Electricity Distribution

nationalgrid

Company Directive

ENGINEERING SPECIFICATION
EE SPEC: 180/1

36kV Outdoor Dead Tank Circuit Breakers

Author: **Anthony Smith**

Implementation Date: **February 2025**

Approved by

Andrew Reynolds
Engineering Policy Manager

Date: **29th January 2025**

Target Staff Group	**Anyone involved with the addition, or alteration of, 33kV substations inclusive of but not limited to Planners, Project Engineers, Technicians, EDS, PND and Purchasing for any tenders**
Impact of Change	**Green – No impact on current working practices**
Planned Assurance checks	**Team Managers of target staff group shall be contacted within 3 months to confirm staff have been made aware of the documents reissue with minimal changes.**

Introduction

This document specifies the requirements for 36kV Outdoor Dead Tank Circuit Breakers.

Main Changes

This version replaces EESPEC 180/0 which will be withdrawn. Any orders via existing contracts may comply with the previous version of EE180 but any new tender or out of contract orders shall comply with this specification.
Modification to Schedule B to aid use.
Reduction of protection CT burden to 15VA
Reduction of metering CT burden to 10VA

Impact of Changes

This document modifies the requirements for 36kV outdoor dead tank circuit breakers and is relevant to all staff, contractors and Independent Connection Providers (ICPs) involved with the design, specification and installation of 33kV substations

Any new contract will be based on this updated specification.

This specification is not retrospective for current contracts or orders.

Implementation Actions

Purchasing to utilise this revised specification for establishing a new purchasing contract.

Managers, including Managers of Independent Connection Providers (ICPs) shall ensure that all staff and contractors involved in the tendering/ purchase and the design, installation modification and maintenance of NGED 33kV substations are aware of, and follow, the requirements of this specification.

Implementation Timetable

EESPEC 180 will be used as part of the 2025 tender process for 36kV dead tank circuit breakers.

Equipment ordered from the current Framework Contract shall continue to meet EESPEC 180/0.

ICPs will be expected to comply with this new specification within 6 months of its issue. (eg from 1st July 2025)

Items currently on order/under an active quotation by an ICP, to the existing specification shall continue to be acceptable to NGED so long as the order was placed before 1st July 2025 but the unit is to be commissioned after 1st July 2025.

Exception to this may be made by NGED DNO Policy team upon formal request.

REVISION HISTORY

Document Revision & Review Table		
Date	**Comments**	**Author**
February 2025	• Table 2 - Metering CT burden reduced to 10VA • Schedule B - Burdens on all Protection Class CTs reduced to 15VA • Schedule B - Rewrite of table into more user friendly arrangements and amalgation of types • Minor typographical edits	Anthony Smith
January 2019	This is a new document based on parts of EE SPEC: 10/2 and overrides the elements of 10/2 that this document references. • The document only relates to 36kV outdoor circuit breakers. • Requirements for other 12 or 36kV outdoor equipment are not included.	Anthony Smith

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1.0 INTRODUCTION

1.1.1. This Technical Specification sets out National Grid Electricity Distribution's (NGED's) requirements for 36kV outdoor dead tank circuit breakers for use on its 33kV systems.

1.1.2. It is based on and must be read in conjunction with the final version of ENA TS 41-36 Issue 3, 2012 and other referenced standards and specifications listed either within ENATS 41-36 ISSUE 3 2012 or this NGED specification. NGED options, changes or additions to the ENATS requirements are stated in this NGED document. Unless otherwise stated the requirements of the relevant part(s) of ENATS 41-36 Issue 3, 2012 shall apply.

1.1.3. Any selection of options or changes to this specification by NGED shall be made in writing.

1.1.4. Where this NGED Technical Specification is being used for Tender purposes then unless otherwise specified in writing at time of Tender, all equipment offered against this Technical Specification shall be compliant with this Technical Specification.

1.1.5. Preference will be given to non Sulphur Hexafluoride (SF6) devices as part of NGEDs commitment to NetZero. This does not preclude SF6 units being offered but the deployment of the same will be limited due to wider environmental legislation requirements.

1.1.6. Where the term "shall" or "must" is used in this document, it means the requirement is mandatory. The term "should" is used to express a recommendation. The term "may" is used to express permission.

2.0 MODIFICATIONS AND ADDITIONS TO ENA 41-36 Issue 3, 2012

2.1. References

2.1.1. References are in accordance with ENA TS 41-36 Issue 3, 2012 with the following additions in Table 1, below.

2.1.2. Users of all standards and technical specifications shall ensure they are applying the most recent editions together with any amendments.

