NPS/003/006 – Technical Specification for Primary 11kV & 20kV Switchgear

1. Purpose

The purpose of this document is to specify the technical requirements for Primary 11 and 20kV switchgear utilised in ground mounted substations on the Northern Powergrid distribution network.

This specification seeks to be functional and to clarify, or vary, existing national specifications and requirements only where necessary.

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

Reference	Version	Date	Title
NPS/003/006	4.0	Jan 2017	Technical Specification for Primary 11 & 20kV Switchgear

2. Scope

This specification includes indoor cable connected primary 11kV & 20kV switchgear, and associated switchgear-mounted protection, control and metering components.

It requires suppliers to provide periodic inspection and maintenance information.

It will also be necessary to consider and include any project specific requirements as detailed in Appendix 10, Addendum to Supplier Requirements.

The following appendices form part of this technical specification:

- Appendix 1 - Technical Schedules Summary Sheet
- Appendix 2 - Routine Testing and Commissioning Testing
- Appendix 3 - Self Certification Conformance Declaration against ENA TS 41-36 requirements
- Appendix 4 - Self Certification Conformance Declaration against ENA TS 41-40 requirements
- Appendix 5 - Self Certification Conformance Declaration against ENA TS 48-05 requirements
- Appendix 6 - Self Certification Conformance Declaration against ENA TS 48-6-6 requirements
- Appendix 7 - Self Certification Conformance Declaration against NPS/003/006 requirements
- Appendix 8 - Protection, Secondary Wiring and Metering Requirements
- Appendix 9 - Technical Summary Information Details
- Appendix 10 - Pre-Commission Testing, Routine Inspection and Maintenance Requirements
- Appendix 11 - Addendum to Supplier Requirements, including Logistics Requirements
- Appendix 12 - Technical Information Check List

2.1. Table of Contents

Contents

3. Technical Requirements

3.1. Compliance with Other Specifications and Standards

Technical documents referenced within this specification refer to the latest versions of the relevant International Standards, British Standard Specifications and all relevant Energy Networks Association Technical Specifications (ENA TS) current at the time of supply.

3.2. Overall

The switchgear shall comply fully with, and meet all the requirements of, the current version of , Issue 3 2012 of "ENATS41-36 – Distribution Switchgear for Service Up to 36kV (Cable and Overhead Conductor Connected)", or in the process of certification to, "ENATS 41-40 Ground Mounted Major Substation 12 to 36kV Rated Indoor Fixed Pattern Switchgear)", except where varied by this specification.

The circuit breakers will preferably have been assessed by the ENA Switchgear Assessment Panel and have been awarded an ENA Notice of Conformity. Products that do not have an ENA Notice of Conformance that are judged to be technically acceptable shall undergo an equivalent assessment process undertaken by Northern Powergrid.

3.3. Environment and Suitability for Use

Switchgear is required for use in an indoor environment.

3.4. Remote Control

All primary circuits on all switchgear types shall be supplied equipped with the capability of being remotely controlled and operated. Details of the required available relay connections, interposing relay requirements and other signal cable requirements are given in Appendix 7.

Manually operated circuit breakers shall have the capability for Remote TRIP and CLOSE. Switch disconnectors shall have the option to be supplied with the capability for Remote OPEN and CLOSE.

Manually operated switch disconnectors shall be supplied equipped with all necessary internal wiring and connections to facilitate the future installation of an actuator mechanism.

3.5. Protection

All panels shall be supplied equipped with a protection system as detailed in Appendix 7.

3.5.1. Relays

Relays shall preferably have been successfully assessed by the Protection Assessment Panel of the Energy Networks Association, against ENA TS-48-5 and ENA TS 48-6-6, but shall, at least be able to demonstrate type tested compliance with ENA TS-48-5 and ENA TS 48-6-6.

All relays shall comply fully with the requirements of IEC 60255. Specific features and requirements are provided in Appendix 7. As a minimum, they shall provide the following features:

a) 110V DC powered operation.

b) Easily re-settable, without the use of special tools, or IT equipment.

c) Unambiguous, visual indication of operation

d) The relay and this indication shall be capable of remaining indefinitely in the operated state.

3.6. Testing

Northern Powergrid policies and procedures require switchgear to be over-voltage tested in accordance with the Northern Powergrid Operational Practice Manual. The test voltages appropriate to this equipment are specified in Table WE.1 in section WE TESTING; a copy of this table is included as Appendix 2.

The switchgear shall be designed and manufactured to allow these test voltages to be applied to associated cables and/or plant whilst these are connected to the switchgear, without any degradation in performance to the switchgear.

Where VTs are installed for metering or protection purposes it shall be possible to easily isolate the VTs from the switchgear primary circuit, to allow testing of the switchgear, any connected cables and/or plant without applying over voltage to the VTs.

Access to the protection CT secondary wiring terminals shall be provided to allow secondary injection testing to be carried out.

Northern Powergrid requires manufacturers to carry out a number of additional pre-commissioning checks on the equipment prior to its final despatch. These tests are detailed in Appendix 2.

3.7. Variances from and Clarifications of ENATS 41-36 Issue 3 2012 and ENATS 41-40 Issue 1 2019

The following are intended to highlight, or are additional requirements to ENA TS 41-36 and 41-40, therefore the Clause numbers in this section that relate to ENA TS 14-36 and 41-40 are represented in italics with the applicable ENATS clause being explicitly stated:

ENATS 41-36 1.2 Normal and special service conditions

1.2.1.2 The switchgear and control gear will be used in an indoor environment.

ENATS 41-36 1.4 Ratings / ENATS 41-40 5 Ratings

1.4.1- Rated Voltage

- For switchgear for use on the 11kV networks shall be 12kV

- For switchgear for use on the 20kV network shall be 24kV

1.4.2.1 Table 1.1 Normal Rated Insulation Levels / 5.3 Table 1

For BOTH 12kV and 24kV switchgear the higher values of Rated Lightning Impulse Withstand Voltage (Up) shall be applied;

- 95kV (peak value) shall be the minimum @ 12kV.
- 125kV (peak value) shall be the minimum @ 24kV.

1.4.4.1 Table 1.3 Rated Normal Current (I_r) / 5.5 Rated continuous current (I_r) [BS EN 62271-1] ;

Busbars shall as shown in Appendix 1 or in Appendix 7 of this document.

1.4.5 Table 1.3 Rated Short-Time Withstand Current (I_k) / 5.6 Rated short-time withstand current (I_k) [BS EN 62271-1]:

Shall be as specified in clause 5.300.101 below.

1.4.8 Rated Supply Voltage of Closing and Opening Devices and of Auxiliary and Control Circuits (U_a) / 5.9 Rated supply voltage of auxiliary and control circuits (U_a) [BS EN 62271-1]

Voltage limits shall be as specified in ENA TS 50-18 Part 6.

- Closing & Tripping: Shall be 110V DC nominal

- Indication: Shall be 110V AC nominal.

- SCADA/telecontrol/supervisory: Shall be 24V DC nominal.

- Spring charge Shall be 110V DC nominal.

ENATS 41-36 - 1.5 Design and construction / ENATS 41-40 – 6 Design and construction [BS EN 62271-1]

1.5.0.3.2 Ground mounted equipment - cable connected

Representative diagrams of the equipment, shall be provided by the manufacturer, as illustrated in: 1.5.0.3.2.1 Equipment incorporating fixed switching devices (Groups F & G) and 1.5.0.3.2.2 Equipment incorporating withdrawable switching devices (circuit breakers)

1.5.0.4.1 - Requirements for devices – General / 6.103.203.1 Requirements for combinations of switching devices - General

1.5.0.4.4 Facilities for testing primary circuits and busbars / 6.103.203.3 Facilities for earthing circuits and busbars

& 1.5.0.4.5.1 Facilities for checking and testing - Testing via primary circuits / 6.103.203.7 Testing via primary circuits

&1.5.105 Provisions for dielectric tests on cables/ Annex A A.1 & 1.5.202 Test devices / 6.12.201.4 Test devices

Particular attention must be paid to ensure that the insertion, removal or replacement of any components (e.g. test bushings, separable connector blanking plugs, etc.) required as part of the procedures to facilitate testing activities can be carried out in an ergonomically acceptable manner.

Manufacturers shall provide detailed instructions on how this can be achieved.

1.5.0.4.5.1 Facilities for checking and testing - Testing via primary circuits / 6.103.203.7 Facilities for checking and testing - Testing via primary circuits

The option for a VPIS, or VDS, system for phase comparison shall be provided on all switchgear primary circuits, regardless of whether the switchgear is fixed pattern, or withdrawable.

1.5.0.4.7 Facilities for checking voltage and phase identification / 6.103.203.10 Facilities for checking voltage and phase identification

This system shall be capable of withstanding; or be suitably protected from the TEST voltages that will be applied prior to commissioning as detailed in clause 3.6 and Appendix 2 of this specification.

