.) shall be applied for one minute between:

Both of the fuse carrier terminals without the fuse link being fitted.

One of the fuse carrier terminals and metal foil which is wrapped around surfaces of the insulating material of the fuse carrier, including thumbscrews, if any, which can be touched during live replacement or withdrawal of fuse carriers. For this test, a fuse link of the largest dimensions intended for the fuse carrier shall be fitted.

Following the high voltage test, the fuse carrier shall complete a humid atmosphere test as detailed in sub-clause 8.2.4.2 of BS EN 60269 – Part 1, the insulation resistance at the conclusion of the test shall be measured; the insulation resistance measured shall not be less than 5 Megohms.

Mechanical strength - the following additional test shall be carried out - Torque tests on thumbscrews: the test shall be carried out on six random samples of the insulating thumbscrew, each complete with a wedge operating screw, to confirm the mechanical strength of the thumbscrew. Each wedge operating screw shall in turn be placed in vice and a torque applied in a clockwise direction to the insulated thumbscrew using a torque spanner adapted as necessary. Each insulated thumbscrew shall withstand a torque of 12Nm, without fracturing or turning on the shank of the wedge operating screw.

Verification of short circuit withstand strength - short time withstand tests shall be under-taken with the minimum number of distributor units to be fitted in service and, in the case of short-circuit withstand ratings verified using prospective short circuit current, the supply voltage shall be equal to 1.1 times the rated operational voltage.

3.8. Incoming cable terminations

The phase cores of the incoming cable shall connect to the relevant fuse way by means of range taking mechanical connectors, which are to be supplied and fitted by the supplier. The connectors shall be suitable for terminating 3 and 4 core sector shaped solid aluminium cores in the range 95mm^2 - 300mm^2 and to ensure the correct tightening torque is applied to the termination, the connector shall have range taking shear-bolts. The head of the shear-bolt shall be in the range 17mm - 19mm and no specialist tooling shall be required to carry out the connection. The shear bolt shall be double headed to allow removal via the second bolt if required, after the first bolt has been sheared.

3.9. Outgoing cable terminations

The phase cores of the outgoing cable which will normally be 35mm^2 to 185mm^2 for stranded copper conductor or 35mm^2 to 150mm^2 for tri-rated copper conductor and shall connect to the relevant outgoing fuse way by means of range taking mechanical shear bolt connections. The shear bolt shall be double headed to allow removal via the second bolt if required, after the first bolt has been sheared.

Suitable clearance shall be provided between phases/phase barriers to permit 2 x outgoing cables per terminal in a 'side by side' connector arrangement.

The cable terminals on each outgoing fuse unit/circuit shall be separately shrouded to a minimum of IP31B. Should shrouds from one outgoing circuit be removed to gain access to its cable terminations, protection in accordance with IPXXB shall be maintained to all live parts, including bus bars and cable terminals of adjacent circuits.

3.10. Neutral / earth

The neutral / earth bar shall be electro-tin plated brass and capable of connecting cables suitable for SNE (PE) or PME (PEN) earthing by removable links, and no earthing facility where required. The removable earth links shall be clearly marked/labelled Facility shall be provided for terminating sector shaped solid aluminium neutral core in the range 95mm^2 - 300mm^2, where a 4c cable is installed, and the stranded copper neutral / earth conductors of cables in this range by means of range taking mechanical connectors. Additionally, a range taking connector suitable for stranded copper core up to 95mm^2 shall be provided for when a 'token' earthing

conductor is installed. To ensure the correct tightening torque is applied to the termination, the connector shall have range taking shear-bolts. The head of the shear-bolt shall be in the range 17mm - 19mm and no specialist tooling shall be required to carry out the connection.

Outgoing connection to the neutral/earth shall be by means of mechanical or compression lugs supplied by the purchaser. The unit shall be supplied with suitable M12 bolts, nuts, flat and spring washers.

