

Electricity Specification 315

Issue 4 May 2024

Pole Mounted Auto Reclosers and Auto Sectionalisers



Amendment Summary

ISSUE NO. DATE	DESCRIPTION
<p>Issue 4</p> <p>May 2024</p>	<p>New Template Applied and Specification reviewed ready for Tendering.</p> <p>Section 5 updated to include ENA TS 41-46. ENA TS 21-26 replaced with 41-36 to cover previously approved products.</p> <p>Section 6.1 updated to include alternative gasses.</p> <p>Sections 6.11.1 and 6.15 has had ENA TS 41-36 replaced with 41-46.</p> <p>Section 6.16 has had the alternative gasses added into the title. All SF₆ references in the bullets and sub lettering has been replaced with gas to cover all gasses.</p> <p>Section 8 has had CD rom replaced with email.</p> <p>Section 12 updated to include ENA TS 41-46.</p> <p>Appendix B has had title in clause 6.16 updated.</p> <p>Prepared by: Matthew Kayes Approved by: Policy Approval Panel and signed on its behalf by Paul Turner, PAP Chairperson.</p>

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1 Scope

This Specification covers the requirements for pole mounted auto reclosers and auto sectionalisers for use on the 11kV and 6.6kV electricity distribution network operated by Electricity North West Limited, hereinafter referred to as Electricity North West. The switchgear can be controlled locally and remotely in either standalone application or as part of a distribution automation scheme.

2 Definitions

Approval	Sanction by the Electricity North West Plant Policy Manager that specified criteria have been satisfied
Contract	The agreement between Electricity North West and the Contractor for the execution of the Works including therein all documents to which reference may properly be made in order to ascertain the rights and obligations of the parties under the said agreement.
Contractor	The person or person's firm or company, including personal representatives, successors and permitted assigns, who's Tender has been accepted by Electricity North West.
ENA TS	Energy Networks Association Technical Specification.
Specification	The Specifications and schedules (if any) agreed by the parties for the purpose of the Contract.
Sub-Contractor	Any person (other than the Contractor) named in the Contract for any part of the Works or any person to whom any part of the Contract has been sub-let with the consent in writing of the Electricity North West Plant Policy Manager, and the legal representatives, successors and assigns of such person.
Supplier	Any person or person's firm or company who supplies goods to Electricity North West or to its Contractor.
Tender	An offer in writing to execute work or supply goods at a fixed price.
Tenderer	The person or person's firm or company, including personal representatives, successors and permitted assigns, invited by Electricity North West to submit a Tender.
Words	Words importing persons shall include firms and corporations; words importing the singular only, also include the plural, and vice versa where the context requires.
Work	All materials, labour and actions required to be provided or performed by the Contractor under the Contract.
Writing	Any manuscript, typewritten or printed statement under seal or hand as the case may be.
EIDMT	Extremely Inverse Definite Minimum Time. Extremely Inverse (Type C) protection relay characteristic curve as defined in BS EN60255-151:2009

IDMT	Inverse Definite Minimum Time. Standard Inverse (Type A) protection relay characteristic curve as defined in BS EN60255-151:2009
VIDMT	Very Inverse Definite Minimum Time. Very Inverse (Type B) protection relay characteristic curve as defined BS EN60255-151:2009

3 General Requirements for Approvals and Testing

3.1 Product not to be Changed

Compliance with this clause shall be in accordance with ES001.

3.2 Electricity North West Technical Approval

Compliance with this clause shall be in accordance with ES001.

3.3 Quality Assurance

Compliance with this clause shall be in accordance with ES001.

3.4 Formulation

Compliance with this clause shall be in accordance with ES001.

3.5 Identification Markings

Compliance with this clause shall be in accordance with ES001.

3.6 Minimum Life Expectancy

The minimum life expectancy of all products covered by this Specification is 40 years.

3.7 Product Conformity

Compliance with this clause shall be in accordance with ES001.

3.8 Confirmation of Conformance

The Tenderer shall complete the conformance declaration sheets in [Appendix A](#). Failure to complete these declaration sheets may result in an unacceptable bid.

