WESTERN POWER DISTRIBUTION

Serving the Midlands, South West and Wales

Company Directive

ENGINEERING SPECIFICATION
EE SPEC : 7/3

Switchgear for use on 66kV to 132kV Distribution Systems

Author: Stephen Hennell / Andy Hood

Implementation Date: January 2013

Approved by:

Paul Jewell
Policy Manager

Date: 28 February 2013

IMPLEMENTATION PLAN

Introduction

Text rewording to provide clarity of technical requirement.

Main Changes

Rewording of technical requirement for current transformer rated continuous thermal current (I_{cth}).

Impact of Changes

No change to content.

Implementation Actions

As there is no change to the content, there are no actions required.

Implementation Timetable

N/A

Page Inserted July 2014

Revision Log

Document Revision & Review Table		
Date	**Comments**	**Author**
10.07.14	• Page 8 revised. Rewording of technical requirement.	Stephen Hennell
Date	**Comments**	**Author**
25.03.13	• Page 10 revised	Andy Hood
Date	**Comments**	**Author**
14.12.12	• Addition of Appendix for disconnector specification/election • Revision of circuit breaker CT ratios and knee points • Text revisions to enhance clarity • Standards references updated	Stephen Hennell

1.0 INTRODUCTION

1.1 This Technical Specification (TS) sets out Western Power Distribution requirements for switchgear for use on its 66kV and 132kV systems. It does not include gas insulated switchgear.

1.2 It is based on and must be read in conjunction with Energy Networks Association (ENA) Technical Specification 41-37 Parts 1, 3 and 4 and other referenced Standards and Technical Specifications listed either within the ENATS or this WPD TS. WPD options, changes or additions to the ENATS requirements are stated in this WPD TS, using the clause numbering from the relevant part of ENATS 41-37 and the applicable IEC Standard. Unless otherwise stated the requirements of the relevant part(s) of ENATS 41-37 shall apply.

1.3 Any selection of options or changes to this specification by WPD shall be made in writing

1.4 Unless otherwise specified in writing at time of Tender all equipment offered against this WPD TS shall be compliant with this TS

1.5 WPD Users of this TS shall complete Annex A and Annex B for each enquiry. In addition the relevant part/s of Annex C shall be completed.

Part 3 - Circuit Breakers
Part 4 - Disconnectors and earthing switches
Part X - Current and Voltage Transformers

These Annexes contain default options in **bold** print which shall be used unless there is a technical reason to do otherwise. Note that in some instances it may be necessary to utilise higher ratings when required/specified by the WPD Primary System Design Team in respect of required rated current, short circuit current and time constant.

Current ratings shall be matched to adjacent plant or specified to match planned current rating requirements.

2.0 COMMON REQUIREMENTS - ENATS 41-37 PART 1 - SWITCHGEAR FOR USE ON 66KV AND 132KV DISTRIBUTION SYSTEMS

2.1 Clause numbering in this section of this WPD TS relates to that in ENATS 41-37 Part 1 and applicable IEC Standard.

2.1.2 **Normal service conditions** - WPD require switchgear to be “class minus 25 outdoor”.

2.1.3 **Normal service conditions** - Tenderers shall offer equipment having pollution performance IV (31mm / kV) according to Table 1 of IEC 60815 where this is available, otherwise equipment to Class III shall be provided. In any event Tenderers shall state which pollution class is offered.

3.204 and 3.205 **Safety padlocking** - Padlocking arrangements shall be suitable to accommodate a WPD padlock having a 7mm diameter hasp

4.3 **Rated Frequency (f_r)** - The rated frequency shall be 50Hz.

4.5 **Rated short time withstand current (I_k)**- Unless otherwise selected in Annex C, the rated normal current and rated short time withstand current shall be as follows -

Rated voltage (kV)	Rated normal current (A)	Rated short-time withstand current (kA)
72.5	2500	31.5
145	2500	31.5

[Note to WPD Users – you must still check with Primary System Design Team that these ratings are adequate.]