Facility shall also be provided for convenient connection of the CT star point to the earth bar via an M6 fixing.

The external earth bolt located on the outer body of the enclosure shall be installed and captive to ensure that a secure connection can be achieved without entering the ISU. Facility shall also be made to allow the bolt to be reversed for situations where this earth connection is not to be made available. This shall ensure that no open holes are left in the ISU body.

3.11. Metering voltage fuses

Three GEC 32 to BS HD 60269-2:2013, BS 88-2:2013 or equivalent, black fuse bases and carriers **without** fuse links shall be mounted on a removable insulating cross member with appropriate phase identification. A matching white neutral link shall be provided and connected.

The incoming side of the metering voltage fuse shall be connected to the outgoing (upper) main fuse connections with 2.5mm^2 stranded copper conductors with double PVC Insulation and comply with the requirements of BS 6231 for each phase.

Front top entry is required for separately supplied metering circuits.

3.12. Support bracket

A suitable bracket / shelf assembly shall be provided below the top plate to accommodate the meter operator's current transformers (CT's). This shall be suitable to accommodate 200/5, 400/5, 500/5 and 600/5 CT's to BS EN 61869-2 and allow reasonable access for installation and termination of secondary wiring. Typically CT's are class 0.5, 7.5VA with approx. dimensions of 10cm (O/D) x 6cm high.

3.13. General

3.13.1. The main current carrying components

The main current carrying components other than those made of aluminium or aluminium alloy shall be Electro-tin or Electro-silver plated.

3.13.2. Creepage and clearance distances

The unit shall be designed to ensure that adequate clearances are provided to permit a live unit with the door(s) open does not compromise any of the designed test values.

For connections in air, the clearance and creepage distance shall not be less than 25mm between conductors and 19mm from conductor to earth as defined in ENA TS 37-2, section 8.

4. References

The industrial service unit shall comply with the relevant International Standards, British Standard specifications and all relevant Energy Networks Association Technical Specifications (ENATS) current at the time of tendering, except where varied by this standard. In respect the following documents are particularly relevant.

4.1. External Documentation

Reference	Date	Title
BS EN 61439-1	2011	Low-voltage switchgear and controlgear assemblies. Part 1: General rules
BS EN 61439-2	2011	Low-voltage switchgear and controlgear assemblies. Part 2: Power switchgear and controlgear assemblies
BS EN 60529	1992	Degrees of protection provided by enclosures (IP Codes)
BS EN 61439-5	2015	Low-voltage switchgear and controlgear assemblies. Part 5: Assemblies for power distribution in public networks
BS 5372	1997	Dimensions of cable terminations for multi-core extruded solid dielectric insulated distribution cables of voltages 600/1000V and 1900/3300v having copper or aluminium conductors
BS EN 50274	2002	Low-voltage switchgear and controlgear assemblies. Protection against electric shock. Protection against unintentional direct contact with hazardous live parts
BS HD 60269-2:2013, BS 88-2:2013	2013	Low-voltage fuses Part 2: Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application) — Examples of standardized systems of fuses A to K
BS EN 60269-1:2007 +A2:2014 BS 88-1:2007+A2:2014	2007	Low-voltage fuses —Part1: General requirements
BS EN 61869-2	2012	Instrument transformers - Part 2: Additional requirements for current transformers
BS 6231	2006	Electric cables – Single core PVC insulated flexible cables of rated voltage 600/1000 V for switchgear and controlgear wiring
ENA TS 37-2	2012	Public electricity network distribution assemblies

The supplier shall provide with the tender full technical details of the equipment offered and shall indicate any divergence from these standards or specifications.