4 Requirements for Type and Routine Testing

Compliance with this clause shall be in accordance with ES001.

4.1 Requirement for Type Tests at Suppliers Premises

Compliance with this clause shall be in accordance with ES001.

4.2 Requirement for Routine Tests at the Supplier’s Premises

Compliance with this clause shall be in accordance with ES001.

5 Standards and Performance Requirements

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The equipment shall comply with the requirements of ENA TS 41-46, except where varied by, or supplemented with, the requirements specified elsewhere in this specification. Equipment that complies with ENA TS 41-36 previously Approved for use in Electricity North West will also be considered.

It shall be designed for minimum maintenance and it shall be possible to connect and disconnect it using “Live Line” techniques. Demonstration of compliance with these requirements shall be given by the Tenderer upon request.

Preference will be given to units offering extended maintenance free periods of service; the supplier shall state the capability of the equipment in terms of the maximum allowable fault operations before maintenance.

In the evaluation of Tenders full regard will be taken of lifetime costs.

5.1 Variations

Any innovative features which are a departure from the specification but will assist in the improvement of the reliability of supplies to customers and/or the reduction in operating costs shall be brought to the attention of Electricity North West at the time of Tender or at anytime within the period of the Contract

The Tenderer shall complete the conformance declaration sheet in [Appendix B](#).

5.2 Equipment Ratings

Table 1: Equipment Ratings

	VOLTAGE	NORMAL CURRENT	SHORT CIRCUIT CURRENT
Auto Recloser	12 or 7.2 kV	400 A	12 kA at 12 kV preferred
Auto Sectionaliser	12 or 7.2 kV	400 A	12 kA at 12 kV preferred

5.3 Operating Temperature Range

All equipment shall be capable of operating within the temperature range -30°C to +50°C.

6 Technical Requirements

6.1 Arc Interruption Medium

The arc interruption medium shall be non-oil. In the case of SF₆ or alternative gas filled equipment, means shall be provided for monitoring the gas pressure and for topping up. Low Gas Pressure warning and monitoring devices shall be fitted, with failure announced locally and remotely. Local Gas Pressure monitoring should ideally be from ground level to remove the need for climbing to confirm gas levels. The use on

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Bluetooth is considered acceptable. Full monitoring details and methods used shall be submitted with the Tender. The maximum and minimum permissible gas pressure values shall be permanently marked, for example as absolute pressure values in PSI or N/m² or as red and green zones on a Bourdon tube gauge.

Low pressure lockout facilities shall be provided, unless the gas is used solely for insulation purposes and the equipment has been tested for satisfactory operation with the gas at atmospheric pressure.

6.2 Mounting

Equipment shall be supplied complete with bracket(s) and fixing(s) for mounting on single wood poles. The mounting bracket shall be supplied with two 22mm diameter holes vertically spaced on 280mm centres. Other forms of mounting brackets may be acceptable, subject to approval by Electricity North West.

At the time of Tendering, information shall be provided on the method of transportation including lifting, handling, mounting upon and removal from the pole. These shall comprise method statements, a certificate covering the testing of lifting attachments and general safety guidance. If a transportation carriage is required, the fact shall be stated and a price quoted in the pricing schedule.

6.3 Batteries

The secondary batteries for the operating mechanisms and the control/protection systems may be separate or combined.

The power source for the charging device may be derived from the network through Voltage Transformers (VTs), from solar cells or exceptionally from a local 400/230V, 50Hz supply network. However, equipment using this last source will be precluded from selection for certain locations.

The operational lifetime of secondary batteries shall be at least 10 years. The capacity of the secondary batteries shall be such that the equipment remains fully functional for at least two weeks, even if the charging devices should fail. The test duty cycle for this two week period shall be: quiescent for 336 hours, followed by OPEN-3s-CLOSE-3s-OPEN-3s-CLOSE.

Charger fail warning and battery monitoring devices shall be fitted, with failure announced locally and remotely.

Information covering battery handling, maintenance and exchange together with guidance on the disposal of batteries shall be included in the Tender documents. Preference will be given to units allowing batteries to be changed without the need to de-energise the primary switches. Disconnection of the batteries for maintenance or replacement shall not cause loss of stored data.