4.7 **Rated duration of short circuit (t_k)** - The value of rated duration of short circuit shall be 3 seconds

4.8 **Rated supply voltage of closing and opening devices and of auxiliary and control circuits (U_a)** – Shall meet the requirements of ENATS 41-37 Part 1 Table 3.

4.9 **Rated supply frequency of closing and opening devices and of auxiliary circuits** -The standard supply frequency shall be d.c.

4.101 **Rated DC time constant** - The rated dc time constant for 145kV shall be 120ms unless otherwise selected in Annex C

5.1.101 **Liquid level -** In addition – a device to enable the liquid level to be checked during service shall be provided unless otherwise agreed in writing.

5.3 **Earthing of switchgear and controlgear** - Where parts of metallic enclosures or structures are intended to be used in primary system earthing, this shall be advised at time of Tender and details provided.

5.4.2.2 **Accessibility of Auxiliary and Control Equipment** - In addition – accessibility shall be from ground level without use of ladders or platforms etc. To provide resilience against flooding it is preferred that all mechanism and control equipment, including auxiliary cable glands and terminations are located as high as practicable above ground level and at a minimum of 500mm. Tenderers shall provide an outline general arrangement drawing showing the proposed location and state the height of these glands and terminations above ground level, at time of tender.

5.4.4.5.3 **Auxiliary switches** - In addition – the tolerance in the drive train to auxiliary switches shall be such that correct operation is maintained at extreme ends of tolerance.

Provision shall be made for auxiliary switches as follows:

(i) Circuit-breakers and switch-disconnectors:30 switches

(ii) Disconnectors: with electrical interlocking: 40 switches
without electrical interlocking: 30 switches

(iii) Earth switches: with electrical interlocking 30 switches
without electrical interlocking 10 switches

5.11 **Interlocking devices and padlocking facilities -** In addition - 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.

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.

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

Measures shall be taken to ensure that:

(i) attempted isolation or attempted movement of an interlock shall not trip or close the associated closed circuit breaker.

(ii) access is to be prevented to the main circuit of the circuit breaker unless it has been fully isolated and/or earthed.

(iii) electrical tripping of a circuit breaker that has been prepared for circuit earthing duty is inoperative both during closing and when closed.

It shall not be possible to return to normal service duty without cancelling the means provided to render the electrical tripping inoperative. Locking is not an acceptable method of achieving this requirement.

5.14.101 **Pollution Performance** - Tenderers shall offer equipment having pollution performance class IV (31mm / kV) according to Table 1 of IEC 60815 where this is available, otherwise equipment to Class III shall be provided. In any event Tenderers shall state which pollution class is offered

5.15.2 **Closed pressure systems for gas -** The maximum relative leakage rate shall be 1% per year maximum.

5.15.3 **Sealed pressure systems for gas** - The leakage rate shall not exceed 0.5% per year.

5.101 **Ergonomics and access** - In addition to the requirements in ENATS 41-37 clause 5.101 refer to clause 5.4.2.2 above.

5.104 **Mechanism cabinets for outdoor switchgear** - In addition to the requirements in ENATS 41-37 clause 5.104 refer to clause 5.4.2.2 above.

5.106 **Surface preparation and coatings -** In addition – surface preparation and coatings shall be suitable to provide a guaranteed life to first maintenance of at least 10 years in any part of WPD (on shore) service territory.

5.110 **Bushing terminals** - In addition - Tenderers shall advise the dimensions and material of terminal stems.

5.111 **Expected Operating Life** - In addition – Tenderers shall advise life to first inspection and maintenance interventions. This may be expressed as a curve where short circuit interruption and number of short circuit break operations are inter-related.

5.112.1 **Pressure Relief** - In addition – pressurised systems shall be provided with pressure relief devices. Such devices shall perform reliably in the service environment having regard to normal service conditions

10.102 **Manufacturers handbook** - In addition - the handbook shall describe the means by which the need for intervention maintenance, such as checking contact erosion, is determined.