1.5.1 Requirements for Liquids / 6.1 Requirements for liquids in switchgear and controlgear [BS EN 62271-1]

Oil filled switchgear and Metering Units shall not be acceptable.

1.5.2 Requirements for Gases in Switchgear and Controlgear / 6.2 Requirements for gases in switchgear and controlgear [BS EN 62271-1]

The manufacturer shall state under what circumstances gas ‘topping up’ OR sampling can be carried out with the switchgear live and shall provide instructions for carrying out this operation.

1.5.0.5.2 Force for operation / 6.8 Manually operated actuators [BS EN 62271-1]

Where the force required to manually operate a dependant manual device is within 10% of the upper limit of 250 N, then an option shall be made available for the device to be converted to independent manual or independent power operation.

1.5.8 Operation of Releases / 6.9 Operation of releases [BS EN 62271-1]

All switchgear utilised for controlling metered HV supplies shall be provided with facilities for accepting remote signals for emergency tripping.

1.5.13.2 Protection against Ingress of Water.

Switchgear and controlgear shall be certified to at least IPX1, and preferably to IPX2, to protect against damage from water ingress into the substation.

This requirement does not apply when the switchgear is in the state required to allow normal operations, i.e. when the switchgear enclosure/shutters are opened to perform the normal operation.

1.5.101 Internal Fault / 6.101Internal arc fault [BS EN 62271-200]

Options for avoiding, or restricting, the venting of arc products into the substation building shall be provided; e.g. ducting to divert arc products out of the building, arc quenchers/filters, etc.

1.5.103.1.101 Cable Compartments/6.103.1.201 Connection Compartments

Northern Powergrid utilises the following cable combinations shown in the table below on its HV system. The cable combination for different switchgear ratings assume that the cable is laid direct.

CB Current Rating	2500A	2000A	1250A[1]	800A[2]	630A
Application[3] (EHV/HV & 132kV/HV)	Transformer CB / Bus-Section CB	Transformer CB / Bus-Section CB	Transformer CB/ Bus-Section CB, Interconnector CB & HV Feeder CB	Transformer CB & HV Feeder CB	HV Feeder CB only
11kV	4 x 3 x 1c x 630mm^2 Cu Stranded (20/40MVA transformer)	2 x 3 x 1c x 500mm^2 Cu stranded (12/24MVA transformer) or 3 x 3 x 1c x 500mm^2 Cu stranded (15/30MVA transformer) or 3 x 3 x 1c 630mm^2 Cu Stranded (20/40MVA transformer)	1 x 3 x 1c x 400mm^2 Cu stranded (HV Interconnector)	2 x 3 x 1c x 300mm^2 solid Al core or *1 x 3 x 1c x 630mm^2 Cu stranded	1 x 3 x 1c x 240mm^2 solid Al core or 1 x 3 x 1c x 300mm^2 solid Al core or 1 x 3 x 1c x 400mm^2 Cu stranded
20kV	--- X ---	--- X ---	2 x 3 x 1c x 400mm^2 Cu stranded (12/24MVA, 15/30MVA & 20/40MVA transformer) or 1 x 3 x 1c x 800mm^2 Cu stranded (12/24MVA, & 15/30MVA transformer)	2 x 3 x 1c x 400mm^2 Cu copper	1 x 3 x 1c x 185mm^2 solid Al core or 1 x 3 x 1c x 400mm^2 Cu stranded

* Northern Powergrid has a strong preference against using 630mm^2 Cu and 800mm^2 cable because of the ergonomic difficulties associated with manipulating short lengths of this cable, particularly inside a cable box.

Northern Powergrid has a preference for equipment with outer cone separable connectors for the termination of HV cables onto the switchgear and for interface type “C” up to and including 1250A and interface type “F” for up to and including 2500A according to EN 50181.

[1] The EHV/20kV substation is limited to 1250A switchboard.

[2] This type of switchgear is applicable to legacy sites only.

[3] Northern Powergrid uses a wide range of primary switchgear based on current and voltage for the protection of primary transformers, bus-section, and circuits.

In any case; terminations shall comply with Northern Powergrid technical specifications:

NPS/002/015 - Technical Specification for 11kV and 20kV Cable Joints and Terminations.

A split gland plate shall be supplied, equipped with suitable cable entry holes (located to allow the cables to remain vertical l throughout their run) and heat-shrink cable entry seals type CES5, or equivalent.

Northern Powergrid has a preference for switch panels equipped with cable support clamps (in addition to the heat-shrink cable entry seals) suitable for accommodating the range of 11 & 20kV cables detailed in Northern Powergrid network product specification NPS/002/020 - Technical Specification for 11 & 20kV Power Cables.

Conductors, such as separable connectors and external busbars that are not surrounded by a continuous metallic earth screen shall be protected by an earthed metal enclosure that:

- Provides a minimum IP rating of IP21B in accordance with IEC 60529.
- For the purposes of this test the unscreened insulation is to be classed as a hazardous part that requires 20mm clearance from the end of the IP21B test probe;
- Provides 5J protection to level IK 08 in accordance with IEC62262.
- During the course of testing the enclosure shall be mounted on a surface representative of the switchgear on which it will be used in service. It shall be fixed to this surface using production fixings and methods that will be used with the switchgear and enclosures as supplied to Northern Powergrid. The pass criterion is maintenance of the IP21B provision;
- Is designed and manufactured to prevent the development of a microclimate inside this housing.
- Provides the same, environmental performance characteristics and longevity as the switchgear it is associated with and is of a similar colour/physical appearance.

1.5.201 Test access covers including shutters / 6.12.201.3 Test access

The equipment shall also be designed and constructed to allow compliance with EU and UK legislation on Work at Heights.

1.5.102.203 Transformer Mounting:

Is not applicable.

ENATS 41-36 1.7 Routine Tests / ENATS 41-40 8 Routine Tests

Northern Powergrid will NOT accept any completed panels without evidence of Partial Discharge tests having been performed and discharge levels proven to be within acceptable limits as stipulated.

ENATS 41-36 1.10 Rules for Transport, Storage, Installation, Operation, Maintenance and Disposal / ENATS 41/40 11 Transport, storage, installation, operating instructions and maintenance [BS EN 62271-1]

The installation, testing, commissioning, operating, maintaining and removal procedures for the switchgear shall take into account the requirements of UK safety legislation and requirements, including legislation governing working at heights. Manufacturers shall demonstrate compliance with all of these.

The switchgear must be able to be installed in existing substations or third party buildings which preclude the use of mechanical lifting devices. It shall be possible to manually move and locate the switchgear in a safe and ergonomically acceptable manner. Manufacturers shall provide detailed instructions on how this can be achieved.

2 ADDITIONAL CLAUSES FOR METAL-ENCLOSED CIRCUIT-BREAKERS

2.4 Ratings

All Circuit Breakers shall be rated for 'line-charging breaking current'

(ENATS 41-36) 2.4.101 Rated short-circuit breaking current (Isc) / (ENATS 41-40) 5.300.101 Rated short-circuit breaking current (I_{sc}) [BS EN 62271-100]

12kV rated units shall have current ratings of at least 25kA @ time constant 45 ms (X/R ratio of 14.14) or 16kA at 120ms (X/R ratio of 37.7).

24kV rated units shall have current ratings of at least 20kA @ time constant 45 ms (X/R ratio of 14.14) or 12.5kA at 120ms. (X/R ratio of 37.7).

2.4.103 Rated Short-Circuit Making Current / 5.300.103 Rated short-circuit making current (Ima) [BS EN 62271-100]

The rated short circuit making current shall be 2.5 times the r.m.s. value of the rated short-circuit breaking current.

2.4.104 Rated operating sequence /5.300.104 Rated operating sequence [BS EN 62271-100]

Feeder circuit breakers shall be rated for auto re-close duty and shall have a rated operating sequence of O – 0.3s – CO – 10s – CO.

2.5.8 Operation of Releases / 6.9.300 Operation of Releases – Circuit Breaker [BS EN 62271-100]

Options shall be provided for supplying switch panels equipped with an electrically connected, plug-in, hard wired, remote control arrangement, which shall allow the operator on site the option to plug the arrangement into the panel to be operated and then stand 25m from the switchboard whilst
(a) opening or closing the circuit breaker only

(b) opening or closing the circuit breaker and/or motorised disconnectors.

The operating voltage of this device shall be as low as practicable, but in any case the maximum nominal voltage shall be 110V. Where the voltage is 55V to earth, or greater, the lanyard and control unit shall be double insulated.

The arrangement shall utilise the control supplies within the switchpanel, i.e. shall not require any additional batteries or power source.

