Electricity Distribution

nationalgrid

Company Directive

ENGINEERING SPECIFICATION

EE SPEC : 178

72.5kV Disconnectors and Earthing Switches

Summary:

This document specifies the requirements for 72.5kV disconnectors and earthing switches.

Author: **Stephen Hennell / Anthony Smith**

Implementation Date: **July 2021**

Approved by

Carl Ketley-Lowe
Engineering Policy Manager

Date: **14th July 2021**

Target Staff Group	**Anyone involved with the addition, or alteration of, 66kV substations inclusive of but not limited to Planners, Project Engineers, Technicians, EDS, PSD and Purchasing**
Impact of Change	**Green – No impact on current working practices**
Planned Assurance checks	**Nil**

All references to Western Power Distribution or WPD must be read as National Grid Electricity Distribution or NGED

IMPLEMENTATION PLAN

Introduction

This document specifies the requirements for 72.5kV disconnectors and earthing switches for use on the Western Power Distribution (WPD) 66kV network.

Main Changes

This is a new document replacing the parts of EESPEC 7 covering 72.5kV disconnectors and earthing switches. A separate EESPEC document covers the WPD requirements for 145kV disconnectors and earthing switches.

Impact of Changes

EESPEC 7 shall no longer apply to 72.5kV disconnectors and earthing switches supplied for use on the WPD 66kV network.

This specification will be used to tender for a new contract with one or more suppliers.

Implementation Actions

This new EESPEC has been issued to allow the tender of new contracts for 72.5kV disconnectors and earthing switches.

- Procurement Team and Engineering Policy to arrange for call-off contract for suitable equipment.
- Engineering Policy to update CROWN templates as required for any new/changed items.
- Amend EESPEC 122 as required for any new/changed items.
- Engineering Policy to notify Engineering Design and Primary System Design of any new/revised makes/types.
- Engineering Policy to revise SP2 as necessary to incorporate new makes/types.

Implementation Timetable

EESPEC 178 will be used as part of a 2021 tender process for 72.5kV disconnectors and earthing switches.

ICPs will be expected to comply with this new specification within 6 months of its issue.

Items currently on order/under an active quotation by an ICP, to the existing specification shall continue to be acceptable to WPD but new orders, after the 6 months have elapsed will need to comply with this specification.

Exception to this <u>may</u> be made by WPD Engineering Policy team upon formal request.

REVISION HISTORY

Document Revision & Review Table		
Date	**Comments**	**Author**
July 2021	This is a new document replacing sections within EESPEC 7 relating to 72.5kV disconnectors and earthing switches. Significant changes incorporated from EESPEC 7 are: • Updating of standards references • Creepage distances given as unified specific creepage distance (USCD).	Stephen Hennell / Anthony Smith

CONTENTS

1.0 INTRODUCTION

1.1 This Engineering Equipment Specification sets out Western Power Distribution (WPD) requirements for 72.5kV disconnectors and earthing switches for use on its 66kV networks.

1.2 It is based on and must be read in conjunction with the current version of ENA TS 41-37 and other referenced Standards and Specifications listed either within ENA TS 41-37 or this WPD Specification. WPD options, changes or additions to the ENATS requirements are stated in this WPD document. Unless otherwise stated the requirements of the relevant part(s) of ENATS 41-37 shall apply.

1.3 Any options selected or changes to this specification shall be made by WPD in writing.

1.4 Where this WPD 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.

1.5 WPD has a distinct preference for equipment which holds an Energy Networks Association (ENA) Notice of Conformity (NoC) to the current version or a previous version of an ENA Technical Specification (TS). Where equipment does not have an ENA NoC then the following preferences apply in order:-

- Equipment from a design where other ratings have an ENA NoC;
- Equipment manufactured in a facility where other equipment having an ENA NoC is manufactured;
- Other non ENA Assessed equipment.

Where equipment offered does not have an ENA NoC then the manufacturer will be required to provide WPD with details and test data for review that will be equivalent to completing and ENA NoC Assessment. There is no guarantee that following WPD assessment of the equipment that it will be accepted for use by WPD.

2.0 REQUIREMENTS

2.1 General

2.1.1 Suppliers and Manufacturers shall satisfy the requirements of BS EN ISO 9000 and BS EN ISO 9001 for all products supplied

2.1.2 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.

2.1.3 Where equipment is provided with design or tested ratings that exceeds those in the enquiry/order then these higher values shall be those applied to the equipment rating plates.

2.2 Guarantee

2.2.1 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 60 months (five years) from the date of completion of cold commissioning on site of the relevant plant / equipment; or where equipment has been manufactured but not delivered to WPD but placed into storage at WPD request, or delivered to WPD but not cold commissioned within 6months, then the warranty period shall be 66 months from the date of storage or delivery.

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

2.3 Safety Labels

Safety labels, warning signs and notices shall be compliant with UK standards in terms of colours, pictograms and layout. [BS5499]

3.0 MODIFICATIONS AND ADDITIONS TO ENA TS 41-37

3.1 References

3.1.1 References are in accordance with ENA TS 41-37 with the following additions in Table 1, below.

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

3.1.3 Whilst the IEC base document is 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
ENA TS 48-4	DC Relays Associated with a Tripping Function in Protection Systems	
ENA TS 48-5	Environmental Test Requirements for Protection and Control Equipment and Systems	

Table 1 Additional References

4.0 SPECIFIC REQUIREMENTS

4.1 System earthing

The equipment shall be suitable for use on three phase systems at 66kV in which the neutral is impedance earthed.

4.2 Normal Service Conditions

4.2.1 WPD require switchgear to be suitable for outdoor use with an ambient air temperature in the range -25°C to +40°C outdoor. [ENATS 41-37 Part 1 - 2.1.2]

4.2.2 The altitude does not exceed 1000m.

4.2.3 Other service conditions shall be as BSEN 61869-1 clause 4.2.5:-

- the average value of the ambient air temperature, measured over a period of 24 h, does not exceed 35 °C;
- solar radiation up to a level of 1 000 W/m2 (on a clear day at noon) should be considered;
- the ambient air may be polluted by dust, smoke, corrosive gases, vapours or salt. The pollution does not exceed the pollution levels given in IEC 60815;
- the wind pressure does not exceed 700 Pa (corresponding to a 34 m/s wind speed);
- the presence of condensation or precipitation should be taken into account;
- the ice coating does not exceed 10 mm.

4.3 Requirements for the external insulation

4.3.1 WPD requires insulators for Site Pollution Severity Class e (IEC/TR 60815:1986) or Class IV (IEC/TR 60815:1986).

4.3.2 Insulators having an alternating shed profile are preferred.

4.3.3 The creepage distances shall be as given in Table 3 below:-

Site Pollution Severity Class	Minimum mm/kV	Ratio = creepage distance divided by arcing distance
IEC/TS 60815:2008 e	Unified specific creepage distance 53.7	≤4.0
IEC/TR 60815:1986 IV Very Heavy	Specific creepage distance 31	

Table 3 Creepage distances [IEC/TR60815 & IEC/TS60815]

4.3.4 Tenderers shall state what shed profile is being offered and which Site Pollution Severity Class is being offered where this is not in accordance with 4.3.1 and 4.3.2 above.

4.3.5 Bushing insulators may be porcelain or composite. Porcelain insulators shall be coloured brown.

4.4 Corrosion protection

4.4.1 All exposed hardware shall be stainless steel.

4.4.2 Any aluminium castings shall be anodized.

4.4.3 WPD prefer fabrication from stainless steel for auxiliary enclosures.

4.4.4 Other exposed non-aluminium or non-stainless steel metal parts shall be shot blasted and galvanized. This shall be followed by two coats of zinc rich primer and two coats of polyurethane based paint. The preferred paint colour is Dark Admiralty Grey (BS381C 632), however other colours may be acceptable (eg RAL 7033).

4.5 Auxiliary enclosures

4.5.1 The degree of protection for low-voltage and/or auxiliary enclosures shall be at least IP44 according to BSEN60529.

4.5.2 Shall be fabricated of stainless steel and painted.

4.5.3 Shall be provided with a securing and locking device that provides security against unauthorised access. The locking arrangement shall be robust and accommodate a padlock with 41mm square body and with a 4mm to 7mm diameter shackle having a clear inside width of 21mm and an inside length of 16mm to 45mm. The holes provided for the shackle shall not be less than 8mm diameter.

4.5.4 Where an auxiliary enclosure (eg. terminal box) is fitted it shall be placed so that work can be carried out on this box with the equipment live after the equipment is installed and cables terminated.

4.5.5 Auxiliary enclosures shall be suitable for the termination of armoured multicore cables using cable glands. A full width stainless steel removable gland plate with gasket shall be provided. Sufficient space shall be provided above the multicore gland plate to allow glanding of cables and looming of cores.

4.5.6 Sufficient terminal blocks shall be provided to terminate all the cores of all multicore cables as detailed in the Summary of Technical Parameters for the device.

4.5.7 Auxiliary enclosures shall be accessible from ground level without the use of ladders of platforms.

4.5.8 Auxiliary enclosures shall be fitted with adequate ventilation so as to prevent condensation when used in conjunction with an anti-condensation heater. The enclosure shall be self-draining. Any ventilation and draining shall be such that vermin and insects are prevented from entering the enclosure.

4.6 Flood resilience

4.6.1 To provide resilience against flooding all mechanisms and control equipment, including auxiliary cable glands and terminations shall be located as high as practicable above ground level and at a minimum height to base of enclosure of 500mm, subject to the requirements of clause 4.5.7 above.

4.6.2 Tenderers shall provide outline general arrangement drawings showing the proposed location and height above ground level.

5.0 RATINGS

5.1 Rated Voltage (Ur)

The rated voltage shall be 72.5kV.

5.2 Rated insulation level

The rated insulation levels shall be as in the table below:

Rated voltage U_r kV (rms value)	**Rated short-duration power-frequency withstand voltage U_d kV (rms value)**		**Rated lightning impulse withstand voltage U_p kV (peak value)**	
	Common value	Across the isolating distance	Common value	Across the isolating distance
72.5	140	160	325	375

5.3 Rated Frequency (fr)

The rated frequency shall be 50Hz.

5.4 Rated continuous current (Ir)

The rated normal current for disconnectors shall be 2500A unless otherwise indicated and selected from Schedule C. Other WPD rated normal current values which may be offered/requested are 1250A and 2000A.

The rated normal current of a disconnector shall be equal to, or better than, the busbars or adjacent circuit breaker (whichever is the greater).

5.5 Rated short-time withstand current (Ik)

The rated short-time withstand current shall be a minimum of 31.5kA unless otherwise indicated and selected from Schedule C Other WPD values are 25kA and 40kA.

The rated short-time withstand of a disconnector shall be equal to, or better than, the busbars or adjacent circuit breaker (whichever is the greater).

[Note: the values of short-time rated current are the same for single-phase and three-phase.]

5.6 Rated duration of short circuit (tk)

The value of rated short circuit current shall be 3 seconds.

5.7 Rated peak withstand current (Ip)

The rated peak withstand current shall be 2.7 times the rated short-time withstand current.

5.8 Rated Supply Voltage of Closing and Opening Devices and of Auxiliary and Control Circuits (Ua)

Switchgear shall be capable of all normal operations without any effect affecting its rated performance, within the voltage ranges specified in table below:-

Nominal voltage V	**Criteria for rated supply voltage operating range**	**Closing and opening releases and operating devices**		**Other operating devices**
		Close volts V	**Open volts V**	**Volts V**
110	Maximum operating voltage (max. charging voltage)	137.5	137.5	137.5
	Minimum operating voltage	87.5 [80% of nominal voltage]	77 [70% of nominal voltage]	87.5

5.9 Rated supply frequency of closing and opening devices and of auxiliary circuits

The rated supply frequency shall be dc.

5.10 Classification of Disconnectors for Mechanical Endurance

Disconnectors shall have a mechanical endurance class of M1 equal to 2000 operating cycles, or better.

5.11 Classification of earthing switches for mechanical endurance

Earth switches shall have a mechanical endurance class of M0 equal to 1000 operating cycles or better.

5.12 Classification of earthing switches for electrical endurance

Earth switches shall have an electrical endurance of E0 with the exception of line earth switches which shall have an electrical endurance of E2.

5.13 Rated bus-transfer current

The rated bus-transfer current for a disconnector used as a busbar selector in double busbar substation shall be a minimum of 80% of the rated continuous current of the disconnector subject to a maximum of 1600A.

5.14 Rated bus-transfer voltage

Disconnectors used as a busbar selector in a double busbar substation shall be 100V (RMS value).

5.15 Earthing Switches induced current switching

This requirement applies to line earth switches only.

Line earth switches shall be class A according to BSEN 62271-102 clause 5.109 and Table 9.

Where class A does not provide a sufficiently high rating due to long sections of line with high coupling to adjacent energised circuits, then class B shall be used.

	Electromagnetic coupling		**Electrostatic coupling**	
	Rated induced current (A rms)	**Rated induced voltage (kV)**	**Rated induced current (A rms)**	**Rated induced voltage (kV)**
Class A	50	0.5	0.4	3
Class B	80	2	2	6

Class	**Type of earthing switch**
A	Earthing switch designed to be used in circuits having relatively short sections of line or low coupling to adjacent energised circuits.
B	Earthing switch designed to be used in circuits having relatively long sections of line or high coupling to adjacent energised circuits.

6.0 MECHANISM

6.1 Local manual operation

Provision shall be made for mechanically operated local manual operation. This shall be the standard default for disconnector and earth switch operation.

Disconnectors acting as busbar selectors in double busbar substations shall be provided with a dependant power operating mechanism. This is to permit circuit reconfiguration by Control using SCADA without the need for site attendance.

6.2 Dependant power operation

Where equipment is provided with dependant power operation then mechanisms using a motor are preferred by WPD. Pneumatic or hydraulic operating devices shall not be supplied.

Power operated mechanisms shall be provided with a means of manual operation. (BSEN 62271-102 clause 6.104.2)

6.3 Three pole operation

Disconnectors and earthing switches shall be arranged for three pole simultaneous operation. This shall be enabled by mechanical linkage and not by electronic or electrical means.

6.4 Visible primary contacts

The design of disconnectors and earth switches shall be such that the position of the primary contacts shall be visible at all times from ground level.

7.0 PHASE CENTRES

Unless otherwise specified the default phase centres shall be 1830mm for 72.5kV.

8.0 INTERLOCKING DEVICES AND PADLOCKING FACILITIES

8.1 Operational and Safety Padlocking

Padlocking arrangements shall be suitable to accommodate a WPD padlock having a 7mm diameter hasp with all other details as per 4.5.3 above.

8.2 Interlocking shall be achieved by mechanical or electro-mechanical means. Each switching device shall have provision for the fitting of key interlocks by which it will be possible to trap and release keys when the switching device is open or closed. This facility will be used in conjunction with the user's interlocking schemes. The number and operating states will be stated at the time of order.

8.3 Where mechanical interlocking is provided it shall also be possible to fit an electro-mechanical interlocking device to each mechanism such that the device is prevented from operating until the interlocking device is energised.

8.4 Electro-mechanical interlocking shall be fail-safe. In the event of a locked mechanical interlock a loss of dc supply, blowing of fuse, removal of fuse or link should not allow the interlocking device to be defeated.

8.5 Software / IED based interlocking is not permitted.

8.6 When manually operated they shall be provided with labels which are readily visible and which contain clear concise instructions for operation.

8.7 In the event that interlocking is required to other plant items then Castell Type Q or Fortress Type H are required. Numbering/legend will be provided at the time of order, and shall be clearly and permanently marked on the key and body of the interlock.

8.8 Interlock keys shall only be released when the disconnector or earthing switch in in either the open or closed position, depending on the requirements of the interlock scheme.

8.9 Interlock keys shall have a different differ to other keys within the same mechanism and to those in use on the same substation site.

8.10 Provision shall be made to provide lockout interlock keys on all disconnectors. These keys shall only be released when the disconnector is in the open position. Lockout keys shall be distinctly labelled and shall each have a different differ to other keys in use on the substation site. The differ shall also be different to other keys associated with the mechanism.

8.11 Where a disconnector and earthing switch are mounted on a single frame they shall be interlocked as follows:

a) The earthing switch shall not be able to operate unless the disconnector is fully open.

b) The disconnector shall not be able to operate unless the earthing switch is fully open.

c) The interlock securing the disconnector in the open position shall not prevent the operation of the earthing switch.

d) The interlock securing the earthing switch in the open position shall not prevent the operation of the disconnector.

9.0 EARTHING

9.1 Earthing conductors

Earthing conductors and connections to them, for outdoor switchgear, shall be provided in accordance with the requirements of BSEN 50522.

Facilities shall be provided for each phase of an earth switch, to be connected via a continuous earthing conductor/ tape to the main substation earth.

9.2 Earthing of compartments and enclosures

Facilities shall be provided to bond all compartments and enclosures to the main substation earth via the earthing conductor. The method of bonding shall be capable of withstanding the rated short-time current.

10.0 AUXILIARY EQUIPMENT & SECONDARY WIRING

10.1 Auxiliary switches

10.1.1 The tolerance in the drive train to auxiliary switches shall be such that the correct operation is maintained consistently at extreme ends of tolerance.

10.1.2 Provision shall be made for auxiliary switches as follows:

	Electrical Interlocking	Auxiliary Switches
Disconnector	**Yes**	**40**
	No	**30**
Earth switch	**Yes**	**30**
	No	**10**

The <u>minimum</u> quantities of each auxiliary switch type available for WPD use shall be:

Description	ENATS 41-37 Part 4 Type Reference	Disconnector	Earth Switch
Normally Open - Early Make	Iii	6	-
Normally Closed – Early Open	iv	10	5
Normally Closed – Late Open	v	4	-
Normally Open – Late Closed	vi	10	5
Bus Transfer	vii	4	-

10.2 Secondary wiring identification

At the interface between switchgear and control gear, wiring and ancillary electrical equipment shall be identified in accordance with ENATS 50-19.

10.3 Small Wiring and Terminals

Small wiring and terminals shall comply with ENA TS 41-37 with the following additions:

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

10.3.2 Secondary wiring shall comprise of:

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

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

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

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.

Sufficient space shall be allowed so that connections can be tightened or un-tightened and wires removed and re-inserted.

Sufficient space shall also be allowed to the side of the terminals so that ferrule markers of up to 7 digit length can be read.

Spare cores shall be terminated at the terminal blocks furthest from the cable gland.

10.4 Fuses and Links

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

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

10.4.3 The fuse holders and bases shall be coloured as follows:

- 2A, 4A, 6A, 10A fuselink ratings: black
- 16A fuselink rating: green
- Solid links: white

2A, 4A and 10A fuse holders and bases shall have supplementary markings applied to denote the fuse rating. These markings shall be applied using permanent self-adhesive coloured vinyl tapes as follows:

- 2A Purple
- 4A Blue
- 10A Grey

[See example photo right.]

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

10.4.5 All fuses and links shall be mounted vertically, grouped logically and consistently in the panel and shall be clearly labelled.

Suitable space should be provided between each fuse/link, from any adjacent object, which may cause interference while the fuse/link carrier is being removed.

The label shall show the function of the fuses/links and include the fuse/link number as specified on the schematic drawings. The fuse rating shall also be included on the label.

The labelling of all fuses and links need to be clearly visible to the operator, particularly where two or more rows are required. This may require the addition of a stand-off bracket and/or angled label mounts.

10.4.6 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.

10.5 Ancillary Equipment

Requirements for ancillary equipment including control / selector switches, push buttons and lamps are specified in EESPEC:136.

10.6 Anti-Condensation Heaters

A heater shall be provided at an appropriate location in the mechanism box. The heaters shall be 230Vac. A control thermostat shall be provided. The supply to the heater/s shall be controlled by a double pole switch which shall be located at a readily accessible position and clearly labelled/identified.

Heaters shall have a low surface temperature, or be guarded if high surface temperature, in order to minimise the likelihood of burn injuries.

Heaters should not be in close proximity to other objects such that they may impact their function or operational life (eg wiring, relays).

10.7 SCADA

Each power operated switching device shall be equipped with a local/remote control selector switch. The facility shall be provided to enable SCADA indication of the state of the local/remote selector switch and the open/close position of the power operated switching device.

11.0 PRIMARY CONNECTIONS AND MARKINGS

11.1 Terminal Palms

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

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

11.2 Labelling and Marking

Labelling and marking shall comply with ENATS 41.37 Part 1 clause 5.10 and relevant sub-clauses.

11.3 Phase Identification

11.3.1 The identity of all primary terminals shall be indelibly marked on the main structure adjacent to the terminals. The marking shall not be on removable covers.

11.3.2 Phases shall be identified in accordance with ENATS 41.37 Part 1 clause 5.10.101; that is U1 U2, V1 V2, W1 W2 for three-pole units. Any alternative offered by a supplier (for example LA, LB, LC) shall be agreed in writing by WPD where acceptable.

11.3.3 The following standard identification sequences shall apply:

Pole	Left Hand	Centre	Right Hand
Marking	U	V	W
	LA	LB	LC
		CONTROL CUBICLE	

	Pole Marking		
CONTROL CUBICLE	U	V	W
	LA	LB	LC

11.3.4 A set of phase identification discs shall be supplied and these shall be interchangeable on site between poles as required. The WPD requirement shall be specified at the time of order and will be selected from:

- Red / Yellow / Blue (coloured roundels)
- Black / Brown / Grey (coloured roundels)
- L1 / L2 / L3 (Black text on White)

11.3.5 Phases shall be identified consistently across all manufactured units and orders supplied to WPD unless specified otherwise at the time of order.

12.0 CLEARANCES FOR OVERHEAD CONDUCTOR CONNECTED EQUIPMENT

12.1 Minimum clearance from ground level of a fixed access platform to exposed live conductors shall be basic electrical clearance (as defined in BSEN61936) plus 300mm plus personal reach. Clearance to support insulation shall be 300mm plus personal reach.

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

13.0 RATING PLATES

13.1 Where equipment is provided with design/tested ratings that exceed those in this specification or order, then these higher values shall be those applied to the equipment rating plate/s.

14.0 DRAWINGS

14.1 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 disconnector or earthing switch
- AC and DC Schematic Diagram for each disconnector or earthing switch
- Wiring diagram for each disconnector or earthing switch

14.2 The manufacturer shall provide a composite DC schematic diagram which includes all parts of the DC circuits within the disconnector or earthing switch.

The manufacturer may also provide individual sheets for each element of the DC circuitry however these shall not be a replacement for the composite DC schematic diagram.

14.3 Once approval has been obtained an additional copy of the drawings shall be provided. These shall be provided on the basis of one set per disconnector or earth switch and not as a common set of drawings per device type.

14.4 All drawings shall be provided electronically in .dwg CAD and PDF format.

15.0 TYPE TESTS

Type tests shall be as per BSEN 62271-102 clause 7, clause 6 of ENATS 41-37 Part 1 and clause 6 of ENATS 41-37 Part4.

16.0 ROUTINE TESTS

Routine tests shall be as per BSEN 62271-102 clause 8, clause 7 of ENATS 41-37 Part 1 and clause 7 of ENATS 41-17 Part 4.

17.0 TEST RESULTS

17.1 The manufacturer shall provide copies of test results following completion of factory routine tests.

17.2 These shall be provided in hardcopy and electronically in .pdf format to the WPD project engineer responsible for the works.

18.0 DOCUMENTATION TO BE PROVIDED AT TIME OF TENDER

The manufacturer shall provide the following documents or information at the time of tender:

- Installation, operation and maintenance manuals
- Summary of recommended inspection and maintenance requirements
- Recommended parts list
- Details of site commissioning tests
- End-of-Life disposal information/guide

APPENDIX A

SUPERSEDED DOCUMENTATION

This is a new specification that supersedes relevant sections in EESPEC 7.
EESPEC 7 will be withdrawn once all sections and equipment are covered by new EESPECs.

APPENDIX B

ASSOCIATED DOCUMENTATION

ENA TS 41-37 Part 1 - Issue 2	Switchgear for use on 66kV and 132kV distribution systems – Part 1 Common clauses
ENA TS 41-37 Part 4 - Issue 2	Switchgear for use on 66kV and 132kV distribution systems – Part 4 Disconnectors and Earthing Switches
ENA TS 41-24	Guidelines for design, installation, testing and maintenance of main earthing systems in substations
ENA TS 41-38	Power installations exceeding 1kVac – Design of high-voltage open-terminal stations
ENA TS 50-18	Application of ancillary electrical equipment
EE SPEC: 136	Ancillary Electrical Equipment for Use in Conjunction with Switchgear and Protection/Control Panels

APPENDIX C

IMPACT ON COMPANY POLICY

None.

APPENDIX D

RECORD OF COMMENTS DURING CONSULTATION

Link to the comment table:

178 comments

APPENDIX E

IMPLEMENTATION OF POLICY

This document may be implemented on issue as required for new tenders and contracts.
This specification is not retrospective for current contracts based on EEPSEC 7/3.

APPENDIX F

KEYWORDS

Disconnector, Earth Switch, 72.5kV, 66kV

SCHEDULE A – WPD Requirements for 72.5kV Disconnectors and Earthing Switches

Information	Sub-clause of ENATS 41-37 Part1	WPD requirement
Particulars of system		
Voltage kV		72.5
Frequency Hz		50
Number of phases		3
Neutral earthing		Impedance
Switch characteristics		
Number of poles		3
Class	1.2	Outdoor -25^{O}C to +40^{O}C
Nominal Voltage U_n (kV)		66
Rated Voltage U_{Ne} (kV)	4.1	72.5
Rated power frequency withstand voltage U_d (kV)	4.2	140
Rated lightning impulse withstand voltage U_p (kV)	4.2	325
Rated frequency (Hz) f_r	4.3	50
Rated Normal current (A) Ir	4.4	1250 / 2000 / 2500
Rated short-time withstand current (kA) I_k	4.5	≥31.5
Rated duration of short circuit (sec) t_k	4.7	3
Voltage factor (k_p)		1.4
Rated supply voltage of opening and closing devices, and auxiliary and control circuits U_a • Closing & Opening • Indication • Control	4.8	110Vdc
Rated supply frequency of closing and opening and of auxiliary circuits	4.9	dc
Classification in regard of electrical endurance	4.111	Class M1
Classification of mechanical operations	4.110	Class M1 - 2000

SCHEDULE B – Manufacturer Declaration for 72.5kV Disconnectors and Earthing Switches

Information	Declaration
Mechanism type	
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)	
Mass of complete unit (kg)	
Maximum dynamic floor/support loading(s) (kN)	
Dimensions (m)	
AIS bushing details	
Colour of paint	
Additional information	

SCHEDULE C – Disconnectors and Earthing Switches for Use on 66kV Distribution Systems

		Pantograph			Rotating Post DSB				
		Busbar selector isolator (double busbar)	Busbar isolator (single busbar)	Bus section / Bus coupler	Busbar selector isolator (double busbar)	Busbar isolator (single busbar)	Bus section / Bus coupler	Line isolator	Transformer isolator
		P2B	P1B	PBS	R2B	R1B	RBS	RLI	RTI
Options	***Rated Voltage (kV)**	72.5	72.5	72.5	72.5	72.5	72.5	72.5	72.5
	***Rated Current (A)**	1250 2000 **2500**	1250 2000 **2500**	1250 2000 **2500**	1250 2000 **2500**	1250 2000 **2500**	1250 2000 **2500**	1250 2000	1250
	***Rated Short-time Current (kA)**	25 **31.5** 40	25 **31.5** 40	25 **31.5** 40	25 **31.5** 40	25 **31.5** 40	25 **31.5** 40	25 **31.5** 40	25 **31.5** 40
	***Motor**	Yes	No	No	Yes	No	No	**No** Yes	**Yes** No
	Bus-transfer current switching *[5.13]*	Yes	No	No	Yes	No	No	No	No
	Electrical Interlocking	Yes	No	Yes	Yes	No	Yes	No	No
	Mechanical Interlocking	For permissive earthing only	Yes	For permissive earthing only	For permissive earthing only	Yes	For permissive earthing only	Yes	Yes
	***Integrated Earth Switch**	**Yes** No	**Yes** No	No **1** 2	**Yes** No	**Yes** No	No **1** 2	No **1** 2	No **1** 2
	***Earth Switch Induced current switching** *[5.15]*	No	No	No	No	No	No	**Yes** No	No
	***Vertical mounting**	N/A	N/A	N/A	**No** Yes	**No** Yes	**No** Yes	**No** Yes	**No** Yes

***=** WPD User selection available and required. Where an option is not selected then **bold** type indicates the default option that shall apply.