6.4 Mechanism

Facilities shall be provided for both local and remote operation by means of stored energy. Electrical operation of the operating mechanism's motors or solenoids shall be provided.

The power supplies to the mechanisms shall be independent of the presence of a high voltage supply to the units.

Initiation of the operating mechanisms shall be either local manual, remote or by the action of the local protection system.

6.5 Operational Safety Padlocking

The equipment shall be lockable, by means of a safety padlock, to prevent operation, whether it be in the OPEN or CLOSED position. Exceptionally and subject to the approval of Electricity North West, this may be achieved by the removal of a link or coupling. If this is the case, facilities shall be provided to store the links or couplings within the control cabinet.

The power supply to the prime movers of the actuators shall be provided through lockable switches or removable fuse and link arrangements, providing double pole isolation.

6.6 Voltage Gradient and Protection from System Overvoltages

The supplier shall state the requirements for system voltage grading to ensure satisfactory operation of the equipment and its overvoltage protection devices.

The equipment shall allow for the fitting of surge arresters to both the supply and controlled side terminals. The particular surge arresters to be used shall be approved by Electricity North West.

6.7 Current Transformers

The Current Transformers (CTs) shall be of ratio 200/1, complying with BS EN 61869-1:2009 and BS EN 61869-2:2012 and the CT shall have a continuous thermal rating to match the normal current rating of the recloser. The CTs shall be suitable for operation throughout the loading range. If multiple ratio CTs are offered the ratio selected will be 200/1 A unless specified otherwise. The CT shall have a short time rating to match the fault rating of the recloser. All ratings shall be marked on a rating plate.

6.8 Protection

The protection settings shall include the following ranges:-

Table 2: Protection Ranges and Available Settings

CONDITION		RANGE
IDMT	Phase fault	20 – 200% (minimum) in 20% steps.
	Earth fault	10 – 80% (minimum) in 10% steps.
	Sensitive Earth fault	1 –15% in 1% steps with added time delay option from 0 to 180 s.
Instantaneous	Phase fault	100 to 300% of minimum trip in steps of 10% 300 to 2000% of minimum trip in steps of 100%
	Earth fault	As Phase fault setting.

Sequence co-ordination with downstream devices must be provided

Table 3: Requirements for Protection Characteristics

CHARACTERISTIC CURVES	REQUIREMENT
IDMT	To be provided in all cases, with available settings as Table 2 .
Instantaneous	To be provided in all cases, with available settings as Table 2 .
VIDMT	Optional.
EIDMT	Optional.
Time multipliers	0.1 to 0.5 in steps of 0.025, 0.5 to 2 in steps of 0.1, additional definite delay time to be stated.

Any setting curve is to be selectable for every trip, with individual trip settings and variable dead time on each trip.

6.9 Controls

In this section LOCAL means from control cabinet mounted on the pole, REMOTE means via a Telecontrol/SCADA system.

Preferably, remote operation and indication shall be implemented by means of an additional module(s) forming an upgrade option that may be installed either at the time of initial purchase of the equipment or at a later date. If this is the case, the quotation shall include equipment with and without remote control and indication module(s) together with quotations for the supply only and supply, installation and commissioning of the control and indication module(s) at a later date.

If remote operation and indication is implemented, this will be the normal operational mode. However, controls shall be provided on the equipment, allowing local operation to be enabled and remote operation disabled.