13 **Commissioning Tests** - In addition – Tenderers shall state at time of tender the site commissioning tests that are proposed, which of these are undertaken by the supplier and confirmation that those costs are included within the tender.

2.2 Where equipment is provided with ratings that exceed those in the enquiry/order then these higher values shall be those applied to the equipment rating plate/s.

3.0 CIRCUIT BREAKERS FOR USE ON 66KV TO 132KV DISTRIBUTION SYSTEMS

3.1 For avoidance of doubt - The requirements set out above in respect of ENATS 41-37 Part 1 and this WPD TS also apply to circuit breakers.

3.2 Clause numbering in this section of this WPD TS relates to that in ENATS 41-37 Part 3 and applicable IEC Standard

4.101 **Rated short circuit Breaking Current (I_{sc})** - The rated dc time constant for 145kV shall be 120ms unless otherwise selected in Annex C

4.103 **Rated short-circuit making current (Isc)** - The rated short-circuit making current values shall be equal to the rated short –time withstand current values listed in Table 2 of Part 1 of ENATS 41-37 (2.7 times rated short-circuit breaking current)

4.104 **Rated Operating Sequence** – As implied by the clause in ENATS 41-37, circuit breakers shall be suitable for rapid auto-reclosing

4.111 **Electrical Endurance** – Note that circuit breakers are to be used for rapid auto-reclosing

5.6 **Stored energy closing –** A motor charged spring mechanism is sought

5.6.101 **Three pole operation** – Circuit breakers shall be arranged for three pole simultaneous operation

5.8.201 **Local manual operation** - Provision shall be made for mechanically operated local manual tripping and closing.

5.8.202 **Slow closing device** – Where facilities are provided then the necessary loose parts, handles, safety blocks etc shall be supplied – 1 set per site

5.11.101 **Mechanical key interlocking** – See also clause 5.11 in Section 2 above.

4.0 DISCONNECTORS AND EARTHING SWITCHES FOR USE ON 66kV TO 132kV DISTRIBUTION SYSTEMS

4.1 For avoidance of doubt - The requirements set out above in respect of ENATS 41-37 Part 1 and this WPD TS also apply to disconnectors and earthing switches.

4.2 The design of open-type disconnectors, earthing switches and the disconnector part of switch-disconnectors shall be such that the position of the primary contacts shall be visible at all times. Disconnectors, and earthing switches, shall be arranged for simultaneous three-phase operation.

4.3 Clause numbering in the remainder of this section of this WPD TS relates to that in ENATS 41-37 Part 4 and applicable IEC Standard

4.103 **Rated mechanical terminal load** – To meet Table 3 of BSEN 62271-102.

4.104 **Rated value of the bus-transfer current switching capability of disconnectors** – To meet Annex B of BSEN 62271-102

4.105 **Rated induced current switching of earthing switches** – Class B of Annex C of BSEN 62271-102 is required

4.106 **Rated value of mechanical endurance for disconnectors** – Class M1 is required (2000 operations)

4.107 **Rated values of electrical endurance for earth switches** – Class E2 is desired (earthing switches with the capability to withstand 5 short-circuit making operations) for earthing devices having a short circuit making capacity, otherwise Class E0 (earthing switches having no making capacity) shall be provided.

4.201 **Earthing devices having a rated short circuit making current** – For equipment with a rated dc time constant of 120ms the rated short-circuit making current shall be 2.7 times the rms value of the ac component of the rated short-time withstand current.

5.4.101 **Auxiliary switches** - See clause 5.4.4.5.3 in Section 2 of this TS.

5.5.101 **Auxiliary switches** - Any specific requirements for auxiliary switch type to Figure 4.1 of Part 4 ENATS 41-37 shall be detailed by the user and agreed in writing as part of the ordering process.

5.11.102 **Key Operated Interlocking** – see also clause 5.11 in Section 2 above.

4.4 Unless specified otherwise the default phase centres shall be

145kV – 2440mm
72.5kV – 1830mm

4.5 Terminal palms shall be Size 2 to 3.1.2 Figure 1 of ENATS 41-16. Where these cannot be provided then the Tenderer shall specify what is offered.