4.2. Internal Documentation

Reference	Version / Date	Title
IMP/001/010	7.0/Nov 2018	Code of Practice for Standard Arrangements for Customer Connections
IMP/001/911	6.0/Nov 2018	Code of Practice for the Economic Development of the LV System
NPS/002/029	2.1/Jul 2019	Technical Specification for Industrial Service Units with Integral Current Transformers
NPS/002/030	2.1/Jul 2019	Technical Specification for Heavy Duty Cutouts with Integral Current Transformers
NPS/002/031	2.1/July 2019	Technical Specification for Metering Base/Panel Unit for Connection to Heavy Duty Cutouts from 100-500Amps with Integral Current Transformers and LV Air Circuit Breakers in accordance with CoP5 up to 1MW

4.3. Amendments from Previous Version

Please note that the following amendments have been made from the previous version of this document (v5.0 – as published Dec-2018). This document has not been subject to a full review and update.

Reference	Title
3.1 Industrial service unit enclosure	Section update to revise the preferred colour from RAL 7032 to BS 381C - Shade 632.Section updated to include nominal enclosure dimensions. Section updated to reference earth bonding of the metal enclosure and door hinge arrangements.
3.2 Fixing	Fixing arrangements updated to reference use of a mounting bracket.
3.3 Front access	Section updated to reference inclusion of captive arm. Section updated to reference security sealing of door/panel.
3.5 Cable enclosure entry / exit	Section updated to reference outgoing cable size change from 185mm to 240mm copper conductor to 35mm to 185mm stranded copper conductor or 35mm to 150mm tri-rated copper conductor. Section updated to reference the application of 2 x cables per termination on outgoing side.
3.9 Outgoing cable terminations	Section updated to reference outgoing cable size change from 185mm to 240mm copper conductor to 35mm to 185mm stranded copper conductor or 35mm to 150mm tri-rated copper conductor. Section updated to reference connector arrangement changing from 'back to back' to 'side by side'.
3.10 Neutral / Earth	Section updated to include label identifying removable earth link. Section updated to reference earth bolt arrangements.
3.11 Metering voltage fuses	Section updated to confirm the use of 2.5mm axillary wiring instead of 10mm. Section updated to reference auxiliary wiring complying with BS 6231.
3.12 Metering support bracket	Section updated to confirm CT types that are accepted.
3.13.2 Creepage and clearance distances	Section updated to reference ENA TS 37-2.
4.1 External Documentation	Latest versions of external standards updated and incorporated into document
4.2. Internal documentation	Latest versions of external standards updated and incorporated into document
Appendix 3 – Self Certification Conformance Declaration	Section updated in line with document changes.

5. Definitions

Term	Definition
The Company	Northern Powergrid
ISU	Industrial service unit
CT	Current transformer

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
Andy Leggett	CDS Administrator	22/11/2018

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 contract 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
Paul Hollowood	Policy & Standards Engineer	22/11/2018

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 & Standards Engineer	13/12/2018
Steve McDonald	Head of Programme Delivery	07/12/2018

6.4. Authorisation

Authorisation is granted for publication of this document.

		Date
Greg Farrell	Head of System Strategy	05/07/2019

Appendix 1 – Product Requirements

Description	Commodity Code
Industrial service unit (ISU) 500A, for up to 300 sq mm waveform cable. Supplied with front cover, one set of metering voltage fuses and mechanical shear bolt connectors.	044960

Supporting evidence of compliance with type tests shall be submitted with the completed tender document.

Manufacturers may provide alternative tenders for items not complying with the above specification. This shall be clearly stated together with detailed descriptions of any variation from the specification, together with drawings and test results.

The supplier shall provide with the tender full technical details of the equipment offered and shall indicate any divergence from these standards or specifications.

Appendix 2 – Logistical Requirements

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

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

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

The Tenderer shall ensure that each item is suitably packaged and protected to enable storage in an outdoor environment whilst maintaining the product and packaging as "fit for service" prior to installation.

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.

In order to maximise storage space all palletised goods shall be supplied in standard returnable box pallets with the following specification. Where applicable, suppliers shall also indicate the maximum number of units of each product that are storable per box pallet.