Table 4: Local and Remote Operational Requirements

	AUTO RECLOSERS	AUTO SECTIONALISERS
Local operation shall include:	<ul style="list-style-type: none"> • CLOSE • OPEN • Auto recloser OPERATIONAL / NOT OPERATIONAL • Earth Fault protection OPERATIONAL / NOT OPERATIONAL • Sensitive Earth Fault protection OPERATIONAL / NOT OPERATIONAL 	<ul style="list-style-type: none"> • CLOSE • OPEN • Auto sectionaliser OPERATIONAL / NOT OPERATIONAL • Auto sectionaliser CLOSE and LOCK IN

	<ul style="list-style-type: none"> Adjust protection sequence for Live Line working, that is, one instantaneous trip without a reclose Protection ENABLED / DISABLED (CB CLOSE and LOCK IN) Control LOCAL / REMOTE CB OPEN and LOCK OUT 	<ul style="list-style-type: none"> Auto sectionaliser OPEN and LOCK OUT Control LOCAL / REMOTE
Remote operation shall include:	<ul style="list-style-type: none"> CLOSE OPEN Auto recloser OPERATIONAL / NOT OPERATIONAL Earth Fault protection OPERATIONAL / NOT OPERATIONAL Sensitive Earth Fault protection OPERATIONAL / NOT OPERATIONAL Adjust protection sequence for Live Line working, that is, one instantaneous trip without a reclose Protection ENABLED / DISABLED 	<ul style="list-style-type: none"> CLOSE OPEN Auto sectionaliser OPERATIONAL / NOT OPERATIONAL Auto sectionaliser CLOSE and LOCK IN Auto sectionaliser OPEN and LOCK OUT

Both local and remote indications shall be provided to announce the successful changes of state associated with the control operations described above and in addition for auto reclosers only:

- Auto recloser TRIP
- Sensitive earth fault TRIP

6.10 Protection and Control Facilities

The uploading and downloading of information from the protection and control equipment shall be achievable from both a local operator interface and by a remote connection facility. The connection to the remote facility shall preferably be of serial format via a USB port. The methods of retrieval provided shall be stated at the time of Tender i.e. hand held data logger or LED display etc. Details of the protocol used for remote data transfer shall be provided at the time of delivery together with a licence, at no extra cost, allowing Electricity North West unrestricted use of the protocol for use in the future, in conjunction with its Network Management Systems.

The following information shall be available from the protection and control equipment.

Local:

- Number of recloser or sectionaliser operations completed since installation
- Fault current magnitudes and duration, for each phase, for at least the last 25 recloser or sectionaliser operations.
- Present load current
- Operation (OPEN or CLOSE)

- Protection Settings (Auto reclosers only)
- Select individual protection feature, for example SEF (Auto reclosers only)
- Maximum demand within the past 12 months
- Contact wear on all three phases
- Battery condition indication

Remote:

- Indication of status (OPEN or CLOSED)
- Indication of Current and Voltage (three digits for current and five digits for voltage)
- Operation (OPEN or CLOSE)
- Protection Settings (Auto reclosers only)
- Indication of battery status
- Select individual protection feature, for example SEF (Auto reclosers only)

Where the optional remote operation and indication module(s) are fitted, protection and control data shall also be transferable to and from suitable modules, which shall be subject to a separate contract. The Tender shall specify the details of any limitations applicable to this arrangement.

6.11 Pole Mounted Control Cubicles

Where equipment is fitted with a local control cubicle, the cubicle shall comply with the following requirements.

6.11.1 Design and Construction

Control cubicles and doors shall be robustly fabricated from stainless steel of minimum 18/8 quality, at least 1.22mm (18 S.W.G.) thick. Cubicles shall be fitted with two strong stainless steel brackets with two 22mm diameter holes vertically spaced on 175mm centres for pole mounting. Double skinned ventilated carcass construction is preferred.

Protection shall be provided to at least IP65 of BS EN 60529. Doors shall be capable of locking in accordance with ENA TS 41-46.

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6.11.2 Provisions for Electricity North West Communications Modules

Cubicles shall provide adequate space for a Remote Telemetry Unit (RTU), batteries and communications modules.

6.11.3 Earthing

Provision shall be made for the connection of earth lugs with 12mm diameter holes (one earth lug per cubicle).

6.12 Remote Control

To effect operation by telecontrol the protection and control unit shall interface with suitable communication equipments, to be specified and provided under a separate contract. The Tenderer shall provide details of any limitations which may apply to this arrangement.

6.13 Umbilical Cables

The preferred length(s) for the umbilical cable are 4m and 6m.