2.1.3. Whilst the IEC base document(s) are listed for information, the prime document that shall take priority is the British Standard enacting the European Standard (EN) or European Harmonisation Document (HD)

BS No.	Title	IEC / ISO base
BSHD 60269	Cartridge fuses for voltages up to and including 1000V ac and 1500V dc	IEC 60269
BSEN 60898	Circuit breakers for overcurrent protection for household and similar installations	IEC 60898
BSEN 61000-6-2	Electromagnetic compatibility (EMC) Generic standards – Immunity for industrial environments	IEC 61000-6-2
BSEN 61000-6-4	Electromagnetic compatibility (EMC) Generic standards – Emission Standard for industrial environments	IEC 61000-6-4
BSEN 61000-6-5	Electromagnetic compatibility (EMC) Generic standards – Emission Standard for Power Station and Substation Environments	IEC 61000-6-5
BS IEC 61508	Functional safety of electrical / electronic / programmable electronic safety-related systems	IEC 61508

Table 1: Additional References

2.2. **System Earthing**

2.2.1. (BSEN 62271-1 – clause 9.1). The equipment shall be suitable for use on three phase systems in which the neutral is earthed either solidly or through a resistance or reactance of low value or through a reactor or arc suppression coil. It should be noted that parts of NGED's network employ arc suppression coil earthing and Tenderers are advised to consider carefully the implications of this, with particular emphasis on the phase voltages during earth fault conditions.

2.3. **Summary of Range (ENA TS 41-36 Issue 3, 2012 Schedule 2.1)**

2.3.1. Schedule 2.1 of ENATS 41-36 Issue 3 2012 includes items for which the required option is already stated within the text of 41-36, for example, rated frequency. Schedule 2.1 of 41-36 is replaced in this NGED Technical Specification by Schedule B. For the avoidance of doubt, where the selected option is already stated in the text of 41-36 it is not repeated within the NGED Schedules.

2.4. **Ratings**

2.4.1. Rated short-time withstand current (ENATS 41-36 Issue 3 2012 cl 1.4.5). In the interests of standardisation default switchgear ratings are shown in NGED Schedule A and these options shall be selected. However, it is the NGED User's responsibility to check with NGED Primary Network Design Team that these default ratings are sufficient for the envisaged future specific site duty.

2.4.2. Rated short-circuit breaking current (ENATS 41-36 Issue 3 2012 cl 2.4.101). The rated short-circuit breaking current shall be no less that the rated short-time withstand current as specified in 2.4.1 above.

2.4.3. The rated value of short-circuit breaking current shall be assigned at dc time constants of both 45ms and 120ms irrespective of current rating. Any differences to this shall be notified.

2.5. **Rated Supply Voltage of Closing & Opening Devices and of Auxiliary & Control Circuits**

2.5.1. (Ua) ENATS 41-36 Issue 3 2012 cl 1.4.8:- In addition, equipment shall operate normally when the supply voltage is within the tolerances specified in ENA TS 50-18 and BSEN 62271-1.

2.6. **Auxiliary Switches (ENATS 41-36 Issue 3, 2012 cl 2.5.4)**

2.6.1. In addition to auxiliary switches required for normal circuit breaker function, further auxiliary switches, in accordance with Appendix A, shall be provided for NGED use and all these, including spares, shall be wired out to an accessible terminal blocks within the fixed portion.

2.7. **Accessibility of Auxiliary and Control Equipment (BSEN 62271-1 cl 5.4.2.2)**

2.7.1. In addition, to provide resilience against flooding all HV and LV live parts, mechanism and control equipment, including cable terminations shall be located as high as practicable above ground level.

2.8. **Labelling and Marking**

2.8.1. Labelling and marking shall comply with ENATS 41.36 and Table 1.8.

2.9. **Phase Identification**

2.9.1. Phases shall be identified in accordance with ENATS 41.36 1.5.10.101.2; that is

U1 U2, V1 V2, W1 W2.

2.10. **Clearances for Overhead Conductor Connected Equipment**

2.10.1. Minimum clearance from ground level of a fixed access platform to exposed live conductors shall be basic electrical clearance (as defined in BSEN 61936) plus 300mm plus personal reach. Clearance to support insulation shall be 300mm plus personal reach.

2.10.2. For the purposes of this specification, personal reach is 2.25m.

3.0 Current Transformers

3.1. **General**

3.1.1. Current transformers (CTs) shall be in accordance with EA TS 41-36 and BSEN 61869-2 with the following additions. Characteristics and ratios are specified in the accompanying Schedules in Appendix B and Appendix C and as set out below.

3.1.2. CT specification, layout and connections shall be as per the detail within EE SPEC 87 and its associated drawings. Appendix B of this document states requirements for each type and ratios. Characteristics are specified below, unless they are required to match those at an existing substation for an existing unit protection scheme.

3.1.3. All connections from secondary windings shall be brought out and taken, by means of separate insulated leads, to an accessible terminal board to permit testing of individual CTs. Any joints or connections in the secondary leads shall be carried out at an accessible terminal board.

3.2. **Standard Protection CTs**

3.2.1. Irrespective of the ratio, the rated continuous thermal current of protection class CTs (I_{cth}) shall match the full continuous current rating of the design of circuit breaker to which they are installed.

3.2.2. CTs and secondary wiring within live compartments shall be fully and effectively shrouded by a substantial, earthed, metal screen. Care shall be taken to ensure that the cable sheath and its earth connections do not short out the current transformers.

3.2.3. Each current transformer forming part of a group of CTs to provide a given function shall have a knee point voltage within 20% of the other CTs within the same group. For example, a group of 3 CTs used as part of an overcurrent and earth fault protection scheme shall have knee point voltages within 20% of each other.

3.2.4. Where dual ratio CTs are specified the required class, accuracy and VA rating applies to both protection class ratios, unless otherwise stated.

3.2.5. Type test certificates shall be provided by the purchaser with the equipment drawings.

3.2.6. Current transformer secondary windings shall have a bare wire diameter (copper) of not less than 0.8mm.

3.2.7. By agreement between the manufacturer and the NGED Policy Team, low energy output devices may be prescribed in lieu of CTs.

3.3. **Class PX CTs**

3.3.1. Class PX current transformers shall comply with BSEN 61869-2 and shall provide accurate transformation up to the maximum fault current withstand rating of the associated main plant and ensure this performance under steady state conditions without undue saturation.

3.3.2. The minimum knee point requirements for CTs with a 1A secondary rating are specified below, where:

V_K = Knee point voltage

R_{CT} = DC secondary resistance of the CT

N = Ratio of the CT (i.e. primary current / rated secondary current)

3.3.2.1. CTs for Current Differential, Pilot Wire or Distance Protection:

- For 25kA circuit breakers: $V_K \geq 9.1x10^4(R_{CT} + 0.5)/N$
- For 31.5kA circuit breakers: $V_K \geq 9.5x10^4(R_{CT} + 0.5)/N$

3.3.2.2. CTs for Transformer Bias Differential and REF Protection

- For 25kA circuit breakers: $V_K \geq 5.0 \times 10^4(R_{CT} + 1.5)/N$
- For 31.5kA circuit breakers: $V_K \geq 6.3 \times 10^4(R_{CT} + 1.5)/N$

3.3.2.3. CTs for High Impedance Busbar Protection

- For 25kA circuit breakers: $V_K \geq 5.0 \times 10^4(R_{CT} + 1)/N$
- For 31.5kA circuit breakers: $V_K \geq 6.3 \times 10^4(R_{CT} + 1)/N$

For CTs with an alternative secondary rating, the minimum knee point requirement shall be calculated in accordance with the protection relay manufacturer's recommendations.

3.3.3. Where dual ratio CTs are specified the knee point requirements shall be satisfied on the higher CT ratio (eg **1000**/500/1).

3.3.4. In addition to the knee point requirements, the magnetising current for the CT shall be less than 50mA at the CTs knee point voltage.

3.4. **Metering Current Transformers**

3.4.1. Metering CTs shall have independent cores and secondary windings from those provided for protection purposes. Provision shall be made to prevent un-authorised access to metering CTs and CT circuits.

3.4.2. Metering CTs shall have a rated continuous thermal current (I_{cth}) of at least 120% of the rated primary current (I_{pr}) of the CT unless a higher rating is separately specified.

3.4.3. Where metering CTs are specified, the CT ratios shall be selected by NGED from the options listed in Table 2.

3.4.4. Metering CTs shall be tested to confirm compliance with BSEN 61869-2 on each ratio. In addition to these requirements, CT errors shall be supplied for each ratio at 5%, 20%, 100% and 120% test load points at the burden specified in the following table. These additional CT errors shall either be separately tested or calculated from other error test results.

Table 2: Metering CT Requirements

CT Ratio Options	VA Rating	Class	Additional Error Data
200/100/1 300/150/1 400/200/1 600/300/1 800/400/1 1200/600/1 1600/800/1 2000/1000/1	10VA	0.2S	Additional error data to be provided for 5%, 20%, 100% and 120% load points with a burden of 2.5VA with a 0.9 lagging power factor

Specifiers of metering CTs will be required to consider and justify the choice of metering CTs based on the following requirements:

The lower of the secondary metering CT ratio shall be chosen to match the size of the connection being made (irrespective of export or import) and shall also be chosen to ensure that under all running conditions the Rated Measuring Current does not fall below 1% or exceed 120%. This includes export and import power measurements but needs to be pragmatic and reasoned when considering final CT ratio choice. This requirement is based on the requirements of the 2024 Elexon Balancing and Settlement Code, Code of Practice which depends on the connection size

3.4.5. Electronic copies of the of test certificates in PDF format, including any error tests used as the basis of the calculations described above, shall be provided in advance of the circuit breakers delivery for each metering current transformer. These shall be sent to the NGED project engineer by electronic mail.

4.0 OVERALL REQUIREMENTS

4.1. General

4.1.1. Suppliers and Manufacturers shall satisfy the requirements of BSEN ISO 9000; BSEN ISO 9001; BSEN ISO 14000 and BSEN 14001 for all products supplied.

4.1.2. All equipment and systems shall satisfy requirements of the EMC directive. EMC emissions and immunity requirements shall, as a minimum, satisfy the requirements of the generic emission and immunity standards for industrial environments BSEN 61000-6-2 and BSEN 61000-6-4 and also all relevant EMC product standards.

4.1.3. There is no requirement for the supplier to offer protection panels or circuit VTs in conjunction with the circuit breakers.

4.2. Guarantee

4.2.1. The supplier of the plant / equipment covered by this specification shall provide a guarantee for that equipment. The guarantee period that the supplier warrants will be a minimum of five (5) years from the date of completion of commissioning of the relevant plant / equipment or 66months from notification to NGED of readiness to deliver.

Note, this requirement applies to plant / equipment purchased by Independent Connection Providers (to be adopted by NGED) as well as equipment purchased directly by NGED.

4.3. **Auxiliary Supplies**

4.3.1. Circuit breaker spring winding motor and protection/alarm relay auxiliary supplies for new equipment shall be normally rated at 110Vdc.

4.3.2. Equipment shall operate correctly over the DC auxiliary voltage ranges specified in ENATS 48-5, ENATS 50-18 and ENATS 41-36 ISSUE 3 2012, as applicable.

4.3.3. Tele-control auxiliary supplies are either 48Vdc or 24Vdc depending on where the equipment is to be installed. In general a positive common rail is used with negative switching, however, for switchgear used in South Wales this polarity may be reversed. Details will be confirmed at time of order.

4.4. **Earthing**

4.4.1. Earthing requirements shall be in accordance with ENA TS 41-24 and ENA TS 50-18.

4.5. **Small wiring and Terminals**

4.5.1. Small wiring and terminals shall comply with ENA TS 41-36 with the following additions:

4.5.1.1. The application of small wiring, ancillary electrical equipment and protection shall in general follow the principles in Engineering Recommendation S15.

4.5.2. Secondary wiring shall comprise of:

4.5.2.1. AC wiring: 2.5mm^2 (minimum) copper stranded cable with PVC insulation to BS6231 Type BR, or equivalent tri-rated cable complying with BS6231.

4.5.2.2. DC wiring: 1.5mm^2 (minimum) copper stranded cable with PVC insulation to BS6231 Type BR, or equivalent tri-rated cable complying with BS6231.

4.5.2.3. The insulation of AC and DC wiring shall be coloured white in all circuits, except earthing which shall be coloured green/yellow. A.C. and D.C. wiring shall be terminated with crimped connections in accordance with ENA TS 50-18.

4.5.2.4. Terminal blocks used for protection, alarm and control circuits shall be screw clamp with spring type, in accordance with EATS 50-18 Type B.

4.5.2.5. Terminal blocks for 24VDC and 48VDC tele-control wiring, and for transducer output wiring shall be screw clamp type, to EATS 50-18 Type C with a hinged link for isolation purposes.

4.5.2.6. Sufficient space shall be allowed so that connections can be tightened or un-tightened and wires removed and re-inserted. Spare cores shall be terminated at the terminal blocks furthest from the cable gland.

4.5.2.7. All circuit breakers are to be equipped with pairs of plug test sockets of a type to be agreed at the time of tender, fitted to the trip and close circuits and connected as shown on NGED drawings. These terminals shall be mounted in accessible position within the circuit breaker control panel compartment and shall be labelled “remote trip socket” and “remote close socket”.

4.6. Fuses and Links

4.6.1. Secondary fuselinks, links and fuse carriers shall be in accordance with EATS 50-18 and BS HD 60269-2 reference A.

4.6.2. Fuses and fuse holders up to 20A rating shall be in accordance with BS HD 60269-2 reference A1.

4.6.3. The fuse holders and bases shall be coloured as follows:

- 2A, 4A, 6A, 10A fuselink ratings: black (colour 642 of BS 381C)
- 16A fuselink rating: green (colour 216 of BS 381C)
- Solid links: white

4.6.4. GE Power Controls or Mersen Red Spot fuse holders shall be provided unless otherwise agreed at the time of tender.

4.6.5. All fuses and links shall be mounted vertically, grouped logically and consistently on the front of the panel and shall be clearly labelled. The label shall show the function of the fuses/links and include the fuse/link number as specified on the schematic drawings. Where a double row of fuses and links is required, the labelling of the bottom row may need to be mounted on a stand-off bracket to ensure they are clearly visible.

4.6.6. Fuse terminals shall be suitably shrouded to minimise electric shock hazards. The incoming (supply) side of each circuit shall be connected on the bottom terminal of the fuse/link.

4.7. Ancillary Equipment

4.7.1. Requirements for ancillary equipment including relays, contactors, control / selector switches, transducers, push buttons and lamps are specified in EE SPEC: 136.

4.8. Multicore / Multipair Terminal Boxes and Glands

4.8.1. Where a multicore / multipair terminal box is fitted it shall be placed so that work can be carried out on this box with the equipment after the equipment is installed and cables jointed. With the multicores / multipairs made off, they shall not interfere with the making or breaking down of the main cable box.

4.8.2. Adequate terminal blocks and cable gland space shall be provided to terminate all the cores of all multicore / multipair cables. Standard types are listed inn EE SPEC: 78/1, EE SPEC 79/2 and EE SPEC 80/1. Insulated cable glands, where required shall be insulated to 4kV ac. for 1 minute.

4.9. Interlocking

4.9.1. Permissive interlocking shall be provided on incoming transformer circuits as detailed in ENATS 41-36 ISSUE 3 2012 clause 2.5.11.101.a

4.9.2. Castell Type Q or Fortress Type H are required. Numbering/legend will be provided at the time of order.

4.10. Anti-Condensation Heaters

4.10.1. A heater shall be provided at an appropriate location in each panel. The heaters shall be 230Vac. One control thermostat per circuit breaker shall be provided. A double pole switch shall control the supply to the heater/s, which shall be located at a readily accessible position on the switchboard and clearly labelled/identified.

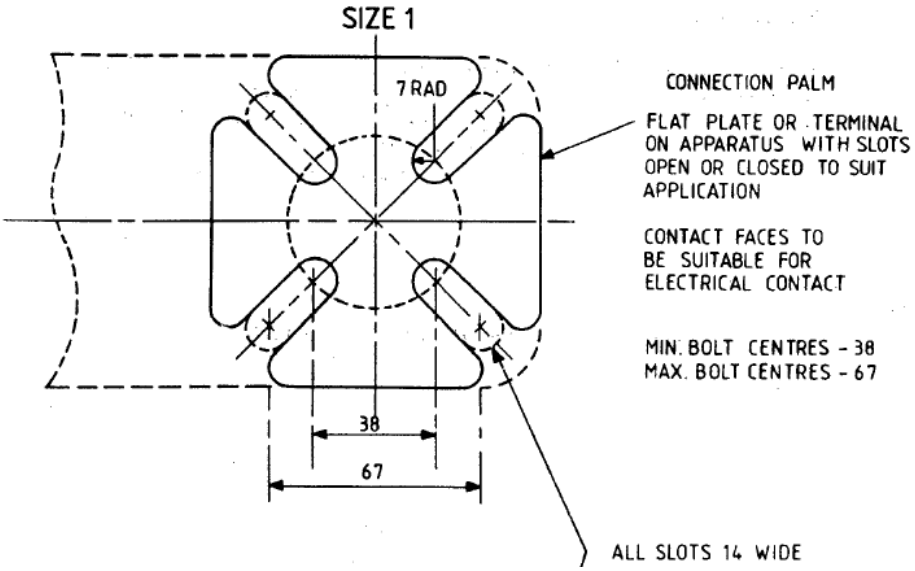
4.11. **Control Cabinet Lighting and Power**

4.11.1. A 230V ac lighting unit within the control cabinet should be fitted to ensure the main indication parts are visible when lit. The unit should operate when the door opens/closes.

4.11.2. A 230V ac UK mains socket to BS1363 with a latching RCD shall be provided.

4.12. **Terminal Palms**

4.12.1. Terminal palms size 1 to 3.1.2 and Figure 1 of ENATS 41.16 are required.



4.12.2. Where these cannot be provided the Tenderer shall specify what is offered.

4.13. **Drawings**

4.13.1. The manufacturer shall provide the following drawings for approval within one month of the commencement date of the contract or by mutually agreed date at the placement of the order:

- General Arrangement of each circuit breaker / cubicle
- Schematic Diagram for each circuit breaker / cubicle
- Wiring diagram for each circuit breaker / cubicle

4.13.2. Once approval has been obtained, an additional copy of the drawings shall be provided.

4.13.3. Following on-site installation and commissioning of the unit(s), the manufacturer/installer shall ensure that all modifications made to the unit during their works are, as a minimum, annotated on a marked up copy of the drawings to be left on site and that these drawings are then fully drawn up and sent to the project engineer prior to the unit being energised or as agreed with site project engineer.

4.13.4. A copy of the commissioning report shall be provided following site commissioning.

4.13.5. All drawings shall be provided electronically in .dwg/.dxf CAD format for archive usage with a .pdf copy available for immediate use on site.

AUXILIARY SWITCHES

Auxiliary switches shall comply with ENA TS 50-18.

Sufficient auxiliary switches shall be provided for the associated protection and control functions. Specific requirements are defined in NGED's standard schematic drawings.

In addition, each circuit breaker shall be provided with the following spare auxiliary switches, each wired back to accessible terminals blocks:

- 6 off normally open circuit breaker auxiliary switches
- 6 off normally closed circuit breaker auxiliary switches
- 2 off normally open springs charged auxiliary switches
- 2 off normally closed springs charged auxiliary switches

APPENDIX B

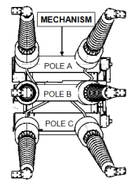
SCHEDULE A - SUMMARY OF TECHNICAL PARAMETERS

Information	NGED Requirement	Sub-clause of ENATS 41.36/ IEC 62271-1 clause
Particulars of System		
Voltage(kV)	33	
Frequency (Hz)	50	
Number of phases	3	
Neutral earthing	Impedance / ASC / Solid	
Circuit Breaker Characteristics		
Number of poles	3	
Class	Outdoor -25ºC +40ºC Pollution level: Class III IEC 60815	1.2 /
Rated Voltage (kV)	36	1.4.1 /
Rated power frequency withstand voltage (kV)	70	
Rated Insulation Level(kV)	170	1.4.2 /
Rated frequency (Hz)	50	1.4.3 /
Rated Normal current (A)	1250A and 2000A (independent)	1.4.4 /
Rated short-time withstand current (kA)	25kA at 1250A; 31.5kA at 2000A	1.4.5 /
Rated duration of short circuit (sec)	3	1.4.7 /
Rated supply voltage of opening and closing devices, and auxiliary and control circuits 1. Closing & tripping 2. Indication 3. Control	 110V dc 110V dc 24V / 48V dc	1.4.8 /
Rated short-circuit breaking current	Equal to rated short-time withstand current. 45 and 120ms time constants	2.4.101 /
Rated short-circuit making current	2.5 times rated short-circuit breaking current	2.4.103 /
Rated operating sequence	O-0.3s-CO-15s-CO	2.4.104 /
Rated out of phase making and breaking currents	a) Rated out-of-phase breaking current – 25% of rated short circuit breaking current b)Rated out –of-phase making current – crest value of a)	2.4.106 /
Rated capacitive switching currents	Class C2	2.4.107 /
Rated cable-charging breaking current (A)	50	2.4.107 /
Rated line charging breaking current (A)	10	2.4.107 /
Classification of mechanical operations	Class M2 – 10000 ops	2.4.110 /
Classification in regard of electrical endurance – tested for auto-reclose duty	Class E2	2.4.111 /

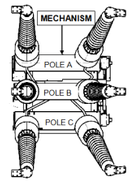
Supplier To Declare		
Mechanism type (give details)		2.5.5 to 2.5.7 /
Closing mechanism power consumption (mA) and duration of consumption (s)		
Operating time – Close operation (ms)		
Operating Time – Open operation (ms)		
Noise (during operation and/or activity) (dB)		
Arc interruption medium		
Insulation medium		
Type of gas		
Mass of Gas (kg)		
Volume of Compartment (m^3)		
Mass of gas (kg) that would be lost if gas leaked until compartment pressure equals the standard atmospheric conditions (+20°C and 101,3 kPa), without air entering the chamber.		
Method(s) of monitoring pressure and achieving temperature compensation		
Gas monitoring indicator		1.5.9 /
Rated filling pressure pre (or density pre) for insulation and/or switching [kPA and BAR(G)]		/ 3.6.5.2
Alarm pressure pae (or density pae) for insulation and/or switching [kPA and BAR(G)]		/ 3.6.5.3
Minimum functional pressure pme (or density pme) for insulation and/or switching [kPA and BAR(G)]		/ 3.6.5.5
Alarm pressure for operation pam (or density pam) [kPA AND Bar(g)]		/ 3.6.5.4
Minimum functional pressure for operation pmm (or density pmm) [kPA AND Bar(g)]		/ 3.6.5.6
Mass of complete unit (kg)		
Maximum dynamic floor/support loading(s) (kN)		
Dimensions (m)		
AIS bushing details		
Colour of paint		

SCHEDULE B TYPES OF DEAD Tank CBs and CT Requirements

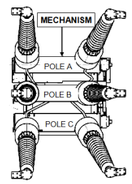
1250A Feeder – Distance/Unit/TX Protection

36kV Outdoor DTCB Type Reference	NGED EE87 Reference		Top	Middle (3.3.2.1)	Bottom	Turret		Turret	Bottom (3.3.2.3)	Middle	Top
36OD01 (Previously 36OD01-1250A and 36OD02a-1250A)	36C1A 36C2A 36C3A 36C4A 36C5A 36C6A 36C7A TX2 (1250A) TX4 (1250A)	Pole A	-	PX 800/1	5P20 15VA 800/1	**1**		**2**	PX 15VA 1200/1	-	-
		Pole B	-	PX 800/1	5P20 15VA 800/1	**3**		**4**	PX 15VA 1200/1	-	-
		Pole C	-	PX 800/1	5P20 15VA 800/1	**5**		**6**	PX 15VA 1200/1	-	-

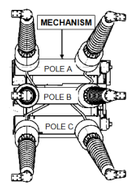
2000A Feeder – Distance/Unit/TX Protection

36kV Outdoor DTCB Type Reference	NGED EE87 Reference		Top (3.3.2.1)	Middle	Bottom	Turret		Turret	Bottom (3.3.2.3)	Middle	Top
36OD03 (Previously 36OD02b-2000A and 36OD03-2000A)	36C1B 36C2B 36C3B 36C4B 36C5B 36C6B 36C7B TX4 (2000A)	Pole A	PX 800/1	5P20 15VA 800/1	5P20 15VA 800/1	**1**		**2**	PX 1200/1	-	-
		Pole B	PX 800/1	5P20 15VA 800/1	5P20 15VA 800/1	**3**		**4**	PX 1200/1	-	-
		Pole C	PX 800/1	5P20 15VA 800/1	5P20 15VA 800/1	**5**		**6**	PX 1200/1	-	-

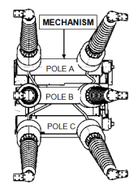
1250A Metering

36kV Outdoor DTCB Type Reference	NGED EE87 Reference		Top	Middle (3.3.2.3)	Bottom (Transducer)	Turret		Turret	Bottom (Metering)	Middle (3.3.2.1)	Top
36OD04 (Previously 36OD04M-1250A and 36OD05M-1250A)	36C11A 36C12A	Pole A	-	PX 1200/1	Class 0.5S 15VA 800/1	**1**		**2**	0.2S 10VA	5P20 15VA 800/1	-
		Pole B	-	PX 1200/1	Class 0.5S 15VA 800/1	**3**		**4**	0.2S 10VA	5P20 15VA 800/1	-
		Pole C	-	PX 1200/1	Class 0.5S 15VA 800/1	**5**		**6**	0.2S 10VA	5P20 15VA 800/1	-

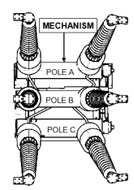
2000A 36 metering

36kV Outdoor DTCB Type Reference	NGED EE87 Reference		Top	Middle	Bottom (Transducer)	Turret		Turret	Bottom (Metering)	Middle (3.3.2.1)	Top
36OD06 (Previously 36OD06M-2000A)	36C12B	Pole A	-	5P20 15VA 800/1	5P20 15VA 800/1	**1**		**2**	0.2S 10VA	5P20 15VA 800/1	-
		Pole B	-	5P20 15VA 800/1	5P20 15VA 800/1	**3**		**4**	0.2S 10VA	5P20 15VA 800/1	-
		Pole C	-	5P20 15VA 800/1	5P20 15VA 800/1	**5**		**6**	0.2S 10VA	5P20 15VA 800/1	-

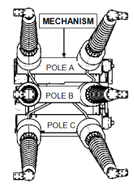
1250A 36 Distance/Bussection Protection

36kV Outdoor DTCB Type Reference	NGED EE87 Reference		Top	Middle (3.3.2.1 or 3.3.2.3)	Bottom	Turret		Turret	Bottom	Middle (3.3.2.1 or 3.3.2.3)	Top
36OD07 (Previously 36OD07-1250A and 36OD08-1250A)	36B3A 36B4A	Pole A	-	PX 800/1 or 1200/1	5P20 15VA 800/1	**1**		**2**	5P20 15VA 800/1	PX 800/1 or 1200/1	-
		Pole B	-	PX 800/1 or 1200/1	5P20 15VA 800/1	**3**		**4**	5P20 15VA 800/1	PX 800/1 or 1200/1	-
		Pole C	-	PX 800/1 or 1200/1	5P20 15VA 800/1	**5**		**6**	5P20 15VA 800/1	PX 800/1 or 1200/1	-

2000A 36 Distance/Bussection Protection

36kV Outdoor DTCB Type Reference	NGED EE87 Reference		Top	Middle (3.3.2.3)	Bottom	Turret		Turret	Bottom	Middle (3.3.2.3)	Top
36OD09 (Previously 36OD09-2000A)	36B4B	Pole A	-	PX 2000/1	5P20 15VA 2000/1	**1**		**2**	5P20 15VA 2000/1	PX 2000/1	-
		Pole B	-	PX 2000/1	5P20 15VA 2000/1	**3**		**4**	5P20 15VA 2000/1	PX 2000/1	-
		Pole C	-	PX 2000/1	5P20 15VA 2000/1	**5**		**6**	5P20 15VA 2000/1	PX 2000/1	-

2000A 36ITB – GTX Protection

36kV Outdoor DTCB Type Reference	NGED EE87 Reference		Top (3.3.2.2)	Middle	Bottom	Turret		Turret	Bottom (3.3.2.3)	Middle	Top
36OD10 (Previously 36OD10-2000A)	36ITB	Pole A	PX 2000/1	5P10 15VA 2000/1	Class 0.5S 15VA 2000/1	**1**		**2**	PX 1200/1	-	-
		Pole B	PX 2000/1	5P10 15VA 2000/1	Class 0.5S 15VA 2000/1	**3**		**4**	PX 1200/1	-	-
		Pole C	PX 2000/1	5P10 15VA 2000/1	Class 0.5S 15VA 2000/1	**5**		**6**	PX 1200/1	-	-

APPENDIX D

SUPERSEDED DOCUMENTATION

This document supersedes EE SPEC: 180/0 dated January 2019 which has now been withdrawn

APPENDIX E

ASSOCIATED DOCUMENTATION

Current versions of:-

ST:SD1C	"Selection and Application of NGED Assessed Switchgear for Use on the Distribution Network"
EE SPEC 10	"12kV and 36kV Outdoor Overhead Conductor Connected Switchgear and Voltage Transformers"
EE SPEC 78	"Specification for Multipair Cables"
EE SPEC 79	"Specification for SCADA Multipair Light Current Control Cables"
EE SPEC 80	"Specification for Multicore Cables"
EE SPEC 87	"Protection, Alarm and Control Panels Associated with 36kV and 72kV Outdoor Switchgear, 33kV and 66kV Transformers and Control Panels Associated with Arc Suppression Coils"
EE SPEC 89	"Relating to Fixed Earthing Systems for Major Substations"
EE SPEC 98	"Relating to Approved Protection, Voltage Control and Alarm Relays and Test Access Blocks"
EE SPEC: 136	"Ancillary Electrical Equipment for Use in Conjunction with Switchgear and Protection/Control Panels"
ENA TS 41-24	"Guidelines for design, installation, testing and maintenance of main earthing systems in substations"
ENA TS 41-36	"Switchgear for service up to 36kV (Cable and overhead line connected)"
ENA TS 41-38	"Power installations exceeding 1kV ac – Design of high-voltage open-terminal stations"
ENA TS 50-18	"Application of ancillary electrical equipment"
BSEN 60898	"Specification for circuit breakers for overcurrent protection for household and similar installations"
BSEN 61869-2	"Instrument transformers: Part 2: Additional requirements for current transformers"
BSEN 61000-6-2	"Electromagnetic Compatibility (EMC). Generic Standards. Immunity for industrial environments"
BSEN 61000-6-4	"Electromagnetic Compatibility (EMC). Generic Standards. Emission Standard for industrial environments"
BSEN 61000-6-5	"Electromagnetic Compatibility (EMC). Generic Standards. Immunity for industrial equipment used in power station and substation environments"
BSEN 61936	"Power installations exceeding 1 kV a.c. - Part 1: Common rules"
BSEN 62271-1	"High-voltage switchgear and controlgear - Part 1: Common specifications"
BSEN 62271-100	"High-voltage switchgear and controlgear - Part 100: Alternating current circuit-breakers"
BSEN 62271-101	"High-voltage switchgear and control gear - Part 101: Synthetic testing"
BSEN 62271-200	"High-voltage switchgear and controlgear - Part 200: AC metal-enclosed switchgear and controlgear for rated voltages above 1kV and up to and including 52 kV"
BSHD 60269-2	"Low-voltage fuses Part 2: Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application)"
BS IEC 61508	"Functional safety of electrical/electronic/ programmable electronic safety-related systems. Requirements for electrical/electronic/ programmable electronic safety-related systems"

APPENDIX F

IMPACT ON COMPANY POLICY

None.

APPENDIX G

RECORD OF COMMENT DURING CONSULTATION

No comments required as minor update.

APPENDIX H

IMPLEMENTATION OF POLICY

This document may be implemented on issue for new tenders and contracts.
This specification is not retrospective for current contracts based on EEPSEC 180.

APPENDIX I

KEY WORDS

Circuit Breaker; Dead Tank; Open Terminal; Switchgear