- Size - 1200mm (w) x 1000mm (d) x 750mm (h)
- Weight (empty) – Up to 33kg
- Load Capacity – Up to 450kg
- Maximum Stacking Capacity – 10 High

Suppliers shall also include details of the type of material used to manufacture the box pallets.

The Company will give consideration to innovative alternatives to this specification.

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

Tenderer shall submit at the time of tendering a sample of the proposed labelling for each product package type.

Appendix 3 – Self Certification Conformance Declaration

Industrial service units (ISU's) shall comply with the latest issues of the relevant national and international standards, including IEC 61439. Additionally this technical specification is intended to amplify and/or clarify requirements relating to these Standards.

This self-declaration sheet identifies the clauses of the aforementioned standards relevant to Industrial Service Units (ISU's) for use on the Company distribution network. The manufacturer shall declare conformance or otherwise, clause by clause, using the following levels of conformance declaration codes.

Conformance declaration codes

N/A = Clause is not applicable/ appropriate to the product

Cs1 = The product conforms fully with the requirements of this clause

Cs2 = The product conforms partially with the requirements of this clause

Cs3 = The product does not conform to the requirements of this clause

Cs4 = The product does not currently conform to the requirements of this clause, but the manufacturer proposes to modify and test the product in order to conform.

Instructions for completion

- When Cs1 code is entered the supplier shall provide evidence to confirm 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' 'IEC' or 'ENATS' as appropriate.
- Provide technical data sheets and associated drawings for each product.

Manufacturer / Supplier:

Manufacturer / Supplier Product Reference:

Northern Powergrid Product Reference (Commodity Code):

Details of the Product Type: (e.g. Voltage, Conductor Type and Size)

Name:

Signature:

Date:

NOTE: One sheet shall be completed for each type of cable offered.

NPS/002/005 - Technical Specification for Industrial Service Units				
Clause/Sub-clause	**Clause / Requirements**	**Conformance Code**	**Evidence Reference**	**Remarks / Comments**
NPS/002/005: 3.1 Industrial Service Unit Enclosure	BS 381C - Shade 632 or equivalent			
	In line with nominal enclosure dimensions			
NPS/002/005: 3.2 Fixings	4 x M8 (internal) "key hole" Type			
NPS/002/005: 3.3 Front Access	Lift off front panel or Single hinged 180º LHS opening door (door also suitable for RHS fixing)			
	Secured by captive screws & apposite for sealing with 2mm wire			
NPS/002/005: 3.4 Meter Cable Access	2 x 25mm pre-punched "knock outs" each side panel of unit			
NPS/002/005: 3.5 Cable Enclosure Entry / Exit	Top and bottom entry			
	Bottom entry suitable for 3 or 4c cables 95mm^2 – 300mm^2 to BS 7870 - 3.40 with removable gland plate and cable cleat			
	Incoming cable terminating distance to BS 5372 or larger			
	Top entry suitable for up to 2 x 1c cables per termination 35mm^2 to 185mm^2 via hard wood (or similar) plate (which is removable for installation of trunking if required)			
NPS/002/005: 3.6 Fuse Ways Within the Cutout	Shall ensure fuse link is correctly aligned with the fixed contacts			
	Insertion of fuse link by hinged pivot action on the lower contact			
	Removal of fuse link by snatch action			
	Designed so on insertion of the fuse carrier current can be safely carried prior to tightening thumbscrews			
	IP2X rating to BS EN 60529 with fuse carriers inserted or if removed replaced with suitable temporary shielding			

NPS/002/005 - Technical Specification for Industrial Service Units				
Clause/Sub-clause	**Clause / Requirements**	**Conformance Code**	**Evidence Reference**	**Remarks / Comments**
	Provision suitable of temporary shielding			
NPS/002/005: 3.6 Fuse Ways Within the Cutout	Without fuse carriers or contact covers in place preferably IPXXB to BS EN 60529 and meets requirements of BS EN 50274 to minimise the possibility of contact with live conductors by the operator			
	Access for test probes to top and bottom contacts with fuse carriers in or out			
NPS/002/005: 3.7 Fuse Carriers	Supplied without fuse links			
	Capable of independent operation, "through" grip shrouded type and made from insulated material with wedge type connections and insulated tightening thumbscrews			
	Suitable for BS 88 Part 5 "L" Type 82mm and 92mm centres fuse links			
	Over voltage & IR Tests			
	Mechanical Strength			
	Short circuit Withstand			
NPS/002/005: 3.8 Incoming Cable Terminations	Shear bolt type, range taking mechanical connectors suitable for solid sector shaped aluminium conductors 95 - 300mm^2.			
	Bolt head : 17 - 19mm			
NPS/002/005: 3.9 Outgoing Cable Terminations	2 x range taking mechanical connectors per termination suitable for 1c stranded copper conductors 35mm^2 to 185mm^2 or tri-rated copper conductors 35mm^2 to 150mm^2			
	Complete with fixings (connector pressure pads, connector gauze)			
	Suitable spacing for 'side by side' connection of outgoing cables			
	Shrouded to min IP31B (IPXXB if shrouding removed)			

NPS/002/005 - Technical Specification for Industrial Service Units				
Clause/Sub-clause	**Clause / Requirements**	**Conformance Code**	**Evidence Reference**	**Remarks / Comments**
NPS/002/005: 3.10 Neutral / Earth	The removable earth links shall be clearly marked/labelled			
	SNE (PE) or PME (PEN) earthing by removable links, and no earthing facility where required			
	As NPS/002/005: 3.8, but also suitable for stranded copper conductors in the range indicated			
	As NPS/002/005: 3.10			
	1 x M6 CT star point to the earth bar, with fixings			
NPS/002/005: 3.11 Metering Voltage Fuses	Three GEC 32 to BS HD 60269-2:2013, BS 88-2:2013 or equivalent with black fuse bases & phase identification			
	"Matching" white neutral link			
	Fuses / links mounting on removable insulated cross member			
	Outgoing connections front top entry			
NPS/002/005: 3.12 Support Bracket / Shelf	Suitable for accommodating CT's as indicated on outgoing circuit below top plate			
NPS/002/005: 3.13.1 Main Current Carrying Components	Electro-tin or Electro-silver plated (other than those of aluminium or aluminium alloy)			
NPS/002/005: 3.13.2 Creepage and Clearance Distances	Min 25mm between conductors and 19mm from conductor to earth as defined in ENA TS 37-2.			

BS EN 61439-1 Low-voltage switchgear and controlgear assemblies. Part 1: General rules				
Clause/Sub-clause	**Clause / Requirements**	**Conformance Code**	**Evidence Reference**	**Remarks / Comments**
5.2.1 Rated Voltage of Assembly	600/1,000V			
5.2.2 Rated Voltage of Circuit of Assembly	600/1,000V			
5.2.3 Rated Insulation Voltage	Manufacturer to state/confirm			
5.2.4 Rated Impulse Withstand Voltage	6kV			
5.3.1 Rated Current of Assembly	500A			
5.3.2 Rated Current of Circuit Assembly	500A			
5.4 Rated Diversity Factor (RDF)	1.0 (3Ø outgoing circuit)			
5.3.4 Rated short-time withstand Current of Circuit of Assembly	Based on potential fault energy let-through of: 630A HRC LV current-limiting fuse-links with the performance and testing requirements of BS EN 60269 – 1: 2007+A1:2009, with the rated current prefixed with the letter "g" as detailed in BS EN 60269 – 1 Section 5.7.1 installed at the LV PENDA at the source substation with 35.5kA fault level AND HRC LV current-limiting fuse-links with the performance and testing requirements of BS EN 60269 – 1: 2007+A1:2009, with the rated current prefixed with the letter "g" as detailed in BS EN 60269 – 1 Section 5.7.1. installed in the ISU.			
5.5 Rated Frequency	50Hz			
7.1.1. Ambient Air Temperature	≤ 40ºC Av over 24hr ≤ 35ºC			

7.1.2. Humidity	≤ 50% at 40ºC			
7.1.3 Pollution Degree	2			
8.1.2 Protection against Corrosion	According to 10.2.2 (severity test A)			
	10.2.2 of BS EN 61439-5			
8.1.3.1 Thermal Stability	According to 10.2.3.1			
8.1.3.2 Resistance to Heat and Fire	According to 8.1.3.2.1, 8.1.3.2.2 and 8.1.3.2.3			
8.1.5 Mechanical Strength	Withstand stresses in service, during short circuit conditions and according to 10.13			
8.1.6 Lifting Provision	According to 10.2.5			
8.2.1 Protection against Mechanical Impact	According to 10.2.6			
8.2.2 Degree of Protection	IP41B to BS EN 60529			
	According to 10.3			
8.2.3 Degree of Protection of Removable Parts	Fuseways - IP2XB to BS EN 60529 (if removed to BS EN 50274 & minimises inadvertent contact with live conductors by operator)			
	Outgoing Cable Ways – IP31B to BS EN 60529 (IPXXB if removed)			
8.3.2 Clearances	NPS/002/005: 3.13.2			
	According to 10.4			
8.3.3 Creepage	See NPS/002/005: 3.13			
	According to 10.4			
8.4.1 Protection against Electric Shock	Min IP2X to IEC 60529, otherwise IPXXB.			

8.4.3.2.2 Earth Continuity	Exposed conductive parts interconnected and connected to PE / earth conductor			
	According to 10.5.2			
8.4.3.2.3 Faults in External Circuits (Through Faults)	Conductors within assembly to withstand thermal and dynamic stresses			
	According to 10.5.3			
8.4.5 Operating and Service Conditions	Accessibility in Service by Authorised persons according to 8.4.6.2			
8.5 Switching Devices and Components	Selection, installation and accessibility according to 8.5.3, 8.5.4 and 8.5.5			
	Barriers according to 8.5.6			
	According to 10.6.1			
8.6 Internal Electrical Circuits and Connections	Main circuits in accordance with 8.6.1			
	Auxiliary circuits in accordance with 8.6.2			
	Conductors in accordance with 8.6.3 and 8.6.4			
	According to 10.7			
8.7 Cooling	Natural Cooling			
8.8 Terminals (Incoming and Outgoing Circuits)	According to 10.8 (see NPS/002/005: 3.8, 3.9 and 3.10)			
9.1 Dielectric Properties	Power frequency withstand in accordance with 9.1.2 and Tables 8 & 9			
	According to 10.9.2			
	Impulse withstand: 6kV			
	According to 10.9.3			
9.2 Temperature Rise	According to Table 6			
	According to 10.10			

9.3 Short Circuit	Assemblies to withstand thermal and dynamic stresses resulting from short circuit currents specified			
	According to 10.11			
9.4 EMC Compatibility	According to J.9.4, Environment A (immunity & emissions for assemblies not incorporating electronic circuits)			
	According to 10.6.2			

Appendix 4 – Addendum to Supplier Requirements

No information added.

Appendix 5 – Pre-commission testing, Routine Inspection and Maintenance Requirements

Suppliers shall provide details of the recommended pre-commission testing and inspection required.

They shall also provide information regarding periodic inspection and maintenance requirements to be undertaken during the lifetime of their product.

Detailed inspection and maintenance instructions shall be also be provided.

Appendix 6 – 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)
Full product descriptions and part number/reference	
Appendix 3 – completed self-certification conformance declaration	
Complete set of drawings for each variant	
Type test evidence	
Routine test plan (example)	
Pre-commissioning testing/inspection requirements	
Recommended periodical inspection and maintenance requirements	
Packaging/delivery information	