It may be necessary to call for special lengths of umbilical cable. Tenderers shall specify in the pricing schedule the price per metre for these cables.

6.14 Terminations

Each bushing shall be provided with an M12 stud, standard nut, two flat washers and one lock washer.

The arrangement of the supply side and controlled side bushings and terminals shall facilitate the connection and disconnection of jumpers by "Live Line" techniques, without the need for jumper cutting. A demonstration of the means by which this requirement is met shall be provided.

6.15 Electromagnetic Compatibility

Equipment (including control and communication systems) shall comply with ENA TS 41-46. Calibration certificates shall be provided.

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6.16 Handling of SF₆ and Alternative Gasses including Decontamination Procedures

In certain situations it will be necessary to access enclosures where Sulphur Hexafluoride (SF₆) or alternative gasses have been used for insulation and/or arc extinction e.g.

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- switchgear modification to correct manufacturing or material defect
- examination following failure
- examination following leak of any gas used
- maintenance
- disposal of switchgear at end of life

Whilst Electricity North West has a procedure for safe decontamination of enclosures containing gasses it is not envisaged that Electricity North West will undertake such work except in an emergency. The original equipment manufacturer, its successor or a suitable contractor, will be expected to assist as necessary in any such work and consequent actions. The supplier shall describe how it intends to discharge this obligation.

When the equipment reaches the end of its working life it will have to be decontaminated and disposed of safely. It is important that this is considered in the design of the equipment. Tenderers shall include a detailed procedure by which each type of switchgear offered under this Tender may be safely de-gassed and decontaminated prior to disposal at the end of its life. This applies to enclosures that have contained any gas as an insulator as well as those where the gas has been used as an arc interrupting medium.

It is a requirement of this Specification that Tenderers shall have procedures and safe working practices in place to:

- (a) Decontaminate the equipment and site as necessary and recover switchgear for examination/disposal as required.
- (b) Decontaminate the equipment on site or elsewhere, as required to carry out modifications
- (c) Decontaminate the equipment prior to removal

Tenderers shall provide the following information: -

- (a) Mass of gas in kg for each type and variant of switchgear offered.
- (b) Details of procedures for handling new and contaminated gas(es).
- (c) Details of procedures for decontaminating failed gas(es) equipment and the associated sites/substations.
- (d) Details of procedures for decontaminating gas equipment prior to carrying out modifications.
- (e) Details of the procedure by which each type of switchgear offered under this Tender may be safely de-gassed and decontaminated prior to disposal as the end of its life and disposed of in accordance with current waste transfer and disposal directives. This shall cover enclosures (a) where any gas is used as an insulator and (b) where any gas is used as an arc interrupting medium.

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7 Technical Support and Training

The supplier shall provide technical support and a source of spares over the lifetime of the equipment, including such upgrades to the application and operating systems software as may become available. If an annual charge is required for this service it shall be stated in the Tender document.

The training requirements relating to system configuration, commissioning, ongoing support and system development shall be provided with the Tender documents.

If the switchgear is of a type not previously supplied to Electricity North West, one unit will be required to be delivered to the Electricity North West Training Centre, free of charge, for the purposes of training. The Tenderer will also be required to provide training for Electricity North West instructors on the installation and operation of the unit.

8 Drawings and Maintenance Instructions

General arrangement drawings shall be submitted with the Tender, to a scale and level of detail that will allow a technical assessment to be made.

A copy of all installation, operation and maintenance manuals shall be submitted with the Tender. These manuals shall, preferably, be via email in Adobe Acrobat (pdf) format. The maintenance manual shall include recommended schedules of maintenance. The supplier shall also provide details of field support including priced options for “full supplier maintenance” and “second line supplier maintenance”.

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9 Disposal of Switchgear and/or its Components

Tenderers shall provide details on how to dispose of the switchgear and/or its components to ensure compliance with the various waste management regulations [Environmental Protection Act 1990 (Part II); Special Waste Regulations 1996; Waste Management Licensing Regulations 1994; Control of Pollution (Amendment) Act 1989; Waste Electrical and Electronic Equipment (WEEE) Regulations 2006]

10 Manual Handling

Tenderers shall supply a Risk Assessment on the manual handling required for installation and operation of the switchgear.

