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# NPS/003/018 – Technical Specification for Multi Service Distribution Boards (MSDBs)

## 1. Purpose

The purpose of this document is to detail the technical requirements for Multi Service Distribution Boards (MSDBs) for use on Northern Powergrid distribution networks.

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

Reference	Version	Date	Title
NPS/003/018	4.0	April 2018	Technical Specification for Multi Service Distribution Boards (MSDBs)

## 2. Scope

This specification applies to Low Voltage Multi Service Distribution Boards (MSDBs) for use on Northern Powergrid 400V, three phase distribution networks.

This document does not apply to domestic, commercial or industrial cut outs or Industrial Service Units (ISUs).

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### 3. Technical Requirements

The requirement is for power switchgear and control gear assemblies (PSC-ASSEMBLIES) that accept an incoming cable from the electricity network, control and distribute this supply via multiple outgoing 100A units to individually metered customers and/or provide a higher rated outgoing way to allow the serial connection of further PSC-ASSEMBLIES. This requirement is fulfilled by a Multi Service Distribution Board (MSBD), which is defined in 3.3 below.

Switchgear covered by this Technical Specification shall comply fully with the latest issue of

BS EN IEC 61439-2, Power switchgear and control gear assemblies.

This document is intended to amplify and/or clarify the requirements of BS EN IEC 61439. Where there is not a corresponding clause or sub-clause in this specification then BE EN IEC 61439 applies without modification.

Part 2 of BS EN IEC 61439 inherently requires compliance with Part 1 of BE EN IEC 61439 (General rules); to avoid duplication this NPS specification only refers to Part 1 of BS EN IEC 61439 where clarification or amplification is necessary.

The following appendices form part of this technical specification:

Appendix 1:	Short Time Current Withstand Values
Appendix 2:	Physical Constraints on MSDBs for Northern Powergrid
Appendix 3:	Temperature rise limits
Appendix 4:	Arrangements of MSDBs required for Northern Powergrid
Appendix 5:	Self-Certification Conformance Declaration
Appendix 6	Logistical requirements
Appendix 7:	Technical Information Check List

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### 3.1. Amplification or clarification of clauses of BS EN IEC 61439 Parts 1 and 2

Where the amplification or clarification requires explanation then the details are given below and in the Appendices of this specification.

To assist in cross-referencing, the subsection numbering of this sub-clause 3.1 of NPS/003/018 version 5 (this document) reflects the numbering of the clauses and sub-clauses of relevant parts of BS EN IEC 61439.

#### Clause 3 of Part 1: Terms and Definitions

The definitions in BS EN IEC 61439 are applicable; with the additions listed below.

Term	Definition
Multi Service Distribution Board (MSDB)	A MSDB is an indoor, enclosed, stationary, wall mounted, surface type, box or multi box PSC-ASSEMBLY intended to be accessed and operated by authorised persons and to resist entry by ordinary persons A MSDB provides an incoming unit to accept a cable from the electricity network and controls and distributes electricity supplies via multiple outgoing 100A units to individually metered customers and/or provides a higher rated outgoing way to allow the serial connection of further MSDBs.
Fuse way	An incoming, or outgoing unit in which each pole (phase) consists of a fuse link/carrier, which can be removed without the aid of additional tools.
Fuse carrier (BS EN 60269: part 1)	The movable part of a fuse designed to carry a fuse link.
Fuse handle	A through grip shrouded fuse carrier, of a suitable insulating material, which provides a secure connection to the fuse link by means of wedge connections and insulated contact tightening thumbscrews.
Safety padlock	A padlock used to ensure safety of personnel working on the system. Safety padlocks have a body up to 38mm square with a 5-mm diameter shackle having a clear inside width of 20 mm and an inside length of between 16 mm and 30 mm. The hole provided for the shackle shall be not less than 6-mm diameter.
Security padlock	A padlock for locking equipment to prevent access by the public and to give security against vandal attack. Security padlocks have a body up to 63-mm square with a 10-mm diameter shackle having a clear inside width of 35 mm and an inside length of between 25 mm and 45 mm. The hole provided for the shackle shall be not less than 12-mm diameter

#### Clause 5.2.4 of Part 1: Rated impulse withstand voltage ( $U_{imp}$ ) (of the assembly)

To coordinate with the BS 7657 insulation requirements for cut-outs; the rated impulse withstand voltage of the MSDB shall be at least 6kV.

#### Clause 5.3.5 of Part 1: Rated short-time withstand current ( $I_{cw}$ ) (of a circuit of an assembly)

The rated short-time withstand current of the MSDB shall allow compliance with the potential currents and short circuit protective devices specified in Appendix 1.

#### Clause 5.3.6 of Part 1: Rated conditional short-time current of an assembly ( $I_{cc}$ )

The rated conditional short circuit current of the MSDB shall be higher than the prospective r.m.s. value of short-circuit current ( $I_{cp}$ ) specified in Appendix 1; for a duration limited by the operation of the short circuit protective devices specified in Appendix 1.

#### Clause 5.4 of Part 2: Rated diversity factor (RDF)

In addition to the requirements of clause 5.4 of Part 2: the following test shall be carried out: All phases of six adjacent 100A outgoing units shall be loaded at 83A simultaneously until the temperature rise is less than 1°C/hour. The selection of the outgoing units for testing shall be based on the manufacturer's calculated 'worst case' location of the six units.

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Where an MSDB has less than six outgoing 100A units then the test shall be applied with 83A per phase applied on all 100A outgoing units.

The unit shall be deemed to have passed the test if:

- (a) no part of the MSDB has exceeded the maximum temperatures specified in the applicable clauses of BS 7657, BS EN IEC 61439 and ENATS 37-2

AND

- (b) the temperature rises of all parts of the MSDB that can be touched by authorised or ordinary persons, with the doors open or closed, comply with BS EN ISO 13732-1.

#### **Clause 5.6 of Parts 1 & 2: Other characteristics**

In addition to the characteristics specified in the MSDB definition above; the other characteristics shall be as specified below.

#### **5.6 (c) of Part 1: Types of system earthing**

The MSDB shall have separate neutral (N) and earth (PE) conductors/busbars and shall be designed for use on a UK Separate Neutral and Earth (SNE) public electricity distribution network AND on a UK Combined Neutral and Earth (CNE) public electricity distribution network.

The MSDB shall be supplied fitted with a fully rated (matching the rating of the neutral or earth busbar, whichever is higher) bolted, removable link between the neutral and earth busbars. This link shall be easy to make and disconnect, even when all distributor units are in position and cabled. A label worded "Disconnect when SNE" shall be mounted on, or in close proximity to the link. The neutral busbars and connections shall be insulated (to the same degree as the phase busbars) from the metal framework and enclosure of the MSDB.

#### **5.6 (j) of Part 1: External design**

The MSDB enclosure(s) shall be metal, and shall be bonded to the earth (PEN) conductor. The MSDB shall be designed and constructed to allow compliance with SI1992/2793 - Manual Handling Operations Regulations 1992; but in any case the dimensions and weights of the MSDB shall be limited to the maximum values specified in Appendix 2 of this specification.

Access to the MSDB shall be from the front and by means of side-hinged, lift off doors. For MSDBs that utilise a single door; the door shall be supplied hinged on the left-hand side; however, the door orientation shall be reversible easily on site.

MSDBs shall be suitable for wall mounting, using at least four fixing bolts. All fixing holes shall be suitable for use with M8 bolts. The upper wall fixing holes in the MSDB shall be of the 'inverted keyhole' type that readily allows the fixings to be installed into the wall and then the MSDB to be installed by being hung onto these. To facilitate the alignment of the fixings into the supporting wall a pattern shall be provided in every MSDB supplied.

When the MSDB is fully installed; the wall fixings shall only be accessible via the hinged front doors of the MSDB.

The exterior of MSDBs shall be finished in a subtle, neutral grey colour, such as RAL 7032 or similar. The following shall be padlockable with a Northern Powergrid Safety Padlock:

Incoming units in the open position.

Large outgoing distributor units in the open position.

Storage facilities shall be provided within the MSDB for all loose devices, e.g. contact covers and unit padlocking devices.

Padlocking devices may be stored on the associated incoming unit or outgoing distributor unit if the MSDB design allows this whether the units are open or closed.

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#### **Clause 6.2.2 of Part 1: Instructions for handling, installation, operation and maintenance**

In addition to the requirements of clause 6.2.2:

The centre of gravity shall be marked in a durable manner on, at least two adjacent sides of the assembly and multi boxes making up the assembly.

The location of lifting points and any lifting attachment points shall be coloured Yellow (RAL 1023 or similar).

#### **Clause 6.3 of Part 1: Device and/or component identification**

In addition to the requirements of clause 6.3:

A circuit label 75mm x 50mm and made of insulating material shall be mounted in a suitable position to identify each incoming unit and outgoing unit with a rating above 100A. These labels shall be securely held without the use of screws. It shall be possible to locate them in position and remove them from the front without danger while the MSDB is live. The incoming unit label shall be inscribed 'Incoming supply'. The outgoing unit label shall be suitable for engraving, by the purchaser, resulting in black letters on a white background. Single-phase fuse ways on 100A distributor units shall be serially numbered and labelled. Provision shall be made by means of a label, or card, to identify each phase of each small outgoing distributor unit and to allow the purchaser to record suitable circuit names for each unit. This label, or card, shall also incorporate a general arrangement style electrical circuit diagram that includes: the incoming units, busbars, outgoing units and neutral (N) and earth (PE) terminations. This diagram shall incorporate the serial numbering references allocated to the outgoing units. The label or card shall be fitted to the inside of the door of the enclosure; where reversible door action is achieved by inverting the door, provision shall be made for inverting the label.

#### **Clause 7.1.2 of Part 1: Pollution degree**

Pollution degree 2 shall apply

#### **Clause 8.1.3.2.3 of Part 1: Resistance of insulating materials to abnormal heat and fire due to internal electric effects.**

In addition to the requirements of clause 8.1.3.2.3: All neutral conductors shall be considered as current-carrying parts.

#### **Clauses 8.1.5 and 8.2 of Part 1: Mechanical strength & Degree of protection provided by an assembly enclosure**

In addition to the requirements of clause 8.1.5 and 8.2: The design and construction of MSDBs shall be such that the possibility of entry or damage by ordinary persons, thieves or vandals is minimised. Facilities shall be provided for padlocking the door(s) of the MSDB, closed with a Northern Powergrid Security Padlock.

#### **Clause 8.2.2 of Part 1: Protection against contact with live parts, ingress of solid foreign bodies and water.**

In addition to the requirements of clause 8.2.2: Because the MSDB might be situated in an area accessible to ordinary persons who might try to gain access to the enclosure: in addition to the additional requirements specified above for Clauses 8.1.5 & 8.2; the enclosure of the complete MSDB, as supplied, with all doors closed and all covers in place, shall provide a minimum degree of protection of IP3XC.

#### **Clause 8.3.2 of Part 1: Clearances**

All equipment shall be designed to ensure that adequate clearances are provided to permit any live unit, with any associated locking device in position, to be left in an open or closed position, and the enclosure door(s) closed, without compromising any of the designed and tested values.

#### **Clause 8.5.3 of Part 1: Selection of switching devices and components**

Incoming unit and outgoing distributor units rated above 100A shall comprise a fuse way. Fuse ways shall be three phase and a neutral terminal located directly on the neutral busbar. Fuse ways shall be arranged vertically, L1, L2, L3 and N top to bottom, or horizontally, L1, L2, L3 and N left to right. The fuse ways shall be suitable for accommodating fuse links with 92mm fixing centres in accordance with BS HD 60269-

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2/BS 88-2. Each phase of the fuseway shall be independently operable. Fuse links shall be located in fuse carriers, as opposed to being bolted, etc.

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 hinge action pivoted on the lower contact and withdrawn by snatch action.

Sufficiently good 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.

Contact covers shall be provided and these shall be suitable for shielding the busbar or circuit contacts associated with the fuse way. With these contact covers in place, it shall be possible to gain access to any one cable-side contact for testing with all busbar-side contacts and the other two cable-side contacts still shielded. The fuse-way units on incoming unit and all outgoing units rated above 100A shall be capable of being padlocked in the open position. Where appropriate this may involve the use of a supplementary insulated device.

Access shall be provided for the use of test probes complying with Engineering Recommendation M15/4. 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.

In addition to the IP protection requirements of BS EN IEC 61439; Protection in accordance with IP XXB shall be provided with all fuse links/handles in position. In addition, three suitable insulated contact covers, or a single combined cover, shall be provided for each fuse way to restore the same level of protection when the fuse links/handles are removed. With neither fuse links/handles nor contact covers 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 touching of live metal by the operator.

Outgoing distributor units rated at 100A:

100A outgoing distributor units consist of single phase and neutral circuits. They shall comprise: a Type B fuse in accordance with BS 7657, a neutral terminal connected directly to the neutral busbar and an earth connection connected directly to the earth busbar.

#### **Clause 8.5.101 of Part 2: Description of the types of electrical connections of functional units**

All circuits shall be fixed connection (i.e., designation of FFF).

#### **Clause 8.7 of Part 1: Cooling**

MSDBs shall be provided with natural cooling only.

#### **Clause 8.8 of Part 1: Terminals for external conductors**

In addition to the requirements of clause 8.8:

All terminals for external conductors shall be suitable for both copper and aluminium conductors. Cables on incoming circuits will normally enter the MSDB through the bottom face of the enclosure. Cables on outgoing circuits will exit from the top. Variations for other arrangements shall be available, including side entry and/or exits.

On each MSDB assembly box; an external earth (PE) terminal shall be provided, preferably on the underside of the MSDB. The terminal and the associated earth circuit back to the incoming supply unit shall be rated to at least the same as the earth circuit of the largest incoming or outgoing unit in that assembly box.

A 16mm entry knock-out hole shall be provided to cater for situations where an additional token earth connection is required.

MSDBs shall be provided with the following cable terminating facilities:

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All units:

The neutral bar shall be provided with two connectors. One shall be the same as that used on the Phase busbars and the other shall be of a design to accommodate earth screen wires such as a Sicame NET 1 or NET 2 or similar.

Units rated above 100A:

The method of terminating cables onto the MSDB shall not require the cables to be threaded through holes in the enclosure.

Cables, including protective conductors, shall as far as practical, enter the enclosure directly in line with their associated cable terminal(s).

MSDBs shall be equipped with mechanical shear-bolt type connections for terminating the cables onto the Incoming/Outgoing distributor units. These shall be suitable for use with solid aluminium conductors and shall comply with BS EN 61238-1 class A. Re-locatable or alternative components may be used to accommodate the full range of conductors specified in Table A.1 of Annex A of BS EN IEC 61439-1, Table A.2 of Annex A of this section of this document, and Appendix 4 of this document.

Outgoing distributor units rated at 100A:

The top of the MSDB shall incorporate one pre-drilled gland plate fitted with either: plastic stuffing glands, or conical rubber grommets. A minimum of one exit point shall be provided per outgoing fuse way (three per unit). This top plate shall be removable to allow the close coupling of 150mm trunking. Phase cables will be terminated directly into the fuse base.

Cable neutral and earth conductors shall connect directly to the neutral and earth busbars; each single-phase 100A distributor fuse way shall be provided with individual, separate neutral and earth terminals. Cables, including protective conductors, shall (as far as practical) enter the enclosure directly in line with their associated cable terminal(s).

Suitable cable cleats at the point of entry to the enclosure shall be provided to support the incoming unit and outgoing unit cables. Cable cleats shall be located so as to provide, as a minimum, the terminating distance specified in BS 5372. The cable cleats shall give adequate support to the cables in normal service and when subject to the short circuit duty specified in Appendix 1.

The cable cleats shall be suitable for the diameter, or ranges of diameters, of cable as detailed in Table A.2 of Annex A of this section of this document. The cleat for each circuit shall be independent of the cleats for adjacent circuits.

#### **Clause 8.101 of Part 2: Internal separation of PSC-assemblies**

The internal separation shall be such to allow the installation/replacement/removal of cables associated with 100A units, whilst all other units and busbars remain live.

The option to install/replace/remove cables associated with units rated above 100A is not required. Accidental bridging of phases, or, between phase and neutral/earth with operating tools, fuse handles or switching arcs and the like shall be prevented by the provision of suitable barriers.

#### **Clause 9.2 of Part 1: Temperature rise limits**

The temperature rise limits shall not exceed the lower of the temperature rise limits specified in Part 1, or in Appendix 3 of this specification.

#### **Clause 10 of Part 1: Design Verification**

All dielectric tests and impulse tests shall be carried out with mechanical cable clamps fitted.

The following additional tests shall be carried out on the fuse carriers on each design of fuse carrier including any wedge mechanism.

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



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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 at a value of not less than 5 Megohms.

The following additional Mechanical strength test shall be carried out; Torque tests on thumbscrews.

The test shall be carried out on six random samples of the insulating thumbscrew 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.

#### **Clause 10.3 of Part 1: Degree of protection of assemblies**

The enclosure of the complete MSDB with all doors closed and all covers in place shall provide a minimum degree of protection of IP3XC and this shall be tested against the relevant requirements of BS EN 60529.

#### **Clause 10.9.3.1 of Part 1: Impulse withstand voltage - General**

Verification shall be made by test.

#### **Clause 10.10.3.1 of Part 1: Verification of temperature rise - General**

Verification shall be made by test.

#### **Clause 10.11.2 of Part 1 – Circuits of assemblies which are exempted from the verification of the short-circuit withstand strength**

Only auxiliary circuits may be exempted from verification and only then if Northern Powergrid formally accepts the manufacturer's justification for omitting these tests.

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#### Annex A - Minimum and maximum cross section of cables suitable for connection to terminals for external conductors

Table A.2 – For Northern Powergrid use shall be:

Circuit Rating (A)	Range of Cables to be accommodated	Termination connections for cable		
		Phases	Neutral	Earth
100	1 x core 25 – 35mm <sup>2</sup> per single phase circuit <i>Consisting of: 3 x single phase cables or 1 x 3 phase cable (3 or 4 cored) 35 mm<sup>2</sup> per core</i>	Integral to fuse 2 x M8 grub screws for use with M3 Allen key	2 x M8 grub screws for use with M3 Allen key	2 x M8 grub screws for use with M3 Allen key
200	1 x 3 phase cable (3 or 4 cored) <i>95 mm<sup>2</sup> per core</i>	M12 stud	M12 stud	M12 stud
500	1 x 3 phase cable (3 or 4 cored) core <i>185-300 mm<sup>2</sup> per core</i>	Mechanical Connectors <i>(Sicame UMT or equivalent)- 1 per phase</i>	Mechanical Connectors x 2 <i>1x Sicame UMT AND 1x Sicame NET1 or 2 or equivalents</i>	Mechanical Connectors <i>(Sicame NET 1 or 2 , or equivalent)</i>

#### Note:

Single phase cables are concentric, solid aluminium core and copper (N/PE/PEN) screened

Three phase cables are solid sectoral aluminium cored (three or four cores depending on whether a separate neutral is present) with copper or aluminium screen wires.

Core insulation is XLPE and outer sheathing is PVC

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### 3.2. Variants of MSDB required.

The variants of MSDB commonly required are detailed in Appendix 4. In addition to these Northern Powergrid may require bespoke designs ('specials'), that require: up to 16 x 100A outgoing units per phase, side entries for incoming or outgoing unit cables, multi-box designs for use where access ways are restricted, etc.

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## 4. References

### 4.1. External Documentation

Reference	Title
BS 5372:1997+A1:2012	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 7657:2010	Specification for cut-out assemblies up to 100 A rating, for power supply to buildings
BS EN 50274:2002	Low-voltage switchgear and controlgear ASSEMBLIES – Protection against electric shock – Operation by partial contact protection.
BS EN 60269-1:2007+A2	Low-voltage Fuses - General requirements
BS EN 60529:1992+A2:2013	Specification for the degrees of protection provided by enclosures (IP code)
BS EN IEC 61238-1-1:2019	Compression and mechanical connectors for power cables for rated voltages up to 30 kV (Um = 36 kV) - Part 1: Test methods and requirements
BS EN IEC 61439-1:2021	Low-voltage switchgear and controlgear assemblies – General rules
BS EN IEC 61439-2:2021	Power switchgear and controlgear assemblies
BS EN ISO 13732-1:2008	Ergonomics of the thermal environment - Methods for the assessment of human responses to contact with surfaces - Part 1: Hot surfaces
BS HD 60269-2:2013+A1:2022 , BS 88-2:2013+A1:2022	Low-voltage fuses. Part2: Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application). Examples of standardized systems of fuses A to J
ENATS 37-2 Issue 5:2012	Public Electricity Network Distribution Assemblies
HSE Document GS38 (Fourth Edition)	Electrical test equipment for use on low voltage electrical systems
SI1992/2793 : Fourth Edition 2016	Manual Handling Operations Regulations:1992

### 4.2. Internal Documentation

Reference	Title
NONE	

### 4.3. Amendments from Previous Version

Reference	Description
4.1	Reference Documents updated

## 5. Definitions

Reference	Definition
Multi Service Distribution Board (MSBD)	<p>A MSDB is an indoor, enclosed, stationary, wall mounted, surface type, box or multi box MSDB intended to be accessed and operated by authorised persons and to resist entry by ordinary persons</p> <p>A MSDB provides an incoming unit to accept a cable from the electricity network and controls and distributes electricity supplies via multiple outgoing 100A units to individually metered customers and/or to provide a higher rated outgoing way to allow the serial connection of further MSDBs.</p>

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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	05/02/2024

### 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.

<b>Standard CDS review of 3 years?</b>	<b>Non Standard Review Period &amp; Reason</b>	
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	22/02/2024

### 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 & Standards Engineer	06/02/2024
Warren Lacey	Meter Systems Engineer	21/02/2024
Joe Helm	Lead Policy & Standards Engineer	13/02/2024

### 6.4. Authorisation

Authorisation is granted for publication of this document.

		<b>Date</b>
Paul Black	Head of System Engineering	26/02/2024

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## Appendix 1 – Short Time current withstand values

The minimum short time current withstand values, etc. required shall be calculated based on the following current supply circuits:

11kV/415V, or 20kV/415V, Distribution Substation with 35.5kA potential fault level LV fuseway protected with 630A HRC fuse link in accordance with BS HD 60629-2 / BS 88-2		
LV 300mm <sup>2</sup> Al cable between Distribution Substation and MSDB in customer's premises		
MSDB 500A Incoming unit		MSDB incoming 200A unit, not fused
Incoming unit fitted with 500A HRC fuse link in accordance with BS HD 60629-2 / BS 88-2		MSDB Busbars and supply side of 100A outgoing units
Busbar connection and supply side of 500A outgoing unit	MSDB Busbars and supply side of 100A outgoing units	Outgoing units fitted with 100A HRC fuse link in accordance with BS HD 60629-2 / BS 88-2
Outgoing unit fitted with 500A HRC fuse link in accordance with BS HD 60629-2 / BS 88-2	Outgoing units fitted with 100A HRC fuse link in accordance with BS HD 60629-2 / BS 88-2	Outgoing side of 100A units
Outgoing side of 500A unit	Outgoing side of 100A units	

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## Appendix 2 – Physical constraints on MSDBs for Northern Powergrid

	2018-Type1	2018-Type2	2018-Type3	2018-Type4	2018-Type5	2018-Type6	2018-Type7	2018-Type8	2018-Type9	2018-Type10	2018-Type16
<b>NPg Commodity #</b>	183362	180058	180059	180060	180061	180062	180063	180064	180065	180066	TBC
<b>Max Height* (mm)</b>	560	560	1390	1390	1800	1800	1390	1390	1800	1800	1800
<b>Max Width (mm)</b>	450	580	560	560	850	840	800	800	1080	1080	1080
<b>Max Depth (mm)</b>	150	150	275	275	275	275	275	275	275	275	275
<b>Max Weight Including Door(s) (kg)</b>	35	35	55	55	80	80	75	75	100	100	100
<b>Max Weight With Door(s) Removed (kg)</b>	30	30	50	50	70	70	65	65	85	85	85

\* Maximum height includes any cable boxes/glanding/clamping arrangement

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### Appendix 3 – Temperature rise limits

Parts of MSDB	Temperature Rise K
100A fuse – terminals connecting to the busbar and outgoing cables (to coordinate with XLPE insulation with a maximum operating temperature of 90°C)	50
100A fuse – fuse-carrier contacts.	55
Fuse link contacts* fused units rated above 100A – fuse links with copper or silver plated copper elements	75
Fuse link contacts* fused units rated above 100A – fuse links with silver elements	90
Fuse handles – fused units rated above 100A.	25

\*Contacts must be of a type that will not deteriorate, e.g. bolted or equivalent, silver-plated pressure applied by springs.



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## Appendix 4 – Arrangements of MSDBs required for Northern Powergrid

	2018-Type1	2018-Type2	2018-Type3	2018-Type4	2018-Type5	2018-Type6	2018-Type7	2018-Type8	2018-Type9	2018-Type10	2018-Type16
Northern Powergrid Commodity code	183362	180058	180059	180060	180061	180062	180063	180064	180065	180066	TBC
Number of Outgoing Circuits (PER PHASE)	1 x 100A	1 x 100A	5 x 100A	5 x 100A	5 x 100A	5 x 100A	10 x 100A	10 x 100A	10 x 100A	10 x 100A	16 x 100A
Number of Outgoing Circuits (SINGLE PHASE)	7	10	15	15	15	15	30	30	30	30	48
Large Outgoing 3-Phase Distributor Units	Not Req'd	Not Req'd	Not Req'd	Not Req'd	1 x 500A	1 x 500A	Not Req'd	Not Req'd	1 x 500A	1 x 500A	Not Req
Position of Outgoing Distributor	N/A	N/A	N/A	N/A	Top Exit, on RHS	Top Exit, on LHS	N/A	N/A	Top Exit, on RHS	Top Exit, on LHS	N/A
Max Size of Outgoing cable: 3 or 4 Core, LSF, Wf or, 4 Core, LSF, SWA	N/A	N/A	N/A	N/A	185mm <sup>2</sup>	185mm <sup>2</sup>	N/A	N/A	185mm	185mm	185mm
Incoming Circuit Connection	Direct to Busbar	Direct to Busbar	500A Fuse way	500A Fuse way	500A Fuse way	500A Fuse way	500A Fuseway	500A Fuseway	500A Fuseway	500A Fuseway	500A Fuseway
Position Of Incoming Fuseway	N/A	N/A	RHS	RHS	RHS	LHS	RHS	RHS	RHS	LHS	RHS
(A) Phase Busbar rating (amps)	500A	500A	500A	500A	500A	500A	500A	500A	500A	500A	500A
(B) Neutral Busbar & Earth Busbar rating (amps)	315A	315A	315A	315A	315A	315A	315A	315A	315A	315A	315A
Incoming Cable Entry	Bottom Entry Centre	Bottom Entry Centre	Bottom Entry RHS	Top Entry RHS	Bottom Entry RHS	Bottom Entry LHS	Bottom Entry RHS	Top Entry RHS	Bottom Entry RHS	Bottom Entry LHS	Top OR Btm RHS (Configurable)
Max Size of Incoming 3 or 4 Core, Wf	95mm <sup>2</sup>	95mm <sup>2</sup>	300mm <sup>2</sup>	300mm <sup>2</sup>	300mm <sup>2</sup>	300mm <sup>2</sup>	300mm <sup>2</sup>	300mm <sup>2</sup>	300mm <sup>2</sup>	300mm <sup>2</sup>	300mm <sup>2</sup>
Connection Type For Large Incoming & Large Outgoing Circuit	Mechanical Connectors	Mechanical Connectors	Mechanical Connectors	Mechanical Connectors	Mechanical Connectors	Mechanical Connectors	Mechanical Connectors	Mechanical Connectors	Mechanical Connectors	Mechanical Connectors	Mechanical Connectors

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## Appendix 5 – Self Certification Conformance Declaration

MSDBs shall comply with the latest issues of the relevant national and international standards.  
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 Multi Service distribution Boards for use on the 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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Clause Reference from BS EN IEC 61439 (Parts 1 & 2) or NPS/003/018		REQUIREMENT	CONFORMANCE CODE	COMMENTS / EXPLANATION
5.2.1	Rated Voltage of Assembly	400v / 230v (+10%/-6%)		
5.2.2	Rated Voltage of Circuit of Assembly	Manufacturer to state/confirm		
5.2.3	Rated Insulation Voltage	Manufacturer to state/confirm		
5.2.4	Rated Impulse Withstand Voltage	(NPS) ≥6kV		
5.3.1	Rated Current of Assembly	Manufacturer to state/confirm		
5.3.2	Rated Current of Circuit Assembly	Manufacturer to state/confirm		
5.3.3 5.3.4	Rated Peak Withstand Current & Rated short-time withstand Current of Circuit of Assembly	(NPS) Per Appendix 1 of NPS		
5.4	Rated Diversity Factor (RDF)	(NPS) 6 adjacent 100A units, loaded at @ 83A Temperature rise limits AND (Part 2) per Table 101		
5.5	Rated Frequency	50Hz		
5.6.c)	Types of system earthing	(NPS) Separate N & PE busbars N – PE bolted link N busbar insulated		

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Clause Reference from BS EN IEC 61439 (Parts 1 & 2) or NPS/003/018		REQUIREMENT	CONFORMANCE CODE	COMMENTS / EXPLANATION
5.6.j)	External Design	(NPS) Allows Manual Handling Regulation compliance Weights per Appendix 2 of NPS Lift off doors Keyhole slots for bolts Northern Powergrid safety padlock		
5.6.m)	(of Part 2): Internal separation	(NPS) 100A units can be cabled up with busbars and other units live		
6.1	Assembly designation marking	Rating plate supplied		
6.2.1	Documentation	ASSEMBLY information supplied		
6.2.2	Instructions for handling, operation and maintenance	Installation, Commissioning, Operation, Maintenance instructions provided?  (NPS) Centre of Gravity is marked Lifting points/devices are yellow		
6.3	Device or component identification	Circuit label on units>100A 100A units numbered & labelled Label/drawing of 100A ways		
7.1.1.1	Ambient Air Temperature	≤ 40°C  Av over 24hr ≤ 35°C		
7.1.2.1	Humidity	≤ 50% at 40°C  ≤ 90% at 20°C  Condensation consideration		

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Clause Reference from BS EN IEC 61439 (Parts 1 & 2) or NPS/003/018		REQUIREMENT	CONFORMANCE CODE	COMMENTS / EXPLANATION
7.1.3	Pollution Degree	Pollution Degree 2		
8.1.2	Protection against Corrosion	Tested to Severity test A per 10.2.2		
8.1.3.1	Thermal Stability	According to 10.2.3.1		
8.1.3.2	Resistance to Heat and Fire	According to 8.1.3.2.2  And 8.1.3.2.3		
8.1.3.2.3	resistance of insulating material to abnormal heat and fire due to internal electrical effects	(NPS) Neutrals to be considered current carrying parts.		
8.1.5	Mechanical Strength	Withstand stresses in service, during short circuit conditions and tested per 10.13		
8.1.6	Lifting	Tested per 10.2.5		
8.2.2	Protection against contact with live parts, ingress of solid foreign bodies and water	(NPS) IP3XC with doors closed		
8.2.3	Assembly with removable parts	Incoming Fuseways – IP2XB to IEC 60529 (if fuse carriers are removed then to BS EN 50274 & minimise inadvertent contact with live conductors by operator)		
		Outgoing Cable Ways – IP31B to IEC 60529 (IPXXB if removed)		

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Clause Reference from BS EN IEC 61439 (Parts 1 & 2) or NPS/003/018		REQUIREMENT	CONFORMANCE CODE	COMMENTS / EXPLANATION
8.3.2	Clearances	As per Table 1 of BS EN61439-1 Tested per 10.9.3 & 11.3		
8.3.3	Creepage distances	As per Table 2 of BS EN61439-1 Measured per Annex F		
8.4	Protection against Electric Shock 8.4.2 Basic protection	Manufacturer to give details (& top surface at least IPXXD)		
8.4.3.2.2	Requirement for earth continuity providing protection against the consequences of faults within the assembly	Manufacturer to give details Tested per 10.5.2 Bonding leads per Table 3		
8.4.3.2.3	Requirements for protective conductors providing protection against the consequences of faults in external circuits supplied through the assembly	Tested per 10.5.3 Connections calculated per Annex B.		
8.4.6	Operating and Service Conditions	Accessibility in Service by Authorised persons according to 8.4.6.2		
8.5	Incorporation of 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. Confirmed per 10.6.1		
8.5.3	Selection of Switching Devices and Components			
8.5.7	Direction of Operation and Indication of switching positions	Direction of Operation and Indication of switching positions is always clearly identified		
8.5.101 of Part 2	Description of Types of Electrical Connections of Units	All circuits shall be fixed (FFF)		

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Clause Reference from BS EN IEC 61439 (Parts 1 & 2) or NPS/003/018		REQUIREMENT	CONFORMANCE CODE	COMMENTS / EXPLANATION
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 / 8.6.4. Identification in accordance with 8.6.5 / 8.6.6. Verified per 10.7		
8.7	Cooling	(NPS) Natural cooling only		
8.8	Terminals (incoming and Outgoing Circuits)	(NPS) Suitable for copper and/or aluminium conductors  One independent cable cleat per unit. Units >100A: Cables not enter via holes, Supplied with shear bolt connectors fitted,  100A units: top exit, gland plate, drilled and fitted with glands/grommets, plate removable to allow trunking to be fitted directly, External connection for PEN conductor, to allow use of external PEN busbar/terminals 16mm knock out hole supplied specifically for additional "token" earth Neutral bar shall include TWO connectors; one as per phase type and other for screen wires		

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Clause Reference from BS EN IEC 61439 (Parts 1 & 2) or NPS/003/018		REQUIREMENT	CONFORMANCE CODE	COMMENTS / EXPLANATION
8.101	Internal separation of PSC Assemblies	(NPS) 100A units can be safely cabled up whilst busbars and all other units are live.		
9.1	Dielectric Properties	Power frequency withstand in accordance with 9.1.2 and Tables 8 & 9 of BS EN IEC 61439-1 Verified per 10.9.2 Impulse withstand: 6kV Verified per 10.9.3 Auxiliary circuits protected to same levels as main circuits.		
9.2	Temperature Rise	(NPS) As Limited by Appendix 3 of this NPS		
9.3	Short Circuit protection and short circuit withstand strength	Assemblies to withstand thermal and dynamic stresses resulting from short circuit currents specified Details indicated on rating plate. Maximum incoming fuse size/type to be stated. Short circuit verified per 10.11		
9.4	EMC Compatibility	According to J.9.4, Environment A (immunity & emissions for assemblies not incorporating electronic circuits) Verified per 10.6.2		
10	Design Verification	(NPS) Additional tests on fuse carriers HV, humidity, torque tests. MSDB short circuit withstand		



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Clause Reference from BS EN IEC 61439 (Parts 1 & 2) or NPS/003/018		REQUIREMENT	CONFORMANCE CODE	COMMENTS / EXPLANATION
10.2.2.2	Resistance to Corrosion	Severity test A Verified per 10.2.2.4		
10.2.3.2	Resistance to Abnormal Heat	Glow wire tested per IEC60695-2-10 &11		
10.2.5	Lifting	Lifting verified by test		
10.2.7	Marking	ALL marking proved by test		
10.3	Degree of Protection of Assemblies	(NPS) MSDB with doors closed shall provide IP3XC		
10.9.3	Impulse withstand voltage	(NPS) Verification must be by test Manufacturer to give details		
		(NPS) Only auxiliary circuits may be exempted and only if justified.		
10.9.3.2	Impulse withstand of isolating distance	Verification must be by test Manufacturer to give details.		
10.10	Verification of temperature rise	Verification must be by test and in accordance with 10.10 Manufacturer to give details.		
10.10.3	Derivation of ratings for similar variants	Manufacturer to give technical justification.		
10.11	Short circuit withstand strength	Verification must be by test  Derivation of strength of similar variants; Manufacturer to give technical justification.  No units are exempt.		

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Clause Reference from BS EN IEC 61439 (Parts 1 & 2) or NPS/003/018		REQUIREMENT	CONFORMANCE CODE	COMMENTS / EXPLANATION
10.11.5.3 .5	Neutral Conductor	Bolted link between N and PEN conductor and PEN conductor shall be tested.  Derivation of strength of similar variants; Manufacturer to give technical justification.		
10.11.5.4	Value & duration of the short circuit current	Per Appendix 1 of this NPS.		
10.13	Mechanical operation	200 operating cycles test		
11	Routine Verification	Manufacturer to give details of all routine verification required by clause 11 of parts 1 and 2		

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## Appendix 6 – Logistical requirements

To enable the Company 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	*	Atmospheric corrosion
*	Humidity	*	Impact
*	Water	*	Vibration
*	Dust	*	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
- Supplier's trademark or name
- Description of item
- Date of packaging and/or batch number
- Northern Powergrid product code
- Weight
- Serial Number

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## Appendix 7 – Technical Information Check List

The Following information shall be provided by the supplier for technical review by the company. Additional information shall be provided if required.

Requirements	Provided (Yes / No)
Full product descriptions, drawings and part/reference numbers	
Appendix 5 – Completed self-certification conformance declaration	
Type test evidence	
Routine test Plan (sample)	
Packaging/delivery information	