5.0 CURRENT AND VOLTAGE TRANSFORMERS

5.1 Whilst ENATS 41-37 does not encompass open terminal instrument transformers, this WPD TS employs the common clause requirements of ENATS 43-37 Part 1 and the requirements of section 2 of this specification, in addition to the requirements set out below. The requirements also relate to current transformers situated within a circuit breaker.

5.2 Applicable Standards – as called up elsewhere in this TS, and BS EN 60044 part 1 and 3, and BSEN 61869 parts 1, 2, 3, 4 and 5.

5.3 CURRENT TRANSFORMERS (BSEN 60044-1)

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 above compound level, at a terminal board.

Current transformer ratios and characteristics are specified within the schedules, unless they are. Where dual ratio CTs are specified the required class, accuracy and VA rating applies to both ratios, unless otherwise stated. Type test certificates shall be provided if required by the purchaser.

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

Clause numbering below relates to BS EN 60044-1.

3.1.1 **Normal service conditions –** Ambient air temperature shall be category -25/40.

3.3 **System earthing**

145kV - Solidly neutral earthed system
72.5kV - Impedance earthed neutral system

4 **Rated primary and secondary currents and accuracy classes (12).**

Irrespective of the ratio of protective CTs, the rated continuous thermal current of the CTs (I_{cth}) shall match the full current rating of the circuit breaker; or in the case of open terminal type current transformers, the full current rating of the primary conductor.

For measuring CTs the rated continuous thermal current (I_{cth}) shall be 120% of the rated primary current (I_{pr}) of the CT.

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Standard CT ratios, VA ratings and classes are as follows –

Rated System Voltage	CT Ratio	VA rating & Class
145kV	1000/1	30VA 5P20
	1000/1	Class PX
72.5kV	800/1	30VA 5P20
	800/1	Class PX

Alternative ratios may be required to match those at existing substations for unit protection schemes**.** Requirements for individual enquiries are shown on Annex C Part X

5.1.6.1 **Pollution –** For outdoor current transformers Tenderers shall offer equipment having pollution performance class IV (31.5mm / kV) according to Table 1 of IEC 60815 where this is available, otherwise equipment to Class III shall be provided. In any event Tenderers shall state which pollution class is offered.

11 **Additional requirements for measuring current transformers**

Metering current transformers shall have independent cores and secondary windings from those provided for protection purposes.

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

For rated circuit capacities up to 100 MVA, one dedicated winding for settlement metering is required.

For rated circuit capacities of more than 100 MVA two windings for metering are required:

a) Dedicated winding for Main meter
b) Check meter winding which can also be used for other purposes,

provided overall accuracy is met and the burden of the additional load is known. (The additional burden must not be changed without the approval of the Settlement System Administrator).

All metering current transformers shall be to Class 0.2S rated at 15 VA unless otherwise specified in accompanying schedules.

SUCH CURRENT TRANSFORMERS SHALL BE TESTED TO CONFIRM COMPLIANCE WITH BSEN 60044-1 BUT SHALL ALSO BE ERROR TESTED ON EACH RATIO AT 7.5 VA 0.9 POWER FACTOR LAGGING BURDEN AT 5%, 20%, 100% AND 120% TEST LOAD POINTS. THREE COPIES OF TEST CERTIFICATES SHALL BE PROVIDED, IN ADVANCE OF DELIVERY, FOR EACH METERING CURRENT TRANSFORMER

12 **Additional requirements for protective current transformers**

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.

14 **Requirements for Class PX protective current transformers**

Class PX current transformers shall comply with BS EN 60044-1 and shall provide accurate transformation up to the maximum fault current rating of the associated main plant and ensure this performance under steady state conditions without undue saturation.

The minimum knee point voltage requirement for each CT (Vk) is specified in the following table where R_{CT} is the d.c. secondary resistance of the CT and N is the associated CT ratio (i.e. N = CT primary current rating ÷ CT secondary current rating).