11 Failure, Modes, Effect and Cause Analysis (FMECA)

Tenderers shall carry out a FMECA or equivalent study for each type of equipment offered. A copy of this study shall be provided with the Tender documents.

12 Documents Referenced

DOCUMENTS REFERENCED	
Health and Safety at Work Act 1974	
Control of Substances Hazardous to Health Regulations 2002	
Manual Handling Operations Regulations 1992	
Environmental Protection Act 1990	
Special Waste Regulations 1996	
Waste Management Licensing Regulations 1994	
Control of Pollution (Amendment) Act 1989	

Waste Electrical and Electronic Equipment (WEEE) Regulations 2006	
BS EN60255-151:2009	Measuring relays and protection equipment. Functional requirements for over/under current protection
BS EN ISO 14001	Environmental management systems. Requirements with guidance for use
BS EN 61869-2:2012	Instrument transformers. Additional requirements for current transformers
BS EN 60529	Specification for Degrees of Protection Provided by Enclosures (IP code)
ISO 9000	Quality Systems - Guide to Dependability Programme Management
ENA TS 41-36	Distribution Switchgear for service up to 36kV (cable and overhead conductor connected)
ENA TS 41-46	Pole Mounted Circuit-breakers & Metal Enclosed Disconnectors

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13 Keywords

Automation; Plant; Overhead; Network; Protection; Switchgear

Appendix A

A1 Schedule A – List of Sub-Contractors

(to be completed by tenderer)

NAME OF SUB-CONTRACTOR	ITEM TO BE SUPPLIED

Name of Tenderer: _____

A2 Schedule B – Technical Schedule

(to be completed by the Tenderer)

- (a) State Notice of Conformity or Approval Notice/Reports Nos. held for the equipment
- (b) What evidence is available to show the equipment is suitable for use on a 21.9kA system?

Appendix B – Conformance Declaration

SECTION-BY-SECTION CONFORMANCE WITH SPECIFICATION

The Tenderer shall declare conformance or otherwise for each product/service or range of products/services, section-by-section, using the following Conformance Declaration Codes.

Conformance Declaration Codes:

N/A =	Clause is not applicable/appropriate to the product/service.
C1 =	The product/service conforms fully with the requirements of this clause.
C2 =	The product/service conforms partially with the requirements of this clause.
C3 =	The product/service does not conform to the requirements of this clause.
C4 =	The product/service does not currently conform to the requirements of this clause, but the manufacturer proposes to modify and test the product in order to conform.

Manufacturer:

Product/Service Description:

Product/Service Reference:

Name:

Company:

Signature:

SECTION-BY-SECTION CONFORMANCE

Section	Section Topic	Conformance Declaration Code	Remarks * (must be completed if code is not C1)
3.1	Product not to be Changed		
3.2	Electricity North West Technical Approval		
3.3	Quality Assurance		
3.4	Formulation		
3.5	Identification Markings		
3.6	Minimum Life Expectancy		
3.7	Manufacturers Already Approved		
3.8	Product Conformity		
4.1	Requirements for Type Tests at the Supplier's Premises		
4.2	Requirement for Routine Tests at the Supplier's Premises		
4.3	Requirement for On Site Tests		
5	Standards and Performance Requirements		
5.1	Variations		
5.2	Equipment Ratings		

5.3	Operating Temperature Range		
6.1	Arc Interruption Medium		
6.2	Mounting		
6.3	Batteries		
6.4	Mechanism		
6.5	Operational Safety Padlocking		
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6.7	Current Transformers		
6.8	Protection		
6.9	Controls		
6.10	Protection and Control Facilities		
6.11	Pole Mounted Control Cubicles		
6.11.1	Design and Construction		
6.11.2	Provisions for Electricity North West Communications Modules		
6.11.3	Earthing		
6.12	Remote Control		
6.13	Umbilical Cables		

6.14	Terminations		
6.15	Electromagnetic Compatibility		
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Schedule A	List of Sub-Contractors		
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Additional Notes: