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# NPS/003/010 - Technical Specification for 400V PSC-Assemblies (LVAC Boards) Utilised in Major Substations

## 1. Purpose

This document is the technical specification for 400V LVAC PSC-Assemblies for use in major substations on Northern Powergrid's distribution network.

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

Reference	Version	Date	Title
NPS/003/010	4.0	Oct 2018	Technical Specification for 400V PSC-Assemblies (LVAC Boards) utilised in Major Substations

## 2. Scope

This specification covers the technical requirements for 400V AC PSC-Assemblies (LVAC Boards) used to control LV auxiliary supplies in Major substations on Northern Powergrid's distribution network. It has been created using IEC/TR 61439-0 as a basis in accordance with best practice.

Specific requirements are listed in the included Appendices and in the drawings referenced.

The following appendices form part of this technical specification:

- Appendix 1 - Addendum to Supplier Requirements regarding verification, delivery and handling
- Appendix 2- Table C.1 user requirements from IEC/TR 61439-0 and cross referenced to BS EN 61439 parts 1 & 2
- Appendix 3 – Additional General Technical requirements.
- Appendix 4 – Self Certification Conformance declaration to be completed by the supplier.
- Appendix 5 – Technical Information Check List
- Appendix 6 - Primary Substation Indoor LVAC Assembly
- Appendix 7 - Grid Supply Point Indoor LVAC Assembly (1 or 2 Incomers)
- Appendix 8 – Generation Substation Indoor LVAC Assembly Type 1
- Appendix 9 - Generation Substation Indoor LVAC Assembly Type 2
- Appendix 10 - Generation Substation Indoor LVAC Assembly Type 3

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### 3. Technical Requirements

#### 3.1. General

The majority of Assemblies shall be 3 phase 400V modular construction complying with BS EN 61439 Parts 1 and 2. Requirement to comply to ENA TS 37-1 issue 4. Internal separation shall be Form 4b (busbars, each functional unit and each set of terminals all in separate compartments). There is rare occasional need for a 230V Single Phase supplied assembly in remote Generation sites where it is not financially practical to convert an existing Single phase HV network to a three phase supply. The full details of those requirements will be confirmed on a project by project basis so are not included within this specification.

Assemblies shall be suitable for terminating PVC insulated and sheathed, armoured multicore cables in a range of sizes to match the rating of the associated circuit (120mm<sup>2</sup> copper XLPE max. on incomers) using compression type glands.

Northern Powergrid requires three standard arrangements of assembly. These are further detailed in the Appendices with the following being a general guide as to the application and use of each of the arrangements on particular sites.

##### 3.1.1. Primary Substation Indoor LVAC Assembly (Appendix 6)

A Primary Substation Indoor LVAC Assembly is fed through two dedicated 50kVA Tank Mounted Auxiliary Transformer incomers located within the curtilage of the substation and controlled via an automatic changeover arrangement which shall include a Manual "Test" switch to force a changeover from the normal incomer to the reserve when operated. The two incomers are typically associated with each of the Primary Transformers. There are a total of six outgoing supplies from the LVAC board out of which two are dedicated to each of the Primary Transformer Marshalling Kiosks and four outgoing supplies are dedicated to specific load types i.e. Substation Equipment, Heating, Lighting, Battery Charger etc. of the primary substation. The details of the circuits associated with these distribution boards are included in Appendix 6.

##### 3.1.2. Grid Supply Point Substation Indoor LVAC Assembly (Appendix 7)

A typical Grid Supply Point Substation Indoor LVAC Assembly is fed through two 200kVA Earthing Auxiliary Transformer (EAT) incomers located within the curtilage of the substation and controlled via an automatic changeover arrangement which shall include a Manual "Test" switch to force a changeover from the normal incomer to the reserve when operated. The two incomers are typically associated with the EAT of the Grid Transformers. There are a total of six distribution boards out of which two are dedicated to supplying power to the respective Grid Transformer Marshalling Kiosks and four outgoing supplies are dedicated to specific load types i.e. Substation Equipment, Heating, Lighting, Battery Charger etc. of the Grid Supply Point Substation. The details of the circuits associated with these distribution boards are included in Appendix 7.

##### 3.1.3. Generation Substation Indoor LVAC Assemblies Types 1 – 3 (Appendices 8-10)

Generation Substation Assemblies are categorized into three different types.

##### 3.1.3.1. Generation Substation Indoor LVAC Assembly – Type 1 (Appendix 8)

A Generation LVAC Board - Type 1 is typically associated with 33kV / 66kV Generation Substations fed via two incomers and controlled via an automatic changeover arrangement which shall include a Manual "Test" switch to force a changeover from the normal incomer to the reserve when operated. One of the incomers is sourced from the NPg network (via PMT or a UDE), and the other is sourced from a metered customer supply with the LVAC board normally being fed from the customer's side. The maximum import power of this type of board is limited to 50kVA. There are a total of four outgoing supplies from this type of LVAC Assembly; one of which is dedicated to supplying the customer in an event of loss of power at their end (only to be used for their essentials i.e. charging batteries, emergency lighting), and three others dedicated for specific load types i.e. Substation Equipment, Heating, Lighting,

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Battery Charger etc. of the Generation Substation. The details of circuits associated with these distribution boards are included in Appendix 8.

### 3.1.3.2. Generation Substation Indoor LVAC Assembly – Type 2 (Appendix 9)

A Generation LVAC Board - Type 2 is typically associated with a 132kV Generation Substation (with Grid Transformer) fed via three incomers controlled via two automatic changeover arrangements which shall include a Manual “Test” switches to force a changeover from the normal incomer and each subsequent reserve when operated. One of the incomers is sourced from the NPg network (via PMT or a UDE). A second is sourced from a metered customer supply with the LVAC board normally being fed from the customer’s side on to a changeover terminal. The third incomer is sourced from the EAT associated with the Grid Transformer at the substation. The maximum import power of this type of board is limited to 200kVA. There are a total of five outgoing supplies from this type of LVAC board out of which, one is dedicated to supplying the customer in an event of loss of power at their end (only to be used for their essentials i.e. charging batteries, emergency lighting) and other four are dedicated for specific load types i.e. Grid Transformer Marshalling Kiosk, Substation Equipment, Heating, Lighting, Battery Charger etc. of the Generation Substation. The details of circuits associated with these distribution boards are included in Appendix 9.

### 3.1.3.3. Generation Indoor LVAC Assembly – Type 3 (Appendix 10)

A Generation LVAC Board – Type 3 is typically associated with a 132kV Generation Substation (without Grid Transformer) and fed via two incomers controlled via an automatic changeover arrangement which shall include a Manual “Test” switches to force a changeover from the normal incomer and each subsequent reserve when operated One of the incomers is sourced from the NPg network (via PMT or a UDE) and the other is sourced from a metered customer supply with the LVAC board normally being fed from the customer’s side. The maximum import power of this type of board is limited to 200kVA. There are a total of four outgoing supplies from this type of LVAC board out of which one is dedicated to supplying the customer in an event of loss of power at their end (only to be used for their essentials i.e. charging batteries, emergency lighting), and three other outgoing supplies are dedicated for specific load types i.e. Substation Equipment, Heating, Lighting, Battery Charger etc. of the Generation Substation. The details of circuits associated with these distribution boards are included in Appendix 10.

## 3.2. Indoor Assemblies

Indoor assemblies shall typically comprise two or three incoming units, two outgoing units and up to four distribution boards. The functional sources and destination (load) of these will be as follows:

Arrangement Type	Primary Substation	Grid Supply Point Substation	Generation Substation Type 1	Generation Substation Type 2	Generation Substation Type 3
Source / Destination					
Incomer 1	Auxiliary TX 1	Auxiliary TX 1	Customer Aux Supply 1	Customer Aux Supply 1	Customer Aux Supply 1
Incomer 2	Auxiliary TX 2	Auxiliary TX 2	NPg Aux Supply	NPg Aux Supply 1	NPg Aux Supply 1
Incomer 3	N/A	N/A	N/A	NPg Aux Supply 2	N/A
Generator Incomer	Generator 1	N/A	N/A	N/A	N/A
Outgoing 1	TX 1 Marshalling	Grid TX 1 Marshalling	Customer Supply CB <i>in series with</i> Customer Supply Fuse	Customer Supply CB <i>in series with</i> Customer Supply Fuse	Customer Supply CB <i>in series with</i> Customer Supply Fuse
Outgoing 2	TX 2 MK Supply	Grid TX 2 MK Supply	N/A	Grid Tx MK Supply	N/A

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Dist Board 1	Heating	Heating	Heating, Lighting & Power	Heating, Lighting & Power	Heating, Lighting & Power
Dist. Board 2	Lighting & Power	Lighting & Power	Substation Equipment	Substation Equipment	Substation Equipment
Dist. Board 3	Substation Auxiliaries (inc 230/110 Tx)	Substation Auxiliaries (inc 230/110 Tx)	110VAC Supplies	110VAC Supplies	110VAC Supplies
Dist Board 4	110VAC Supplies	110VAC Supplies	N/A	N/A	N/A
NPg Drawings	C1017575	C1083403	C1083404	C1083405	C1083406

Where specified, there shall be a mechanical changeover switch between Incomer 1 and the Generator incomer so that a generator can be connected to maintain supplies in the event of loss of normal supplies.

An auto-changeover shall be provided between Incomer 1 and Incomer 2 to ensure supplies are maintained to all outgoing circuits. The auto-changeover is biased to Incomer 1 which is usually taken from Transformer or Supply 1 and shall include a Manual "Test" switches to force a changeover from the normal incomer to the reserve when operated.

At substations with three transformers there shall be an additional incoming way and a second auto changeover facility with manual Test switch.

The 230/110V transformer shall be rated 2kVA and centre earth tapped on the LV side 230/55-0-55V. This shall supply Distribution Board 3 OR 4 – 110V supplies depending on type of site.

MCBs shall comply with BS EN 60898-1 and be rated and tested as a point of isolation. Instantaneous tripping shall be Type C (7.5 x MCB rating) and Type D (12 x MCB rating).

### 3.3. Outdoor Assemblies

Outdoor assemblies will only be required in exceptional circumstances (when the distance between the auxiliary transformer and the indoor assembly is greater than 100m.) In these situations the specific clauses and requirements resulting from the change of environment will be established and confirmed.

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## 4. References

### 4.1. External Documentation

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

Reference	Title
IEC/TR 61439-0:2022	Low voltage switchgear and controlgear assemblies Part 0: Guidance to specifying assemblies
BS EN IEC 61439-1:2021	Low voltage switchgear and controlgear assemblies: Part 1: General rules
BS EN 61439-2:2021	Low voltage switchgear and controlgear assemblies: Part 2: Power switchgear and controlgear assemblies
BS EN 60529:1992+A2:2013	Degree of protection provided by enclosures (IP Code)
BS EN 60898-1:2019	Circuit Breakers for overcurrent protection for households and similar Installations
BS EN 60947-2:2017	Low-voltage switchgear and controlgear Part 2: Circuit-breakers
BS HD 60269-2 : 2010 + a2 2022,	Low-voltage fuses. Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application). Examples of standardized systems of fuses A to J
ENA TS 37-1 issue 4 to Clause	

### 4.2. Internal Documentation

Reference	Title
C1017575	Drawing – Plant Standard Indoor LVAC Switchboard for Primary Substations
C1083403	Drawing – Plant Standard Indoor LVAC Switchboard for Grid Supply Point Substations
C1083404	Drawing – Plant Standard Indoor LVAC Switchboard for Generation Substations Type 1
C1083405	Drawing – Plant Standard Indoor LVAC Switchboard for Generation Substations Type 2
C1083406	Drawing – Plant Standard Indoor LVAC Switchboard for Generation Substations Type 3

### 4.3. Amendments from Previous Version

Clause	Amendments
All	Format updated to current standard
2.1	Table inserted
3.1	Additional clarification / expansion on types with creation of sub sections.
3.2	Added Table for clarification
3.3	Added text.
4.1	Text added and table updated
4.2	Expanded table to reflect added drawings and Arrangement drawing has been made obsolete
4.3	Insert of new table
5	Updated and expanded
Appendix 1	New added content. Old Appendix 1 now appendix 2
Appendix 2	Updated to current version
Appendix 3	Old Appendix 2 – Details expanded and updated
Appendix 4	Old Appendix 3 – Format and details updated
Appendix 5	New Added
Appendix 6	Old Appendix 5 – Title updated
Appendices 7-10	New tables added

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## 5. Definitions

Reference	Title
Circuit Breaker	Air Circuit Breaker (ACB) or Mould Case Circuit Breaker (MCCB)
EHV	Extra High Voltage.  All assets with a nominal operating voltage of 33kV or 66kV, including the 33kV or 66kV circuit breaker(s) at a 400 or 275kV/EHV, 132kV/EHV or EHV/HV substation.
Grid Supply Point	A Grid Supply Point, or GSP, is a Systems Connection Point at which the Transmission System is connected to a Distribution System.  The substation will transform an incoming voltage (typically 400 or 275kV) to lower voltages used on the Distribution System (typically 132 or 66kV).
HV	High Voltage.  All assets with a nominal operating voltage between 1kV and 22kV, including the HV circuit breaker at EHV to HV substations and HV switchgear and HV to LV transformer at HV substations.
Major Substation	A major substation forms part of the Primary Distribution System.  This includes typically, but not exclusively, Grid Supply point (GSP), Supply point (SP), Primary Substation, EHV switching station, Large EHV / HV* load customers and Large EHV/HV* generation substations.  * HV connected means directly to the HV busbar at a primary substation, and does not include any HV load/generation customer connected to the Secondary Distribution System.
MK	Marshalling Kiosk
PMT	Pole Mounted Transformer
Primary Substation	Substation to transform 132kV or EHV voltage to HV.  Part of the Primary Distribution System.  A Primary Substation is a Connection Point at which the Primary Distribution System is connected to the Secondary Distribution System.
PSC-Assembly	Low-voltage switchgear and controlgear assembly used to distribute and control energy for all types of loads, intended for industrial, commercial and similar applications where operation by ordinary persons is not intended (formerly an Assembly / LVAC Board).
Supply Point	Substation to transform 132kV voltage to EHV.
UDE	Unit Distribution Equipment

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## 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.

		<b>Date</b>
Liz Beat	Governance Administrator	11/03/2024

### 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
<b>Should this document be displayed on the Northern Powergrid external website?</b>		Yes
		<b>Date</b>
Paul McAdoo	Lead Policy & Standards Engineer	03/04/2024

### 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.

		<b>Date</b>
Alan MacDonald	Policy and Standards Engineer	Date
Joe Helm	Lead Policy & Standards Engineer	12/03/2024

### 6.4. Authorisation

Authorisation is granted for publication of this document.

		<b>Date</b>
Paul Black	Head of System Engineering	25/03/2024



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## Appendix 1 – Addendum to Supplier Requirements

*Items to be supplied with each and every assembly*

### **Copies of routine verification procedures and results:**

These shall include a listing of the results of micro-ohmmeter tests of the resistance between the incoming transformer or generator side, busbars and each of the outgoing contacts. This test shall be done at the end of all production procedures, but before any over voltage tests.

One copy to be supplied as a weatherproof, durable, hard copy attached to the unit being supplied and one copy to be supplied electronically.

### **Handling Instructions and delivery:**

A weatherproof, durable, permanently fixed label with lifting/slinging arrangements with and without packaging shall be attached to the ASSEMBLY.

This label shall include, at least: gross weight, attachment/lifting points, recommended slinging arrangements and indication of centre of gravity.

If appropriate this label shall be repeated on the outside of the packaging.

Deliveries shall be made direct to substation sites within the Northern Powergrid area.

Proposals for the off-loading of the assembly on site shall be supplied. It should be noted that risk assessments and method statements will be required prior to delivery and that if a crane delivery is proposed, trained operators and slingers will be required who should provide proof of competence (CITB certificates etc).

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## Appendix 2: BS EN 61439 Specification Guidance – Indoor Assemblies

Characteristics	IEC/TR 61439-0 Annex C.1	BS EN 61439-1:2021 / BS EN 61439-2:2011	User Requirements
<b>Electrical System</b>	<b>5</b>		
Earthing system	5.2	5.6, 8.4, 3.1, 8.4.3.2.3, 8.6.2, 10.5, 11.4	TN-S
Nominal Voltage (V)	5.3	3.8.9.1, 5.2.1, 8.5.3	400V +10%, -6% 3 phase
Transient overvoltages	5.4, 5.5	5.2.4, 8.5.3, 9.1, Annex G	Cat IV
Temporary overvoltages	5.5	9.1	As above
Rated frequency $f_n$ (Hz)	5.6	3.8.12, 5.5, 8.5.3, 10.10.3.2, 10.11.5.4	50Hz
Additional onsite testing requirements: wiring, operational performances and function	5.7	11.10	Not required
<b>Short-circuit withstand capability</b>	<b>6</b>		
Prospective short-circuit current at supply terminals $I_{cp}$ (kA)	6.2	3.8.7	35kA for 1 sec
Prospective short-circuit current on the neutral	6.3	10.11.5.3.5	60%
Prospective short-circuit current in the protection	6.4	10.11.5.6	60%
SCPD in the incoming functional unit	6.5	9.3.2	Not required
Co-ordination of short-circuit protective devices including external short-circuit protective device details	6.6	9.3.4	Supplier to determine
Data associated with loads likely to contribute to the short-circuit current	6.7	9.3.2	Not applicable
<b>Protection of persons against electric shock in accordance with IEC 60364-4-41</b>	<b>7</b>		
Protection against electric shock – basic protection	7.2	8.4.2	Barriers or enclosures
Protection against electric shock – fault protection	7.3	8.4.3	To comply with 7.3.2
<b>Installation environment</b>	<b>8</b>		
Location type	8.2	3.6, 8.1.4, 8.2	Indoor
Protection against ingress of solid foreign bodies and ingress of water	8.3	8.2.2, 8.2.3	IP41D
Protection after removal of withdrawable part	8.3	8.2.101	Not applicable
External mechanical impact (IK)	8.4	8.2.1, 10.2.6	Not applicable
Resistance to UV radiation	8.5	10.2.4	Not applicable
Resistance to corrosion	8.6	10.2.2	Severity A
Ambient air temperature – Lower limit	8.7	7.1.1	-5° C

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Ambient air temperature – Upper limit	8.7	7.1.1	40°C				
Ambient air temperature – Daily average maximum	8.7	7.1.1, 9.2	35° C				
Maximum relative humidity	8.8	7.1.1	50% at 40°C 90% at 20°C				
Pollution degree	8.9	7.1.2	Pollution degree 3				
Altitude	8.10	7.1.1	Not applicable				
EMC environment	8.11	9.4, 10.12, Annex J	Environment A				
Special service conditions	8.12	7.2, 8.5.4, 9.3.3, Table 7	None				
<b>Installation method</b>	<b>9</b>						
Type	9.2	3.3, 5.6	Mounted over a cable trench and bolted to the wall				
Portability	9.3	3.5	Stationary				
Maximum overall dimensions and weight	9.4	5.6, 6.2.1	Assemblies shall be sized and constructed to satisfy the performance requirements specified, but within the minimum size and weight as possible.				
External conductor type	9.5	8.8	Cable				
Direction of external conductors	9.6	8.8	Bottom				
External conductor material	9.7	8.8	Copper				
External phase conductor, cross sections and terminations	9.8	8.8	4 core - 95mm <sup>2</sup> OR 120mm <sup>2</sup> copper				
External PE, N, PEN conductor cross sections, and terminations	9.9	8.8	Neutral same size as phases				
Special terminal identification requirements	9.10	8.8	None				
<b>Storage and handling</b>	<b>10</b>						
Maximum dimensions and weight of transport units	10.2	6.2.2, 10.2.5	None				
Methods of transport (e.g. forklift, crane)	10.3	6.2.2, 8.1.6	None				
Environmental conditions different from the service conditions	10.4	7.3	None				
Packing details	10.5	6.2.2	None				
<b>Operating arrangements</b>	<b>11</b>						
Access to manually operated devices	11.2	8.4	Authorised Person				
Location of manually operated devices	11.2	8.5.5	To comply with 11.2				
Isolation of load installation equipment items.		8.4.2, 8.4.3.3, 8.4.6.2	Separate compartment for each functional unit				
<b>Maintenance and upgrade capabilities</b>	<b>12</b>						
Requirements related to accessibility for inspection and similar operations	12	8.4.6.2.2	Not applicable				
Requirements related to accessibility for maintenance in service by authorized persons	12.2	8.4.6.2.3	Inspection. Replacement of fuses and lamps. Fault location on internal circuits and outgoing circuits.				

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Requirements related to accessibility for extension in service authorized persons	12.3	8.4.5.2.3	Access to isolated functional units
Requirements related to accessibility for extension in service by authorised persons	12.4	8.4.6.2.4	Not required
Method of functional units connection	12.6	8.5.1, 8.5.2	F - fixed connections
Protection against direct contact with hazardous live internal parts during maintenance or upgrade	12.5	8.4	Protection required to prevent access to live parts
Gangways	12.7	8.4.6.2.101	Not required
Method of functional unit's connection NOTE This refers to the capability of removal and re-insertion of functional units.		8.5.101	F - fixed connections
Form of separation	12.8, Table B.1	8.101	Form 4b
Capability to test individual operation of the auxiliary circuits relating to specified circuits while the functional unit is isolated.	12.2	3.1.102, 3.2.102, 3.2.103, 8.5.101, Table 103	Yes
<b>Current carrying capability</b>	<b>13</b>		
Rated current of the assembly $I_{NA}$ (A)	13.2	3.8.10.1, 5.3, 8.4.3.2.3, 8.5.3, 8.8, 10.10.2, 10.10.3, 10.11.5, Annex E	Up to 300A depending on arrangement
Rated current of circuits $I_{NC}$ (A)	13.3	5.3.2	See drawings applicable to each type
Rated diversity factor	13.3	5.3.3, 10.10.2.3, Annex E	No diversity
Ratio of cross-section of the neutral conductor to phase conductors	13.4	8.6.1	100%

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## Appendix 3: Additional General Technical Requirements

Substation LVAC Assembly Specification			
	Unit	Requirement	
Fuse Specification		BS HD 60269-2 : 2010 + a2 2022	
Miniature Circuit Breaker Specification		BS EN 60898 or 60947-1 as appropriate,. But shall be suitable for isolation	
Contactors and timers		Suitable for 300V overvoltage	
Gland plate: Min height above ground level.	mm	450	
Space below gland plate		Must be enclosed and vermin proof	
Access: Installation		Front	
Access: Operation		Front	
Access: Maintenance		Front	
Locking Arrangements		Isolators/switch fuses shall be suitable for locking-off with padlocks with a 5mm diameter shackle in the ON and OFF position.	
Door stays		All access covers must be fitted with door stays	
Testing lamp facility		Incoming terminals should have access for testing without the need to remove covers (suitable for use typically with Drummond or Cyclim test lamps).	

The typical requirements may need to be altered for specific project based applications by Primary Engineering Projects.

### A3.1 Mounting

LVAC assemblies shall be suitable for mounting across two parallel flange channels (PFC) over a concrete cable trench for bottom cable entry. Indoor boards shall be suitable for mounting against and fixing to a wall.

### A3.2 Drawings

The following drawings showing typical arrangements for the circuits on the assembly shall be provided separately as their size restricts usable inclusion within this specification.

C1017575	Plant Standard Indoor LVAC Switchboard for Primary Substations
C1083403	Plant Standard Indoor LVAC Switchboard for Grid Supply Point Substations
C1083404	Plant Standard Indoor LVAC Switchboard for Generation Substations Type 1
C1083405	Plant Standard Indoor LVAC Switchboard for Generation Substations Type 2
C1083406	Plant Standard Indoor LVAC Switchboard for Generation Substations Type 3

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## Appendix 4 - SELF CERTIFICATION CONFORMANCE DECLARATION

LVAC Assemblies shall comply with the latest issues of the relevant national and international standards, including, IEC/TR 61439-0:2013 and BS EN 61439 Parts 1 & 2.. Additionally this technical specification is intended to amplify and/or clarify the requirements of elements of these Standards.

This self-declaration sheet identifies the clauses of the aforementioned standards relevant to Fuseboards, Fusepillars, Fusecabinets and Circuit Breakers (CB's) for use on Northern Powergrid distribution network. The manufacturer shall declare conformance or otherwise, clause by clause, using the following levels of conformance declaration codes

Conformance declaration codes

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

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

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

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

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

**Manufacturer:**

**Product Reference:**

**Related ASSEMBLY type(s):**

**Name and position/role (block capitals):**

**Signature & Date:**

### Instructions for Completion

- **When Cs1 code is entered:**
  - (i) State the reference of test reports, etc. that support this declaration AND
  - (ii) A summary of the compliance.
- **When any other code is entered:** state the reference of the test report(s), etc. that support this declaration AND a summary of the reason for non-conformance.
- **Prefix each remark with the relevant 'BS EN' 'IEC' or 'ENATS' as appropriate to indicate which specification the comment is made against**

**NOTE:** A separate self-declaration shall be completed for each item or variant submitted, OR the products can be grouped together and a group declaration made for each group IF every self-declaration states clearly the range of products to which it applies.

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<b>Self-certificate declaration of conformance to NPS/003/010 – Technical Specification for 400V Assemblies (LVAC Boards) utilised in Major Substations</b>				
	Item	Clause / Requirements	Conformance Code	Remarks / Comments
	Supply Voltage	400v +10% -6% / 230v +10% -6%		
	No of Phases	3 (Single Phase in remote locations where existing networks are not 3 Phase) State.		
	Frequency	50 Hz		
	Internal Separation	Form 4b		
	Incomers: Fuse Switch / ACB	100A / 300A		
	Outgoing Circuits: Fuse Switch / ACB	63A		
	Busbar Normal Current Rating	Up to 300A, Depending on LVAC Board Type as Specified in Appendix 6, 7 & 8		
	Fuses	BS HD 60269-2 : 2010 + a2 2022,		
	MCB's	BS EN 60898-1 / BS EN 60947-2		
		Suitable for Point of Isolation & Lockable		
	Fault break duty or prospective current?	35kA		
	Rated Short Time Withstand Current.	35kA		
	Rated Time Duration	1 Sec		
	Contactors and Timers	Suitable for 300V		
	Incomer Cable	Bottom Entry		
	Feeder Cable	Bottom Entry		
	Gland plate	Min 450mm above Ground / Floor level		
	Space below the gland plate	Enclosed and vermin proof. State method of enclosure.		
	Installation	Suitable for mounting against wall		
	Operation	From Front		
	Maintenance	From Front		

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<b>Self-certificate declaration of conformance to NPS/003/010 – Technical Specification for 400V Assemblies (LVAC Boards) utilised in Major Substations</b>				
	Item	Clause / Requirements	Conformance Code	Remarks / Comments
	Incoming and outgoing isolators / switch fuses	Lockable with a padlock with a 5mm diameter shackle		
	Minimum Degree Protection of Enclosures: Indoor Boards.	Indoor Boards: IP41D		
	Door stays	Required		
	Test lamp facilities	Testing access to incoming terminals without the need to remove covers – (typically Drummond or Cyclim test lamps).		
	EMC requirements	EMC compatible with requirements of BS EN 61439 and CE marked		



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## Appendix 5 – 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 required.

Requirements	Provided (Yes / No)
Full product descriptions, drawings and part/reference numbers. Including: A general arrangement drawing detailing the depth, height and length and the position of the main components of the assembly. A single line diagram detailing the power and control circuits A drawing showing the detail of fixing arrangements. Full technical details of the main components of the assembly; including manufacturer and load/fault ratings	
Appendix 4 - Completed self-certification conformance declaration	
Type verification evidence – copies of test certificates, reports, etc. are required to support the self-declaration in Appendix 4	
Routine test Plan (sample)	
Packaging/delivery information	

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## Appendix 6 – PRIMARY SUBSTATION INDOOR LVAC ASSEMBLY (1 or 2 Transformers)

<b>Way Designation</b> <i>(label in bold)</i>	<b>Type</b>	<b>Switch Rating</b>	<b>Fuse Rating</b>	<b>Other</b>
<b>Incomer 1</b> <b>Incomer 2</b> <b>Generator</b>	4 Pole Isolator	100A		Glanding/termination of incoming cable to be in a separate cubicle on the assembly with shrouded links. Access required to allow phase checks between incomers. Suitable for cable cores up to 95mm <sup>2</sup> Cu.
<b>Generator/Incomer 1 changeover switch</b>	4 Pole changeover switch	100A		Manual changeover between Incomer 1 and Generator.
<b>Auto Changeover Arrangement</b>		100A		Changeover contactors required between Generator/Incomer 1 & Incomer 2. On loss of supply from Incomer 1, there should be automatic changeover to Incomer 2. Indicator lights should show status of incoming circuits. Phase failure relays required on Incomer 1, Incomer 2 and main busbars with contacts for remote alarms.
<b>Transformer 1</b>	TP+N Switch fuse	63A	63A	Supply to transformer 1 marshalling kiosk
<b>Transformer 2</b>	TP+N Switch fuse	63A	63A	Supply to transformer 2 marshalling kiosk
<b>Distribution Board 1 – Heating</b>	TP+N Switch fuse	63A	63A	5 x 3ph ways (all Type C MCBs) as follows:  2 three pole 32A lockable MCBs, each set controlled by a contactor (one for control room, one for switch room). 9 single pole lockable MCBs: 6 x 16A 3 x 6A (two ways controlling contactors and timers with connections for remote thermostats)
<b>Distribution Board 2 – Lighting and Power</b>	TP+N Switch fuse	63A	63A	<b>9 x 3ph ways (all Type C MCBs) as follows:</b>  2 three pole 32A lockable MCBs:  21 single pole lockable MCBs: 6 x 32A 3 x 16A 12 x 6A
<b>Distribution Board 3 – Substation Auxiliaries</b>	TP+N Switch fuse	63A	63A	<b>7 x 3ph ways (all Type D MCBs) as follows:</b>  2 three pole lockable MCBs: 1 x 3ph 32A ways 1 x 3ph 16A way  15 single pole lockable MCBs: 3 x 32A 6 x 16A (one way controlling a 230/110 transformer 6 x 6A (one way controlling a contactor for remote 110V indications)
<b>Distribution Board 4 – 110V Supplies</b>	DP Switch disconnect	32A		6 x 6A double pole lockable MCBs (two ways controlled by a contactor and remote switch)

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## Appendix 7 – GRID SUPPLY POINT INDOOR LVAC ASSEMBLY (1 or 2 Incomers)

<b>Way Designation</b> <i>(label in bold)</i>	<b>Type</b>	<b>Switch Rating</b>	<b>Fuse Rating</b>	<b>Other</b>
<b>Incomer 1 : NPg Aux TX 1 Supply</b> <b>Incomer 2: NPg Aux TX 2 Supply</b>	4 Pole Isolator	300A		Glanding/termination of incoming cable to be in a separate cubicle on the assembly with shrouded links. Access required to allow phase checks between incomers. Suitable for cable cores up to 120mm <sup>2</sup> Cu. XLPE
<b>Auto Changeover Arrangement</b>	4 Pole Auto Changeover Switch	300A		Changeover contactors required between Generator/Incomer 1 & Incomer 2. On loss of supply from Incomer 1 there should be automatic changeover to Incomer 2. Indicator lights should show status of incoming circuits. Phase failure relays (PFRs) required on Incomer 1, Incomer 2 and main busbars with contacts for remote alarms.
<b>Grid Transformer 1: Cooler and Tapchanger Supply</b>	TP+N Switch fuse	63A	63A	Supply to Grid Transformer 1 marshalling kiosk.
<b>Grid Transformer 2: Cooler and Tapchanger Supply</b>	TP+N Switch fuse	63A	63A	Supply to Grid Transformer 2 marshalling kiosk.
<b>Distribution Board 1 – Heating</b>	TP+N Switch fuse	63A	63A	<b><u>5 x 3ph ways (all Type C MCBs) as follows:</u></b>  2 three pole 32A lockable MCBs, each set controlled by a contactor (one for control room, one for switch room).  9 single pole lockable MCBs: 6 x 16A 3 x 6A (two ways controlling contactors and timers with connections for remote thermostats)
<b>Distribution Board 2 – Lighting and Power</b>	TP+N Switch fuse	63A	63A	<b><u>9 x 3ph ways (all Type C MCBs) as follows:</u></b>  2 three pole 32A lockable MCBs:  21 single pole lockable MCBs: 6 x 32A 3 x 16A 12 x 6A
<b>Distribution Board 3 – Substation Auxiliaries</b>	TP+N Switch fuse	63A	63A	<b><u>7 x 3ph ways (all Type D MCBs) as follows:</u></b>  2 three pole lockable MCBs: 1 x 3ph 32A way 1 x 3ph 16A way  15 single pole lockable MCBs: 3 x 32A 6 x 16A (one way controlling a 230/110 2kVA Transformer) 6 x 6A (one way controlling a contactor for remote 110V indications)
<b>Distribution Board 4 – 110V Supplies</b>	DP Switch disconnect	32A		6 x 6A double pole lockable MCBs (two ways controlled by a contactor and remote switch)

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## Appendix 8 – GENERATION SUBSTATION INDOOR LVAC ASSEMBLY Type 1

<u>Way Designation</u> (label in bold)	<u>Type</u>	<u>Switch Rating</u>	<u>Fuse Rating</u>	<u>Other</u>
<b>Incomer 1 :Customer Aux Supply</b> <b>Incomer 2: NPg Aux Supply</b>	4 Pole Isolator	100A		Glanding/termination of incoming cable to be in a separate cubicle on the assembly with shrouded links. Access required to allow phase checks between incomers. Suitable for cable cores up to 95mm <sup>2</sup> Cu.
<b>Auto Changeover Arrangement</b>	4 Pole Auto Changeover Switch	100A		Changeover contactors required between Incomer 1 & Incomer 2. On loss of supply from Incomer 1 there should be automatic changeover to Incomer 2. Indicator lights should show status of incoming circuits. Phase failure relays required on Incomer 1, Incomer 2 and main busbars with contacts for remote alarms.
<b>Customer Supply Breaker <i>in series with</i> Customer Supply Fuse</b>	Circuit Breaker <i>plus</i> TP+N Switch fuse	63A	63A	Supply to Remote Customer LVAC Board
<b>Distribution Board 1 – Heating, Lighting and Power</b>	TP+N Switch Fuse	63A	63A	<b><u>9 x 3ph ways (all Type C MCBs) as follows:</u></b>  2 three pole 16A lockable MCBs, each set controlled by a contactor (one for control room, one for switch room). 21 single pole lockable MCBs: 3 x 32A 6 x 16A 10 x 6A 2 x 6A (two ways controlling contactors and timers with connections for remote thermostats)
<b>Distribution Board 2 – Substation Equipment</b>	TP+N Switch Fuse	63A	63A	<b><u>3 x 3ph ways (all Type D MCBs) as follows:</u></b>  9 single pole lockable MCBs: 6 x 16A (One way controlling a 230/110 transformer) 3 x 6A (One way controlling a contact for remote switch)
<b>Distribution Board 3 – 110V Supplies</b>	DP Switch disconnecter	32A		6 x 6A double pole lockable MCBs (two ways controlled by a contactor and remote switch)

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## Appendix 9 – GENERATION SUBSTATION INDOOR LVAC ASSEMBLY Type 2

<b>Way Designation</b> <i>(label in bold)</i>	<b>Type</b>	<b>Switch Rating</b>	<b>Fuse Rating</b>	<b>Other</b>
<b>Incomer 1 : Customer Auxiliary Supply Incomer 2: NPg Auxiliary Supply (PMT/UDE) Incomer 3: NPg Auxiliary Supply (EAT Supply)</b>	4 Pole Isolator	300A		Glanding/termination of incoming cable to be in a separate cubicle on the assembly with shrouded links. Access required to allow phase checks between incomers. Suitable for cable cores up to 120 mm <sup>2</sup> Cu.
<b>Auto Changeover Arrangement 1</b>		300A		Changeover contactors required between Incomer 1 & Incomer 2. On loss of supply from Incomer 1 there should be automatic changeover to Incomer 2. Indicator lights should show status of incoming circuits. Phase failure relays required on Incomer 1, Incomer 2 and main busbars with contacts for remote alarms.
<b>Auto Changeover Arrangement 2</b>		300A		Changeover contactors required between Auto Changeover 1 & Incomer 3. On loss of output from Auto Changeover 1, there should be automatic changeover to Incomer 3. Indicator lights should show status of incoming circuits. Phase failure relays required on output of Auto Changeover 1, Incomer 3 and main busbars with contacts for remote alarms.
<b>Customer Supply Breaker <i>in series with</i> Customer Supply Fuse</b>	Circuit Breaker <i>plus</i> TP+N Switch fuse	63A	63A	Supply to Remote Customer LVAC Board.
<b>Grid Transformer Cooler and Tapchanger Supply</b>	TP+N Switch fuse	63A	63A	Supply to Grid Transformer 1 marshalling kiosk.
<b>Distribution Board 1: Heating, Lighting and Power</b>	TP+N Switch Fuse	63A	63A	<b><u>9 x 3ph ways (all Type C MCBs) as follows:</u></b>  2 three pole 16A lockable MCBs, each set controlled by a contactor (one for control room, one for switch room). 21 single pole lockable MCBs: 3 x 32A 6 x 16A 10 x 6A 2 x 6A (two ways controlling contactors and timers with connections for remote thermostats)
<b>Distribution Board 2: Substation Equipment</b>	TP+N Switch Fuse	63A	63A	<b><u>3 x 3ph ways (all Type D MCBs) as follows:</u></b>  9 single pole lockable MCBs: 6 x 16A (One way controlling a 230/110 transformer) 3 x 6A (One way controlling a contact for remote switch)
<b>Distribution Board 3: 110V Supplies</b>	DP Switch disconnecter	32A		6 x 6A double pole lockable MCBs (two ways controlled by a contactor and remote switch)

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## Appendix 10 – GENERATION SUBSTATION INDOOR LVAC ASSEMBLY Type 3

<b><u>Way Designation</u></b> <i>(label in bold)</i>	<b><u>Type</u></b>	<b><u>Switch Rating</u></b>	<b><u>Fuse Rating</u></b>	<b><u>Other</u></b>
<b>Incomer 1: Customer Auxiliary Supply Incomer 2: NPg Auxiliary Supply (PMT/UDE)</b>	4 Pole Isolator	300A		Glanding/termination of incoming cable to be in a separate cubicle on the assembly with shrouded links. Access required to allow phase checks between incomers. Suitable for cable cores up to 120 mm <sup>2</sup> Cu.
<b>Auto Changeover Arrangement</b>	4 Pole Auto Changeover Switch	300A		Changeover contactors required between Incomer 1 & Incomer 2. On loss of supply from Incomer 1 there should be automatic changeover to Incomer 2. Indicator lights should show status of incoming circuits. Phase failure relays required on Incomer 1, Incomer 2 and main busbars with contacts for remote alarms.
<b>Customer Supply Breaker <u>in series with</u> Customer Supply Fuse</b>	Circuit Breaker <i>plus</i> TP+N Switch fuse	63A	63A	Supply to Remote Customer LVAC Board.
<b>Distribution Board 1: Heating, Lighting and Power</b>	TP+N Switch Fuse	63A	63A	<b><u>9 x 3ph ways (all Type C MCBs) as follows:</u></b>  2 three pole 16A lockable MCBs, each set controlled by a contactor (one for control room, one for switch room). 21 single pole lockable MCBs: 3 x 32A 6 x 16A 10 x 6A 2 x 6A (two ways controlling contactors and timers with connections for remote thermostats)
<b>Distribution Board 2: Substation Equipment</b>	TP+N Switch Fuse	63A	63A	<b><u>3 x 3ph ways (all Type D MCBs) as follows:</u></b>  9 single pole lockable MCBs: 6 x 16A (One way controlling a 230/110 transformer) 3 x 6A (One way controlling a contact for remote switch)
<b>Distribution Board 3: 110V Supplies</b>	DP Switch disconnect	32A		6 x 6A double pole lockable MCBs (two ways controlled by a contactor and remote switch)