In addition to the knee point requirement, the magnetising current for each CT (Im) shall be less than 50mA at the CT's minimum knee point voltage.

Voltage	Circuit Breaker Short Circuit Withstand Rating	Protection Duty	Minimum Knee Point Voltage (Vk)
145kV	25kA or 31.5kA	Feeder Protection (eg Current Differential Protection or Distance Protection)	Vk > (189000+173000Rct)/N
		High Impedance Protection and Transformer Bias Differential Protection	Vk > (188000+126000Rct)/N
	40kA	Feeder Protection (eg Current Differential Protection or Distance Protection)	Vk > (220000+199000 Rct)/N
		High Impedance Protection and Transformer Bias Differential Protection	Vk > (239000+160000 Rct)/N
72.5kV	25kA or 31.5kA	Feeder Protection (eg Current Differential Protection or Distance Protection)	Vk > (136000+126000Rct)/N
		High Impedance Protection and Transformer Bias Differential Protection	Vk > (188000+126000Rct)/N
	40kA	Feeder Protection (eg Current Differential Protection or Distance Protection)	Vk > (152000+139000Rct)/N
		High Impedance Protection and Transformer Bias Differential Protection	Vk > (239000+160000Rct)/N

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5.4 VOLTAGE TRANSFORMERS (BS EN 61869)

5.4.1 Ratings

Item	Unit	Rated Voltage 72kV	Rated Voltage 145kV
Voltage factor		1.9	1.5
Time period	s	30	30
Transformation ratio	V	38106/63.5	76200/63.5
Minimum rating	VA	100.00	100.00
Accuracy class (see text below on VTs for Settlement Metering)			
Capacitor voltage transformer		Class 1/3 P	Class 1/3P
Electromagnetic voltage transformer		Class 0.5/3P	Class 0.5/3P

[Note: High accuracy metering voltage transformers shall maintain these accuracy classes and burdens in addition to providing the metering accuracy specified, usually Class 0.2 at 15 VA.]

Voltage transformers shall be single phase capacitor type to BS EN 61869-5, unless otherwise specified.

VTs shall be earthed in accordance with EE:SPEC 89 and ENA TS 41-24.

5.4.2 Voltage transformers used for settlement metering purposes

Voltage transformers used for settlement metering purposes shall be inductive type (electromagnetic) to BSEN 61869-3.

Individual test certificates shall be provided for voltage transformers used for settlement metering purposes,.

Voltage transformers used for settlement metering with circuit capacities between 10 and 100 MVA shall be to BS EN 61869-3 Class 0.5 and have two windings, either:

a) 1 dedicated winding for Main and Check metering with other burdens on the second winding, or

b) 1 dedicated winding for Main and a second for Check, which may be shared with other burdens providing overall accuracy is met. (The additional burden must not be changed without the approval of the Settlement System Administrator).

Voltage transformers used for settlement metering with circuit capacities over 100 MVA shall be to BS EN 61869-3 class 0.2 and have 2 windings for Metering:

a) Dedicated winding for Main meter

b) Check meter winding which can also be used for other purposes, provided the overall accuracy is met and the burden of the additional load is known. (The additional burden must not be changed without the approval of the Settlement System Administrator).

ALL METERING VTS SHALL BE TESTED BY THE MANUFACTURER TO CONFIRM COMPLIANCE WITH BS EN 60044-5 BUT SHALL ALSO INCLUDE ERROR TESTS ON RED/YELLOW AND YELLOW/BLUE AT 10VA 0.5 POWER FACTOR LAGGING BURDEN. THREE COPIES OF THE TEST CERTIFICATE SHALL BE PROVIDED PRIOR TO DELIVERY. For other voltage transformers type test certificates shall be provided if required by the purchaser.

5.4.3 Secondary Connections

Voltage transformer secondary fuses and links shall be contained in a separate box, so placed as to permit changing of fuses with equipment alive. Both secondary terminals shall be insulated for a 2kV withstand test. Where voltage transformers are fitted on two or three phases of a circuit, a single terminal box per circuit is required to facilitate single point earthing of secondary circuits. This shall be wired in accordance with Engineering Recommendation S15, and shall be padlockable.

The secondary windings shall be connected to the appropriate circuits through fuses and links, labelled to indicate their functions and phase colour to be marked in accordance with BS EN 60445

Separate fusing shall be provided for:

a) Main meter
b) Check meter
c) Any additional burden

These fuses must be as close as practical to the VT and must be readily accessible with the VT in service.

Both ends of all secondary windings shall be brought out through fuses and links situated in the single terminal box per circuit. (Where individual phases have been provided with their own terminal box in addition to the above single terminal box, isolation links only shall be provided.)

ANNEX A

DETAILS OF SITE AND DELIVERY TIMESCALE SOUGHT

Site address and location for delivery
Known transport access restrictions en-route to site. Whether access is entirely on made up roadway – details if applicable
Whether offloading to be included in tender
Date by which delivery to site is sought
Date by which site commissioning is sought

ANNEX B

DETAILS FOR CONTACT IN EVENT OF SPECIFICATION QUERY

Name and contact telephone number of WPD User initiating enquiry –
Contact in relation to technical queries over equipment to be offered and the gaining of WPD Approval for its purchase shall be directed to WPD Policy Team via the above WPD User.

Part 1 Common requirements – Switchgear for use on 66kV to 132kV distribution systems

Note – WPD User to select and mark options from list below subject to the requirements in 1.5 of this WPD TS. Where a WPD option is not selected, the one shown in **bold** shall apply**.**

Item	**Sub-clause of Section 2 of this WPD TS (Part 1 of ENATS 41-37)**	**WPD option required**
Class - indoor, outdoor	1.2	Outdoor
Pollution Level	2.1.2	Level III (25mm / kV) **Level IV (31mm / kV)**
Rated voltage 72.5kV/145kV	4.1	72.5kV, 145 kV
Rated frequency	4.3	50 Hz
Rated normal current a) Busbars b) Circuit-breaker	4.4	 1250, 2000**, 2500,** 3150 A 1250, 2000**, 2500,** 3150 A
Rated short-time withstand current	4.5	25**, 31.5,** 40 kA
Rated supply voltage of closing and opening devices and auxiliary and control circuits	4.8	To meet ENATS 41-37 Table 3
Rated supply frequency of closing and opening and of auxiliary circuits -	4.9	d.c
Rated d.c. time constant	4.101	45 **120 mS**

Part 3 –
Circuit Breakers for use on 66kV to 132kV distribution systems

Note – WPD User to select and mark options from list below subject to the requirements in 1.5 of this WPD TS Where a WPD option is not selected, the one shown in **bold** shall apply**.**

Item	**Sub-clause of Section 3 of this WPD TS (Part 3 of ENATS 41-37)**	**Option required**
Rated short-circuit breaking current - Equal to rated short-time withstand current	4.101	25k **31.5** 40 kA
Rated short-circuit making current	4.103	2.7 times rated short-circuit breaking current [Table 2 Part 1 ENATS 41-37]
Rated time quantities	4.109	45 **120** ms
Electrical endurance	4.111	Note that circuit breakers are to be used for rapid auto-reclosing
Local manual tripping Local manual closing	5.8.201	To be provided
Slow closing device - 1 set per site	5.8.202	**Yes*** / No
Current transformers		See Annex C Part X

Part 4 –
Disconnectors and earthing switches for use on 66kV to 132kV distribution systems

Note – WPD User to select and mark options from list below subject to the requirements in 1.5 of this WPD TS Where a WPD option is not selected, the one shown in **bold** shall apply

Item	Sub-clause of Section 4 of this WPD TS (Part 4 of ENATS 41-37)	Option required
Rated bus-transfer current switching	4.104	To meet Annex B, BS EN 62271-102
Rated induced current switching of Earthing switches	4.105	Class B of Annex C, BS EN 62271-102
Classification of mechanical operations	4.106	Class M1 [2000 operations]
Rated values of electrical endurance for earth switches having short-circuit making capability	4.107	Class E2

The combinations of Annex C requirements for disconnectors used in various roles are detailed in Schedule 1 of this WPD TS.

Notes for WPD User

- Current rating shall be matched to adjacent plant, circuit breaker, line or busbars
- Selection should allow for planned and foreseeable expansion
- Disconnectors for busbar selection at double busbar substations shall be configured so as to allow remote unattended on-load transfer of circuits across busbars
- Motors shall be fitted to all transformer disconnectors and to banked circuits or line isolators so as to enable remote restoration of the mesh corner or banked plant
- Default selections should be used for a “green-field” site build

Part X –
Instrument transformers for use on 66kV to 132kV distribution systems

Note – WPD User to select and mark options from list below subject to the requirements in 1.5 of this WPD TS. Where a WPD option is not selected, the one shown in **bold** shall apply

Current transformers to be housed within circuit breakers – see Section 5 of this TS.

Repeat table as required for each circuit breaker / state quantity of circuit breakers to which the table applies

CT ratio	Class and VA	Quantity per phase	Line side or busbar side and sequence in from termination*

- it will be necessary to CHECK with supplier to ensure that orientation with respect to location of mechanism cabinet and marking of terminals (BSEN 60044-1 cl 10) prior to manufacture. The information provided above is sufficient for the Tenderer to check CT accommodation requirements and to quote**.**

Current transformers to be provided in single phase open terminal stacks – see Section 5 of this TS

Repeat table as required for each CT stack / state quantity of CT stacks to which the table applies

CT ratio	Class and VA	Quantity per phase	sequence in from P1 termination*

Single phase voltage transformers

Rated voltage	Ratio	Windings required including use, class and VA

APPENDIX A

SUPERSEDED DOCUMENTATION

Engineering Specification EE SPEC 7-2 is superseded by this Engineering Specification and shall be withdrawn with immediate effect.

APPENDIX B

ANCILLARY DOCUMENTATION

ENA Technical Specification 41-37 Parts 1, 3 and 4 hyperlinked below. Copies of those ENATS documents are not to be copied to third parties as they are protected by Copyright. Third parties may purchase copies from Energy Networks Association – refer to website www.energynetworks.org.uk

ENATS 41-37 Part 1 Switchgear for use on 66kV to 132kV distribution systems
ENATS 41-37 Part 3 Circuit breakers for use on 66kV to 132kV distribution systems
ENATS 41-37 Part 4 Disconnectors and earthing switches for use on 66kV to 132kV distribution systems

BS EN 60044 Parts 1, 5, 6 Instrument Transformers

BS EN 60694 / IEC 60694 – Common specifications for high voltage switchgear and controlgear standards

BSEN 61869 Parts 1, 3, 5 Instrument Transformers

BSEN 62271-100 / IEC 62271-100 - High voltage switchgear and controlgear Part 100 – high voltage alternating current circuit breakers

APPENDIX C

POLICY IMPLEMENTATION

This Engineering Equipment Specification shall be applied with immediate effect.

Primary System Design Manager and 132kV and Projects Managers shall notify all staff involved in specifying, buying, installing, commissioning or maintaining 66kV and 132kV switchgear that this specification has been issued and shall be used

APPENDIX D

POLICY IMPACT

Revised to provide for introduction of a Framework Contract for substation disconnectors allowing for the selection of default specification units with options depending on site requirements.

CT ratios revised and Class PX kneepoint voltages adjusted.

Update to standards referenced.

Schedule 1 – Disconnectors and Earthing Switches for Use on 66kV and 132kV 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)**	**145** 72.5	**145** 72.5	**145** 72.5	**145** 72.5	**145** 72.5	**145** 72.5	**145** 72.5	**145** 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 *[4.104]*	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** *[4.105]*	No	No	No	No	No	No	**Yes** No	No
	***Earthing devices with a rated short-circuit making current** *[4.201]*	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.