The operator end of the arrangement shall provide position indication of the circuit breaker and disconnector of the switch panel to be operated.

The switchgear end of the arrangement shall, when the remote control device is not plugged in, be protected to IP6X in accordance with IEC 60529.

The arrangement shall be designed, tested and constructed to failsafe and to prevent accidental operation of the circuit breaker, including protection against: EMC immunity, inadvertent operation if the unit is dropped, etc.

A facility to test the remote control arrangement shall be provided. This shall be in addition to any self-test that is built into the remote control, arrangement. It shall test the remote control arrangement's operation and indication functions and the integrity of the lead(s).

One lead/control unit, one test facility and one on-site storage box shall be provided with every six switch panels.

2.5.10.1 Nameplates and labelling – Nameplates / 6.11 Nameplates [BS EN 62271-1]

The nameplate shall also include a statement of the version of ENA TS 41-36 that the switchgear complies with and, if an ENA Notice of Conformance (NOC) has been issued, shall include the reference details of the Notice.

10 ADDITIONAL CLAUSES FOR MISCELLANEOUS EQUIPMENT

ENATS 41-36 10.3 Voltage transformers / ENATS 41-40 6.201.2 Voltage transformers

10.3.3.1 General / 6.201.2.2 VT general connections

Voltage transformers shall be connected to the primary conductors by mechanical disconnector or fuse links .

4. References

The products described within this specification shall comply with all current versions of the relevant International Standards, British Standard Specifications and all relevant Energy Networks Association Technical Specifications (ENATS) current at the time of supply.

4.1. External Documentation

Reference	Title
BS 6231	Electric cables. Single core PVC insulated flexible cables of rated voltage 600/1000 V for switchgear and controlgear wiring
BS EN 60529	Specification for classification of degrees of protection provided by enclosures
BS EN 60947-7-1	Low-voltage switchgear and controlgear. Ancillary equipment. Terminal blocks for copper conductors
BS EN 62262	Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)
BS EN 62271-206	High-voltage switchgear and controlgear : Voltage presence indicating systems for rated voltages above 1 kV and up to and including 52 kV
BS HD 60269-2	Low-voltage fuses – Part 2: Supplementary requirements for fuses for use by authorized persons
BSCP02	UK Balancing and Settlement Code; BSC PROCEDURE BSCP02 Proving Test Requirements for Central Volume Allocation Metering Systems
EN 50181	Plug-in type bushings above 1 kV up to 52 kV and from 250 A to 2,50 kA for equipment other than liquid filled transform
ENA ER S15	Engineering Recommendation S15 – Part 1 Schematic Diagrams
ENA TS 41-36	Energy Networks Association; Distribution Switchgear For Service Up To 36kV (Cable And Overhead Connected)
ENA TS 41-40	Ground Mounted Major Substation 12 to 36 kV Rated Indoor Fixed Pattern Switchgear
ENA TS 48-4	DC relays associated with a tripping function in protections systems
ENA TS 48-5	Energy Networks Association; Environmental Test Requirements for Protection Relays and Systems
ENA TS 48-6-6	Energy Networks Association; Functional Test Requirements – Overcurrent and Earth Fault Protection Equipment
ENA TS 50-18	Energy Networks Association. “Application of Ancillary Electrical Equipment”
IEC 60255 series	Measuring relays and protection equipment
IEC 62271-1	High-voltage switchgear and controlgear - Part 1: Common specifications

4.2. Internal Documentation

Reference	Title
NPS/002/015	Technical Specification for 11 & 20kV Joints and Terminations
NPS/002/020	Technical Specification for 11 & 20kV Cables
IMP/001/912	Code of Practice for the Economic Development of the HV System

Drawing No	Revision	Title
C1049653	C	11kV / 20kV Busbars/Feeders Primary Substation Main Connection and Protection
C1049654	E	Standard Connections and Protection 11kV / 20kV Switchgear/ Feeder Types (630A Feeders) Legacy Design Types and Optional Arrangements
C1037797	C	VT Selection Scheme for Feeders using Transformer Circuit VT’s

C1037796	D	11kV BB/FDR Busbar Protection using Blocked Transformer OCEF Protection with Integral CB Fail Scheme Overview Drawing

4.3. Amendments from Previous Version

Reference	Amendment
2.4 Ratings	Amendments to the current ratings and the X/R ratios
Section 3.7 – clause 2.4 Ratings	Further details given in relation to Northern Powergrid cable combinations and their uses.
3.7 Facilities for checking voltage and phase identification	Added to ensure withstand to test voltages as detailed in the document.
Appendix 4	Self-Certification sheet added for ENATS 41-40
Internal Documentation	Drawing Revisions updated
Throughout	Clauses amended to include 41-40 references

5. Definitions

Term	Definition
None	

6. Authority for Issue

6.1. CDS Assurance

I sign to confirm that I have completed and checked this document and I am satisfied with its content and submit it for approval and authorisation.

		Date
Liz Beat	Governance Administrator	20/03/2023

6.2. Author

I sign to confirm that I have completed and checked this document and I am satisfied with its content and submit it for approval and authorisation.

Review Period - This document should be reviewed within the following time period.

Standard CDS review of 3 years	Non Standard Review Period & Reason	
No	Period: 5 Years	Reason: Update will be dictated by contract renewal date or any significant changes in the specification or documents referenced
Should this document be displayed on the Northern Powergrid external website?		Yes

		Date
Paul McAdoo	Senior Policy & Standards Engineer	20/03/2023

6.3. Technical Assurance

I sign to confirm that I am satisfied with all aspects of the content and preparation of this document and submit it for approval and authorisation.

		Date
Joe Helm	Policy & Standards Manager	21/03/2023
Michael Crowe	Technical Services Manager (North)	27/03/2023
Anuj Chhettri	Smartgrid Development Engineer	20/03/2023
Alan MacDonald	Policy & Standards Engineer	20/03/2023

6.4. Authorisation

Authorisation is granted for publication of this document.

		Date
Paul Black	Head of System Engineering	25/04/2023

Appendix 1 – Technical Schedules Summary Sheet

Options required for 11kV:

2000A Switchboard

Busbars for all the units listed in this table shall be rated at 2000A.

	2000A	1250A	800A	630A
Incomer CB (transformer)	√	Not Required	Not Required	Not Required
Bus Section CB	√	Not Required	Not Required	Not Required
Feeder CB	Not Required	√	√	√
Busbar Extension Panel (to accommodate additional CTs/VTs)	√	√	√	√
Busbar-connected Cable Box/Panel	√	√	√	√

Busbar Earthing Panel	√

1250A Switchboard

Busbars for all the units listed in this table shall be rated at 1250A.

	1250A	800A	630A
Incomer CB (transformer)	√	Not Required	Not Required
Bus Section CB	√	Not Required	Not Required
Feeder CB	Not Required	√	√
Busbar Extension Panel (to accommodate additional CTs/VTs)	√	√	√
Busbar-connected Cable Box/Panel	√	√	√

Busbar Earthing Panel	√

Options required for 20kV:

1250A Switchboard

Busbars for all the units listed in this table shall be rated at 1250A.

	1250A	800A	630A
Incomer CB (transformer)	√	Not Required	Not Required
Bus Section CB	√	Not Required	Not Required
Feeder CB	Not Required	√	√
Busbar Extension Panel (to accommodate additional CTs/VTs)	√	√	√
Busbar-connected Cable Box/Panel	√	√	√

Busbar Earthing Panel	√

Appendix 2 – Routine Testing and Commissioning Testing

a) Test Voltages Applied By Northern Powergrid

As defined in 'WE TESTING' section of the Northern Powergrid Operational Practice Manual

WE 4.2.1 Tests **Shall** be applied to earth, between phases and across the gap.

WE 4.2.2 Vacuum Interrupter: Where testing is required, to avoid a possible X ray hazard, no personnel **Shall** approach within 3 metres of a vacuum interrupter which is subjected to an overvoltage test. Test values to be applied across the break are detailed in Table WE.2

Table WE.2 Switchgear Test Voltages (kV)

Working Voltage	DC 1 min	AC 1 min
11kV	20	16
20kV	37	30

b) Testing to be carried out by the Supplier

The supplier shall provide Northern Powergrid with details of proposed: test arrangements and combinations, test values, test pass/fail criteria, tolerances applicable and associated test record content and layout for each of the tests listed below.

1. All protection and metering VTs and CTs shall be primary injection tested, at all available ratios, to prove ratio and polarity.
2. All trip coils shall be primary and secondary injected to test operation of the trip coil and subsequent operation of the circuit breaker.
3. Self-powered relays shall have a factory default setting applied and a primary or secondary injection test carried out to determine and record the current pickup and 2x setting time values.
4. All secondary wiring shall be insulation resistance tested.
5. All fault flow indicator CTs shall be primary injected to prove ratio and polarity and the indicator unit shall be tested for detection and operation for both phase-phase and for phase-earth faults.
6. Power frequency tests shall be applied, using the criteria specified in the Northern Powergrid Operational Practice Manual as included in part (a) of this Appendix.
   Tests shall prove all combinations of operational condition: between each phase, between phase and earth and across all isolation gaps.
7. Tests shall be carried out, after all assembly operations have been completed, to confirm the phase relationship between primary conductors and all VDS, or VPIS, outputs and displays.
8. Partial discharge testing, preferably of the complete assembly. But at least of critical components, by agreement with Northern Powergrid.

With every switch panel the supplier shall provide Northern Powergrid with copies of the tests arrangements and test values applied, test results and associated test records for each of the above tests.

For all metering CTs and VTs the supplier shall also provide Northern Powergrid with copies of the CT and/or VT manufacturers' magnetising curve and ratio test certificates

A complete set of printed hard copies of these records shall be shipped in the associated LV control cabinet. Electronic copies of these records shall also be supplied to Northern Powergrid.

Appendix 3 – Self-Certification Conformance Declarations Against ENA TS 41-36 Requirements

Appendix 3a – ENATS 41-36 - Schedule Part 1 – COMMON CLAUSES.

CLAUSE BY CLAUSE CONFORMANCE WITH ENATS 41-36 – Part 1

Appendix 3b – ENATS 41-36 - Schedule Part 2 – METAL ENCLOSED CIRCUIT BREAKERS.

CLAUSE BY CLAUSE CONFORMANCE WITH ENATS 41-36 – Part 2
TYPE TEST CONFORMANCE DECLARATION

Appendix 3c – ENATS 41-36 - Schedule Part 3 – METAL ENCLOSED SWITCHES.

CLAUSE BY CLAUSE CONFORMANCE WITH ENATS 41-36 – Part 3
TYPE TEST CONFORMANCE DECLARATION D3

Appendix 3d – ENATS 41-36 - Schedule Part 10 – PROTECTION, INSTRUMENTATION & METERING.

CLAUSE BY CLAUSE CONFORMANCE WITH ENATS 41-36 – Part 10

Appendix 3a – ENATS 41-36 - Schedule Part 1 – COMMON CLAUSES.

SELF CERTIFICATION CONFORMANCE DECLARATION - NOTE: One sheet shall be completed for each item or variant submitted.

The following sheets replicate the self-declaration section of ENATS 41-36 and also include the clauses of the international Standards relevant to common specifications for high-voltage switchgear and control gear standards.

If the product has already been assessed by ENA then re-completion of these self-declaration sheets is not required and the manufacturer may simply state the ENA Notice Of Conformance or Approval Notice number in the boxes below and supply copies of the sheets used in the ENA assessment.

If NOT already ENA assessed then the manufacturer shall declare conformance or otherwise, clause by clause, using ENA standard conformance declaration codes below.

Conformance declaration codes:

N/A = Clause is not applicable/appropriate to the product
Cs1 = The test conforms fully with the requirements of this clause
Cs2 = The test conforms partially with the requirements of this clause
Cs3 = The test does not conform to the requirements of this clause
Cs4 = Test not performed, but alternative evidence/ technical case offered

Instructions for completion

- **When Cs1 code is entered then details of how compliance is achieved SHALL be provided in the remarks column.**
  This shall include details of type tests, where appropriate.
- **When any other code is entered; an explanation of the reason for non-conformance shall be entered**
- Prefix each remark with the relevant 'IEC' or 'ENATS' as appropriate

Manufacturer:		**ENA Reference:**
Product Reference:	**Ratings:**	
Name:	**Signature:**	**Date:**

IEC 60694, IEC 62271-200				ENATS 41-36			
Clause / Sub-clause		Requirement	Conformance code	ENATS 41-36 - Part 1 Clause / Sub- clause	Requirement	Conformance code	Remarks
IEC60694	IEC62271-200						
1	1	General		1.1	General		
2	2	Normal and special service conditions		1.2	Normal and special service conditions		
				1.2.1.1	Class minus 5 indoor		
				1.2.1.2	Class minus 25 outdoor		
				1.2.1.2	Class 10 – ice coating		
				1.2.1.2	Class III – pollution level		
				1.2.1.2	Influence of solar radiation		
3	3	Definitions		1.3	Definitions		
4	4	Ratings		1.4	Ratings		
4.1	4.1	Rated voltage		1.4.1	Rated voltage		
4.2	4.2	Rated insulation level		1.4.2	Rated insulation level		
				1.4.2.1	Disconnectors (0 bar gauge)		
				1.4.2.2.	Provision for cable tests		
4.3	4.3	Rated frequency		1.4.3	Rated frequency		
4.4	4.4	Rated normal current and temperature rise		1.4.4	Rated normal current and temperature rise		
				1.4.4.1	Rated normal current		
4.5	4.5	Rated short-time withstand		1.4.5	Rated short-time withstand		
4.6	4.6	Rated peak withstand current		1.4.6	Rated peak withstand current		
4.7	4.7	Rated duration of short circuit		1.4.7	Rated duration of short circuit		
4.8	4.8	Rated supply voltage of closing and opening devices and of auxiliary and control circuits		1.4.8	Rated supply voltage of closing and opening devices and of auxiliary and control circuits		
4.9	4.9	Rated supply frequency of closing and opening devices and of auxiliary circuits		1.4.9	Rated supply frequency of closing and opening devices and of auxiliary circuits		
4.10	4.10	Rated pressure of compressed gas supply for insulation and/or operation		1.4.10	Rated pressure of compressed gas supply for insulation and/or operation		

IEC 60694, IEC 62271-200				ENATS 41-36			
Clause / Sub-clause		Requirement	Conformance code	ENATS 41-36 - Part 1 Clause / Sub- clause	Requirement	Conformance code	Remarks
IEC60694	IEC62271-200						
	4.10.1	Rated filling level (of fluid-filled compartments					
5.1	5.1	Requirements for liquids		1.5.1	Requirements for liquids		
				1.5.1	Oil level indication		
				1.5.1	Drain plugs, indicators, valves		
				1.5.1	Controlled gasket compression		
				1.5.1	No communicating bolts		
				1.5.1	BS 148		
				1.5.1	Bolt access		
				1.5.1	Breather design/position (IP3XDW)		
5.2	5.2	Requirements for gasses		1.5.2	Requirements for gasses		
				1.5.2	Gas filling valve		
				1.5.2	Recycled SF6		
5.3	5.3	Earthing of switchgear and control gear		1.5.3	Earthing of switchgear and control gear		
				1.5.3	Earthing conductor		
				1.5.3	Earthing terminals.		
				1.5.3	Earthing conductor coupling		
				1.5.3	Withdrawable /removable parts earth connection.		
				1.5.3	Cable sheath earth connection		
				1.5.3	Relay/instrument case earthing		
				1.5.3	Specific means for earthing		
				1.5.3	Frame-earth busbar protection		
5.4	5.4	Auxiliary and control equipment		1.5.4	Auxiliary and control equipment		
				1.5.4.1.3	Degrees of protection – LV terminals		
				1.5.4.4.4.4	ENATS 50-19		
				1.5.4.4.4.4	Identification		

IEC 60694, IEC 62271-200				ENATS 41-36			
Clause / Sub-clause		Requirement	Conformance code	ENATS 41-36 - Part 1 Clause / Sub- clause	Requirement	Conformance code	Remarks
IEC60694	IEC62271-200						
				1.5.4.4.5.1	Segregation (>125V).		
				1.5.4.4.5.1	Interchangeable - identical		
				1.5.4.4.5.1	Conductor material/size.		
				1.5.4.4.5.1	HV compartment segregation.		
				1.5.4.4.5.1	Actuator control/indication		
				1.5.4.4.5.1	Micro switches		
				1.5.4.4.5.2	Terminals/terminations reliability 50 breaks		
				1.5.4.4.5.2	CT terminal blocks – screw clamp with spring (ENATS 50-18 type B)		
5.5	5.5	Dependent power operation		1.5.5	Dependent power operation		
				1.5.5	Positively driven contacts		
				1.5.5	Movement gap withstand voltage		
				1.5.5	Maintenance / slow operation		
				1.5.5	Labelled - maintenance		
5.6	5.6	Stored energy operation		1.5.6	Stored energy operation		
				1.5.6	Sub-clause 1.5.5 applicable plus the following		
				1.5.6	Main contact movement		
				1.5.6	Dedicated handle		
				1.5.6	Handle direction indication		
				1.5.6	Handle release and stowed		
				1.5.6	Motor actuator fitting		
				1.5.6	Motor actuator disconnection		
				1.5.6	Actuator ‘in step’ (methods a or b)		
				1.5.6	Manual charging motor-charge		
				1.5.6	Max/min handle heights		

IEC 60694, IEC 62271-200				ENATS 41-36			
Clause / Sub-clause		Requirement	Conformance code	ENATS 41-36 - Part 1 Clause / Sub- clause	Requirement	Conformance code	Remarks
IEC60694	IEC62271-200						
				1.5.6	Re-charge closing springs		
				1.5.6	Spring charge indication		
				1.5.7	Manual operation		
				1.5.7	Handles and padlocking accessible from front		
				1.5.7	Handle storage facilities		
5.7	5.7	Independent manual operation		1.5.7.1	Independent manual operation		
				1.5.7.1	Sub-clause 1.5.6 applicable plus the following		
				1.5.7.1	Inhibit closing spring charge in closed position		
				1.5.7.1	No stored energy from Incomplete operation		
				1.5.7.1	Anti-reflex =>3 secs (manual)		
				1.5.7.1	Anti-reflex =>3 secs (actuator)		
				1.5.7.2	Dependent manual operation. - as 1.5.7.1 plus: Inhibit op handle removal		
5.8	5.8	Operation of releases		1.5.8	Operation of releases		
				1.5.8	Local manual release		
				1.5.8	Operation outside switchroom		
				1.5.8	No movement of spring charge handle.		
5.9	5.9	Low and high-pressure interlocking and monitoring devices		1.5.9	Low and high-pressure interlocking and monitoring devices		
				1.5.9	Pressure/density gauge/indicator		
				1.5.9	20°C filling mark		
				1.5.9	Green/red, Go/No go		
				1.5.9	Single/two stage pressure switch		
				1.5.9	36kV equipment – a) & c)		

IEC 60694, IEC 62271-200				ENATS 41-36			
Clause / Sub-clause		Requirement	Conformance code	ENATS 41-36 - Part 1 Clause / Sub- clause	Requirement	Conformance code	Remarks
IEC60694	IEC62271-200						
				1.5.9	Temperature fluctuations		
5.10	5.10	Nameplates		1.5.10.1	Nameplates		
				1.5.10.1	Internal arc test Fig		
				1.5.10.101	Labelling		
				1.5.10.101.1	Safety signs BS 5499		
				1.5.10.101.1	Durable/non-fading		
				1.5.10.101.1	Contrast with background		
				1.5.10.101.1	In accordance with Table 1.4		
				1.5.10.101.1	Symbols to Annex C		
				1.5.10.101.1	BS381C or RAL colours		
				1.5.10.101.2	Phase identification		
				1.5.10.101.3	Circuit labels to Fig 1		
				1.5.10.101.3	Additional labels to Fig 2		
				1.5.10.101.3	Repeat labels		
				1.5.10.101.3	Safely detachable		
5.11	5.11	Interlocking devices		1.5.11	Interlocking devices and padlocking facilities		
				1.5.11	No removal of covers when part of interlock/padlock facility		
				1.5.11.101	Interlocking devices		
				1.5.11.101.1	General		
				1.5.11.101.1	Interlocking devices- Mechanical, key, electro-mechanical		
				1.5.11.101.2	Test access – interlocks a) to d)		
				1.5.11.102	Padlocking facilities		
				1.5.11.102	Size of padlock		
				1.5.11.102.1	Safety padlocks – facilities a) to c)		
				1.5.11.102.1	Single padlock for electrical and mechanical		

IEC 60694, IEC 62271-200				ENATS 41-36			
Clause / Sub-clause		Requirement	Conformance code	ENATS 41-36 - Part 1 Clause / Sub- clause	Requirement	Conformance code	Remarks
IEC60694	IEC62271-200						
				1.5.11.102.1	Electrical/Electro-mechanical 'FMA'		
				1.5.11.102.1	Inhibit facia removal		
				1.5.11.102.1	Warning label		
				1.5.11.102.2	Operational padlocking		
				1.5.11.102.2	Facilities (a) to (e)		
5.12	5.12	Position indication		1.5.12	Position indication		
				1.5.12	Positively driven mechanical		
				1.5.12	Output side of mechanism		
				1.5.12	Inscribed as Table 1.4		
				1.5.12	Mimic diagram symbols–Annex C		
				1.5.12	One indicator visible		
5.13	5.13	Degrees of protection by enclosures		1.5.13	Degrees of protection by enclosures		
				1.5.13.1	Hazardous parts / solid foreign objects IP4X,IP3X,IP3XD		
				1.5.13.1	Doors open IP2X		
				1.5.13.1	Requirements a)		
				1.5.13.2	Ingress of water		
				1.5.13.2	IP3XDW		
				1.5.13.2	Weather proofing test		
				1.5.13.2	IP34D - pole mounted		
				1.5.13.2	Material/water lodging		
				1.5.13.3	Mechanical impact 2J - indoor		
				1.5.13.3	Mechanical impact 5J - outdoor		
5.14	5.14	Creepage distances		1.5.14	Creepage distances and environmental considerations		
				1.5.14	Outdoor - class 3 –IEC 60815		

IEC 60694, IEC 62271-200				ENATS 41-36			
Clause / Sub-clause		Requirement	Conformance code	ENATS 41-36 - Part 1 Clause / Sub- clause	Requirement	Conformance code	Remarks
IEC60694	IEC62271-200						
				1.5.14	Insulating system design		
				1.5.14	30 year life		
				1.5.14	Condensation/heaters		
				1.5.14	Shrouding in air filled cable box		
5.15	5.15	Gas and vacuum tightness		1.5.15	Gas and vacuum tightness		
				1.5.15	Leakage rate =< 1% per year (closed pressure) 30 year life expected		
				1.5.15	30 year life expected (sealed pressure)		
5.16	5.16	Liquid tightness		1.5.16	Liquid tightness		
5.17	5.17	Flammability		1.5.17	Flammability		
5.18	5.18	EMC		1.5.18	EMC		
	5.101	Internal fault		1.5.101	Internal fault		
				1.5.101	Class IAC		
				1.5.101	a) Metal enclosed – class IAC AF		
				1.5.101	b) Pole mounted – class IAC C		
				1.5.101	c) Air		
				1.5.101	d) 1 second duration		
				1.5.101	e) Prospective test current		
				1.5.101	f) Criteria of acceptance		
				1.5.101	g) Test arrangement		
				1.5.101	h) Compartments tested		
				1.5.101	Cable box prospective current		
	5.102	Enclosure		1.5.102	Enclosure		

IEC 60694, IEC 62271-200				ENATS 41-36			
Clause / Sub-clause		Requirement	Conformance code	ENATS 41-36 - Part 1 Clause / Sub- clause	Requirement	Conformance code	Remarks
IEC60694	IEC62271-200						
				1.5.102.1	General		
				1.5.102.1	Support weight of personnel		
				1.5.102.1	Identify areas not safe to stand		
				1.5.102.1	Safe access - CDM Regs 1994		
				1.5.102.1	Lifting facilities		
				1.5.102.1	Integral step (150kg)		
				1.5.102.1	No communicating holes		
				1.5.102.2	Covers and doors		
				1.5.102.2	Interlock controlled accessible types for test access and provided with locking facilities		
				1.5.102.2	Controlled compression gaskets		
				1.5.102.2	No communicating holes		
				1.5.102.101	Surface preparation and coatings - ENATS 98-1		
				1.5.102.101	Colour		
				1.5.102.102	Foundation arrangements		
				1.5.102.102	Cable gland positions		
				1.5.102.102	Floor fixing (M12 bolts)		
				1.5.102.103	Transformer mounting		
				1.5.102.103	Access (fig 16 ENATS 35-1)		
				1.5.102.103	Transformer circuit flange as fig3		
				1.5.102.103	Dimensional limitations a) to g)		
				1.5.102.103	600mm max projection		
				1.5.102.103	Adjustable support		
				1.5.102.103	Load distribution		
				1.5.102.103	Assembly instructions		

IEC 60694, IEC 62271-200				ENATS 41-36			
Clause / Sub-clause		Requirement	Conformance code	ENATS 41-36 - Part 1 Clause / Sub- clause	Requirement	Conformance code	Remarks
IEC60694	IEC62271-200						
				1.5.102.104	Heater		
				1.5.102.104	Easily accessible		
	5.103	Compartments		1.5.103	Compartments		
				1.5.103.1	Service continuity class LSC2 (except RME)		
				1.5.103.1.101	Cable compartments		
				1.5.103.1.101	Separate cable compartment		
				1.5.103.1.101	Cable compartment-ENATS 12-11		
				1.5.103.1.101	Compartment/termination design - manufacturers		
				1.5.103.1.101	Min of two propriety cable terminations systems		
				1.5.103.1.101	Accommodation / compatibility		
				1.5.103.1.101	Method statement		
				1.5.103.2	Fluid filled compartments		
				1.5.103.2.2	Solar radiation influences		
				1.5.103.2.3	Tightness		
				1.5.103.2.4	Pressure relief to be provided		
				1.5.103.2.4	No burn-through		
				1.5.103.2.4	Satisfactory performance in Outdoor environment		
				1.5.103.3	Partitions and shutters		

IEC 60694, IEC 62271-200				ENATS 41-36			
Clause / Sub-clause		Requirement	Conformance code	ENATS 41-36 - Part 1 Clause / Sub- clause	Requirement	Conformance code	Remarks
IEC60694	IEC62271-200						
				1.5.103.3.1	Partitions metallic – class PM		
					Shutters metallic - class PM		
					Individually operated		
					Independently padlockable closed		
					Open/close automatically		
					Provision for retaining open		
					Re-engagement of removable part Restores automatic operation		
					Colour to table 1.4		
	5.104	Removable parts					
	5.105	Provisions for dielectric tests on cables					
				1.5.201.1.1	Testing via primary ccts a) to g)		
				1.5.201.1.2	Testing via secondary ccts a) to c)		
				1.5.201.2	Test facilities provided a) or b)		
				1.5.201.2	Test connections/main circuit- DC test (table 1.5)		
				1.5.201.2	Test connections/main circuit- 200A		
				1.5.201.2	Test terminals to cable =<500 microhms		
				1.5.201.2	Security of test contacts		
				1.5.201.2	Access to provide for safe working		
				1.5.201.2	Test point on mimic		
				1.5.201.3	Fixed equipment – VDS or VPIS		
				1.5.201.3	Withdrawable equipment - VDS		
				1.5.201.3	Min 60mm dia test access		

IEC 60694, IEC 62271-200				ENATS 41-36			
Clause / Sub-clause		Requirement	Conformance code	ENATS 41-36 - Part 1 Clause / Sub- clause	Requirement	Conformance code	Remarks
IEC60694	IEC62271-200						
				1.5.201.4	Test access cover – 1.5.102.2)		
				1.5.201.4	"EARTH ON" for test access		
				1.5.201.4	Interlock on cable compartment		
				1.5.201.4	Test access at front		
				1.5.201.4	Physical indication of test access open (amber lamp for open, white lamp for closed)		
				1.5.201.4	Single lamp push to test facility		
				1.5.201.4	"EARTH ON" indication		
				1.5.201.4	No access to compartment containing live HV conductors.		
				1.5.201.4	Position to avoid water/debris ingress		
				1.5.201.4	Inhibit close of test access with test device inserted		
				1.5.201.4	Inhibit closing of disconnector or compromise POI with test access open		
				1.5.201.5	Test device security a) to c)		
				1.5.201.5	100 connections/disconnections		
				1.5.201.5	Test device identification		
				1.5.201.5	Test device container		
				1.5.202	Busbars - same current rating		
				1.5.202	Extension busbar trunking		
				1.5.202	Standard length		
				1.5.203	Conductor terminations		
				1.5.203	ENATS 41-16		
				1.5.203	BS 7354 clearances		
				1.5.203	BS 7354 clearances + 300mm		

IEC 60694, IEC 62271-200				ENATS 41-36			
Clause / Sub-clause		Requirement	Conformance code	ENATS 41-36 - Part 1 Clause / Sub- clause	Requirement	Conformance code	Remarks
IEC60694	IEC62271-200						
6	6	Type tests		1.6	Type tests		
				1.6	Short circuit testing liaison(STL)		
				1.6	Criteria to pass lightning impulse		
				1.6	Dielectric (arrangement representative of cable termination systems in 1.5.103.1)		
				1.6	Most unfavourable arrangement		
				1.6	Production handle –most onerous in-service condition.		
				1.6	Partial discharge (ENATS 41-18 levels)		
				1.6	High temp or equivalent		
				1.6	Influence of solar radiation		
				1.6	Temperature rise at max solar gain		
7	7	Routine tests		1.7	Routine tests		
				1.7	Partial discharge (ENATS 41-18 Levels		
8	8	Guide to the selection of switchgear and controlgear		1.8	Guide to the selection of switchgear and controlgear		
9	9	Information to be given with enquiries, tenders and orders		1.9	Information to be given with enquiries, tenders and orders		
10	10	Rules for Transport, Storage, installation, operation and maintenance		1.10	Rules for Transport, Storage, installation, operation, maintenance and disposal		
				1.10	Safe methods for extending and/or replacement		
				1.10	Extension of corresponding types		
				1.10	Stable during storage/transport		

IEC 60694, IEC 62271-200				ENATS 41-36			
Clause / Sub-clause		Requirement	Conformance code	ENATS 41-36 - Part 1 Clause / Sub- clause	Requirement	Conformance code	Remarks
IEC60694	IEC62271-200						
				1.10	Prevent water ingress		
				1.10	Temporary labels		
				1.10	Protect bushings		
				1.10	Maintenance design (BS 6626)		
				1.10	Handbook contents + storage		
11	11	Safety		1.11	Safety		

NOTE: One sheet shall be completed for each item or variant submitted.

Appendix 3b – ENATS 41-36 - Schedule Part 2 – METAL ENCLOSED CIRCUIT BREAKERS.

SELF CERTIFICATION CONFORMANCE DECLARATION - NOTE: One sheet shall be completed for each item or variant submitted.

The following sheets replicate the self-declaration section of ENATS 41-36 and also include the clauses of the international Standards relevant to common specifications for high-voltage switchgear and control gear standards.

If the product has already been assessed by ENA then re-completion of these self-declaration sheets is not required and the manufacturer may simply state the ENA Notice Of Conformance or Approval Notice number in the boxes below and supply copies of the sheets used in the ENA assessment.

If NOT already ENA assessed then the manufacturer shall declare conformance or otherwise, clause by clause, using ENA standard conformance declaration codes below.

Conformance declaration codes:

N/A = Clause is not applicable/appropriate to the product
Cs1 = The test conforms fully with the requirements of this clause
Cs2 = The test conforms partially with the requirements of this clause
Cs3 = The test does not conform to the requirements of this clause
Cs4 = Test not performed, but alternative evidence/ technical case offered

Instructions for completion

- **When Cs1 code is entered then details of how compliance is achieved SHALL be provided in the remarks column.**
  This shall include details of type tests, where appropriate.
- **When any other code is entered; an explanation of the reason for non-conformance shall be entered**
- Prefix each remark with the relevant 'IEC' or 'ENATS' as appropriate

Manufacturer:		**ENA Reference:**
Product Reference:	**Ratings:**	
Name:	**Signature:**	**Date:**

IEC62271-100			ENATS 41-36 - Part 2			
Clause / Sub-clause	Requirement	Conformance code	Clause / Sub-clause	Requirement	Conformance code	Remarks
1	General		2.1	General		
2	Service conditions		2.2	Service conditions		
3	Definitions		2.3	Definitions		
4	Ratings		2.4	Ratings		
4.101	Rated short-circuit breaking current		2.4.101	Rated short-circuit breaking current		
4.101.1	AC component of the rated short-circuit breaking current					
4.101.2	DC component of the rated short-circuit breaking current		2.4.101	Time constant (45ms)		
4.102	Transient recovery voltage related to the rated short-circuit breaking current		2.4.102	Transient recovery voltage related to the rated short-circuit breaking current		
4.102.1	Representation of TRV waves					
4.102.2	Representation of TRV					
4.102.3	Standard values of TRV related to the rated short-circuit breaking current		2.4.102	Table 1A of IEC 62271-100		
4.103	Rated short-circuit making current		2.4.103	Rated short-circuit making current		
4.104	Rated operating sequence		2.4.104	Rated operating sequence		
			2.4.104	O-0.3s-CO-15s-CO intended for auto-reclose		
			2.4.104	O-3min-CO-3min-CO not intended for auto-reclose		
4.105	Characteristics for short-line faults		2.4.105	Characteristics for short-line faults		
4.106	Rated out-of-phase making and breaking current		2.4.106	Rated out-of-phase making and breaking current		
4.107	Rated capacitive switching currents		2.4.107	Rated capacitive switching currents		
			2.4.107	Class C1		
4.107.1	Rated line-charging breaking		2.4.107	Line-charging breaking – Table 2.1 ENATS 41-36		
4.107.2	Rated cable-charging breaking		2.4.107	Cable-charging breaking - Table 2.1 ENATS 41-36		
4.108	Rated small inductive breaking current		2.4.108	Rated small inductive breaking current		
4.109	Rated time quantities		2.4.109	Rated time quantities		
4.109.1	Rated break time			Rated break time		
4.110	Number of mechanical operations		2.4.110	Number of mechanical operations		
			2.4.110	Class M2 (10000 Ops) (5000 Ops)		
			2.4.110	Class M1 (2000 Ops)		

IEC62271-100			ENATS 41-36 - Part 2			
Clause / Sub-clause	**Requirement**	**Conformance code**	**Clause / Sub-clause**	**Requirement**	**Conformance code**	**Remarks**
4.111	Classification of circuit-breakers as a function of electrical endurance		2.4.111	Classification of circuit-breakers as a function of electrical endurance		
			2.4.111	Class E2		
			2.4.111	Auto-reclosing		
			2.4.111	Non-auto-reclosing		
5.1	Requirements for liquids in circuit-breakers		2.5.1	Requirements for liquids in circuit-breakers		
			2.5.1	Correct tank mounting.		
			2.5.1	Inhibit service/earth position without tank.		
			2.5.1	Correct contact/arc device positions		
5.2	Requirements for gasses		2.5.2	Requirements for gasses		
5.3	Earthing of circuit-breakers		2.5.3	Earthing of circuit-breakers		
			2.5.3.101	Earthing facilities		
			2.5.3.101.1	Short circuit making ability		
			2.5.3.101.1	CB or class E2 earthing switch		
			2.5.2.101.1	Kinematic chain test on CB used for earthing		
			2.5.3.101.1	CT short circuit facility		
			2.5.3.101.1	Earthing device ratings		
			2.5.3.101.2	Disconnector / earthing switch		
			2.5.3.101.2	AC + DC withstand test		
			2.5.3.101.2	Class E0		
			2.5.3.101.2	Class M0		
			2.5.3.101.2	Number of mech ops		
			2.5.3.101.2	Selector arrangements (a to d)		
5.4	Auxiliary equipment		2.5.4	Auxiliary equipment		
			2.5.4	Isolating features		
			2.5.4	Secondary connections		
			2.5.4	Secondary circuit coupling for maintenance		
			2.5.4	Contact location/screening		
5.5	Dependent power closing		2.5.5	Dependent power closing		
5.6	Stored energy closing		2.5.6	Stored energy closing		
5.7	Independent manual		2.5.7	Independent manual		
5.8	Operation of releases		2.5.8.	Operation of releases		
			2.5.8.	Inhibit continuous open/close		
			2.5.8.	Padlockable device - RED		
			2.5.8.	Closing facility - BLACK		
			2.5.8.	Push buttons RED/BLACK		
			2.5.8.	Remote operation socket		
			2.5.8.	Local/remote selector		
5.9	Low and high-pressure interlocking and monitoring devices		2.5.9	Low and high-pressure interlocking and monitoring devices		

IEC62271-100			ENATS 41-36 - Part 2			
Clause / Sub-clause	Requirement	Conformance code	Clause / Sub-clause	Requirement	Conformance code	Remarks
5.10	Nameplates		2.5.10.1	Nameplates		
			2.5.10.1	Supplementary (a to c)		
			2.5.10.101	Labelling		
			2.5.10.101	Mimic diagram		
			2.5.10.101	Test points		
			2.5.10.101	VT /VT disconnection		
			2.5.10.101	Mimic colour/symbols (Annex C)		
			2.5.10.101	Pictogram for busbar earthing (Annex C)		
5.11	Interlocking devices		2.5.11	Interlocking / padlocking		
			2.5.11.101	Interlocking devices		
			2.5.11.101.1	Indoor circuit-breakers		
			2.5.11.101.1	Inhibit close of disconnector with test access open		
			2.5.11.101.1	No CB trip on attempted isolation / disconnector selection		
			2.5.11.101.1	No main circuit access		
			2.5.11.101.1	Safety shutters remain closed		
			2.5.11.101.1	Earthing device located		
			2.5.11.101.1	Inhibit disconnector closure		
			2.5.11.101.1	Move before BB earthing device		
			2.5.11.101.1	Inhibit circuit breaker trip		
			2.5.11.101.2	Outdoor circuit-breakers		
			2.5.11.101.2	Key interlock		
5.12	Position indication		2.5.12	Position indication		
5.13	Degrees of protection		2.5.13	Degrees of protection		
5.14	Creepage distances		2.5.14	Creepage distances		
5.15	Gas and vacuum tightness		2.5.15	Gas and vacuum tightness		
5.16	Liquid tightness		2.5.16	Liquid tightness		
5.17	Flammability		2.5.17	Flammability		
5.18	Electromagnetic compatibility		2.5.18	Electromagnetic compatibility		
5.101	Requirements for simultaneity of poles during single closing and single opening operations.					
5.102	General requirement for operation					

IEC62271-100			ENATS 41-36 - Part 2			
Clause / Sub-clause	Requirement	Conformance code	Clause / Sub-clause	Requirement	Conformance code	Remarks
5.103	Pressure limits of fluids for operation					
5.104	Vent outlets					
			2.5.201	Test facilities		
			2.5.202	Open-terminal circuit-breaker bushings		
			2.5.202	Prismatic gauge		
			2.5.202	Terminals (ENATS 41-16) BS 7354 design		
			2.5.203	Outdoor open-terminal circuit-breaker control facilities		
			2.5.203	Operation facilities		
			2.5.203	Selector switch		
			2.5.203	Close/open control switch		
			2.5.204	Open-terminal circuit-breaker mechanism cabinet		
			2.5.204	ON/OFF indicator		
			2.5.204	Inside and outside labels		
			2.5.204	Multicore terminal blocks		
			2.5.204	Power socket +RCD		
			2.5.205	Transformer mounting		
6	Type tests		2.6	Type Tests - Table 2.3		
6.1	General					
6.2	Dielectric tests					
6.3	Radio interference voltage tests					
6.4	Measurement of resistance of the main circuit					
6.5	Temperature rise tests					
6.6	Short-time withstand current and peak withstand current tests					
6.7	Verification of the degree of protection					
6.8	Tightness test					
6.9	Electromagnetic compatibility (EMC) tests					
6.101	Mechanical and environmental tests					
6.102	Miscellaneous provisions for making and breaking tests					
6.103	Test circuits for short-circuit making and breaking tests					
6.104	Short-circuit test quantities					

IEC62271-100			ENATS 41-36 - Part 2			
Clause / Sub-clause	Requirement	Conformance code	Clause / Sub-clause	Requirement	Conformance code	Remarks
6.105	Short-circuit test procedure					
6.106	Basic short-circuit test duties					
6.107	Critical current tests					
6.108	Single phase and double earth fault tests					
6.109	Short-line fault tests					
6.110	Out of phase making and breaking tests					
6.111	Capacitive current switching tests					
6.112	Special requirements for making and breaking tests on class E2 circuit-breakers.					
7	Routine Tests		2.7	Routine Tests		
7.1	Dielectric test on the main circuit					
7.2	Dielectric test on auxiliary and control circuits					
7.3	Measurement of resistance of the main circuit					
7.4	Tightness test					
7.5	Design and visual checks					
8	Guide to the Selection of Circuit-breakers for service		2.8	Guide to the Selection of Circuit-breakers for service		
9	Information to be Given with Enquiries, Tenders and Orders		2.9	Information to be Given with Enquiries, Tenders and Orders-schedule 2.1		
10	Rules for Transport, Storage, Erection and Maintenance		2.10	Rules for Transport, Storage, Erection and Maintenance		
			2.10	Contact erosion		
			2.10	Operation counter		
11	Safety		2.11	Safety		

Appendix 3b – ENATS 41-36 - Schedule Part 2 – METAL ENCLOSED CIRCUIT BREAKERS.

SELF CERTIFICATION CONFORMANCE DECLARATION

PART 2 – METAL ENCLOSED CIRCUIT-BREAKERS

TYPE TEST CONFORMANCE DECLARATION

Type tests for feeder or bus-section circuit-breaker including enclosure, disconnector, VT, CTs and earthing switch as appropriate.

Manufacturer: **Ratings**
Product reference:
Name: **Signature:** **Date:**

Instructions for completion:

- Complete a separate table for each variant and rating
- ENA/SAP to complete columns 1 to 4
- Manufacturer to complete columns 5 to 10
- When test report also covers another rating insert 'See ???A unit' in the Remarks column

Tests not requested may be shown as 'Additional tests' at the bottom of the table

Type test reports table based on ENATS 41-36 Table 2.3
*See bottom of table for conformance declaration codes
** I = Independent; M= Manufacturer; ENA= Energy Networks Association

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
	Test Requirement	**Specification & Standards**	**Rated value**	**Test req'd Y or N**	**Conformance***	**Test value**	**Date of test**	**Test station Report / Cert No**	**Witness I, M or ENA ****	**Remarks**
1.	Dielectric. Partial discharge ≤ 10pC For cable connected circuit-breakers, tests to be representative of two cable termination systems, in addition to switchgear manufacturer's own system if any.	IEC60694. Sub-clause 6.2, IEC62271-100. Sub-clause 6.2, IEC62271-200. Sub-clause 6.2. Tables 1.1a and 1.1b of ENATS 41-36. IEC 62271-200. Sub-clause 6.2.9 and annex BB, ENATS 41-18 Sub-clauses 1.5.103.1 and 1.6 of ENATS 41- 36.								
2.	" - Busbars	"								
3.	Voltage Withstand - Isolating Gap (provision for dielectric tests on cables).	IEC62271-200. Sub-clause 5.105. and 6.2.101 Sub-clause 1.4.2.2 of ENATS 41-36.								
4.	DC Withstand Test on Test Devices, including all parts of main circuit, which cannot be disconnected from the test connections.	IEC62271-200. Sub-clause 5.105. Sub-clause 1.5.201.1 of ENATS 41-36.								
5.	Insulation level - electrically stressed gap due to possible movement of earthing switch contacts	Sub-clause 1.5.6 of ENATS 41-36								
6.	Measurement of the resistance of main circuit – Panel	IEC 60694. Sub-clause 6.4, IEC62271-100. Sub-clause 6.4, IEC62271-200. Sub-clause 6.4.								
7.	" - Busbars	"								
8.	Temperature Rise - Panel	IEC 60694. Sub-clause 6.5, IEC62271-100. Sub-clause 6.5, IEC62271-200. Sub-clause 6.5								
9.	" - Busbars	"								
10	Short-time withstand current and peak withstand current tests - Circuit-breaker and Enclosure.(3sec short time)	IEC60694.Sub-clause 6.6, IEC62271-100. Sub-clause 6.6, IEC62271-200. Sub-clause 6.6.								
11	" - Busbars	"								
12.	" - Earthing Switch	IEC60694.Sub-clause 6.6, IEC62271-102. Sub-clause 6.6, IEC62271-200. Sub-clause 6.5.								
13.	" - Single phase test of earth circuit (sub-clause 1.4.5 of ENATS 41-36)	IEC60694.Sub-clause 6.6, IEC62271-100. Sub-clause 6.6, IEC62271-200. Sub-clause 6.6.								
14.	Verification of protection. (Indoor – IP3X min) Weatherproofing for outdoor equipment (IP3XDW min) Mechanical impact (indoor – 2J, outdoor – 5J)	IEC60694.Sub-clause 6.7, IEC62271-100. Sub-clause 6.7, IEC62271-200. Sub-clause 6.7. IEC 529 Sub-clause 1.5.13 of ENATS 41-36.								

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
	Test Requirement	**Specification & Standards**	**Rated value**	**Test req'd Y or N**	**Conformance***	**Test value**	**Date of test**	**Test station Report / Cert No**	**Witness I, M or ENA ****	**Remarks**
15.	Tightness test	IEC60694.Sub-clause 6.8, IEC62271-100. Sub-clause 6.8, IEC62271-200. Sub-clause 6.8.								
16.	EMC tests	IEC60694.Sub-clause 6.9, IEC62271-100. Sub-clause 6.9,								
17.	Mechanical operations - Circuit-breaker. a) Auto-reclosing circuit-breaker -min 5000 ops, preferably class M2 - 10,000 operating cycles, auto- reclosing sequences - Table 8, IEC 62271-100) b) Non-auto-reclosing circuit-breaker - class M1 - 2000 operating cycles If used as earthing device -mechanical strength of kinematic chain between movable contacts and the position indicating device	IEC62271-100. Sub-clause 6.101.2. IEC62271-200. Sub-clause 6.102 Sub-clause 2.4.110 of ENATS 41-36 IEC62271-102. Sub-clause 6.105 and Annex A								
18.	Mechanical operations - Earthing switch and disconnector - Manual - 1000 operating cycles Disconnectors operating in conjunction with circuit -breaker –2000, (5000) or 10,000 operating cycles depending on class of circuit-breaker Mechanical strength of kinematic chain between movable contacts and the position indicating device.	IEC62271-102. Sub-clause 6.102 IEC62271-200. Sub-clause 6.102 IEC62271-102. Sub-clause 6.105 and Annex A								
19.	Mechanical operations- switching devices and removable parts-50ops - interlocks (mechanical and electro-mechanical - 50 ops	IEC62271-200. Sub-clause 6.102								
20	Cable-charging current breaking test*	Subclause 6.111,5.2 IEC 62271-100								
21.	Low temperature tests	IEC 62271-100. Sub-clause 6.101.3								
22.	High temperature tests - subject to design (see clause 1.6)	IEC 62271-100. Sub-clause 6.101.3. Clause 1.6 of ENATS 41-36								
23.	Short-circuit making and breaking tests - Circuit-breaker class E2 Auto-reclosing circuit-breaker - tested for duty as specified in IEC62271-100. table 21, list 1. Non-auto-reclosing circuit-breaker - tested in accordance with sub-clauses 6.112.1 and 6.106 of IEC 62271-100	IEC62271-100. Sub-clauses 6.102 to 6.106, and 6.112 IEC62271-200. Sub-clause 6.101 Sub-clause 2.4.111 of ENATS 41-36								
24.	Short-circuit making tests - Earthing switch (class E2 - Test duty 5 of	IEC62271-102. Sub-clause 6.101,								

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
	Test Requirement	**Specification & Standards**	**Rated value**	**Test req'd Y or N**	**Conformance***	**Test value**	**Date of test**	**Test station Report / Cert No**	**Witness I, M or ENA ****	**Remarks**
	IEC 60265 sub-clause 6.101.10 - 5 making ops).	IEC60265: PART 1. Sub-clause 6.101.10								
25	Out of phase making and breaking current	IEC62271-100. Sub-clause 6.110, Sub-clause 2.4.106 of ENATS 41-36								
26.	Line-charging breaking current tests	IEC62271-100. Sub-clause 6.111 Sub-clause 2.4.107 of ENATS 41-36								
27.	Cable-charging breaking current tests	IEC62271-100. Sub-clause 6.111 Sub-clause 2.4.107 of ENATS 41-36								
28.	Internal Arc -- C B Chamber, C T Chamber, B B Chamber, Cable box. (36kV cable boxes using separable connectors – min 5kA).	IEC62271-200. Sub-clause 6.106. and Annex A Sub-clause 1.5.101 of ENATS 41-36								
29.	Gas-filled Compartment – Pressure Withstand	IEC62271-200. Sub-clause 6.103								
30.	Voltage presence indicating system (VPIS)	IEC 61958. Clause 6								
31	Voltage detecting system (VDS)	IEC 61243-5. Clause 5								
32.	Tests on auxiliary and control circuits/ equipment - Dielectric - Measurement of resistance - Temperature rise - Functional - Electrical continuity or earthed metallic parts - Verification of operational characteristics (Auxiliary contacts) - Ripple on d.c. input power port immunity - Environmental (Cold; Dry heat; Damp heat, steady state; Cyclic humidity; Vibration response & seismic; Final condition check)	Subclauses of IEC 60694 IEC 60694 incorporating Amd 2 Sub-clause 6.2.10 IEC 60694 incorporating Amd 2 Sub-clause 6.4.2 IEC 60694 Sub-clause 6.5.5 IEC 60694 incorporating Amd 2 Sub-clause 6.10.2 IEC 60694 incorporating Amd 2 Sub-clause 6.10.3 IEC 60694 incorporating Amd 2 Sub-clause 6.10.4 IEC 60694 incorporating Amd 2 Sub-clause 6.10.5 IEC 60694 incorporating Amd 2 Sub-clause 6.10.7								
33.	Finish	Performance to ENATS 98-1								24 monthly surveillance checks to maintain validity of the Notice
34	Process Control	ISO 9001 ER G79 Parts 1 & 2a								

* Conformance declaration codes

Ct1 = Independent witnessed tests
Ct2 = Not fully independent witnessed tests
Ct3 = Self verified tests
Ct4 = Alternative tests / evidence offered
Ct5 = Manufacturer has underwritten that the product meets the functional and performance requirements without further testing.
Ct6 = Not tested

N/A = Clause is not applicable/appropriate to the product
Cs1 = The test conforms fully with the requirements of this clause
Cs2 = The test conforms partially with the requirements of this clause
Cs3 = The test does not conform to the requirements of this clause
Cs4 = Test not performed, but alternative evidence/ technical case offered

Appendix 3c – ENATS 41-36 - Schedule Part 3 – METAL ENCLOSED SWITCHES.

SELF CERTIFICATION CONFORMANCE DECLARATION - NOTE: One sheet shall be completed for each item or variant submitted.

The following sheets replicate the self-declaration section of ENATS 41-36 and also include the clauses of the international Standards relevant to common specifications for high-voltage switchgear and control gear standards.

If the product has already been assessed by ENA then re-completion of these self-declaration sheets is not required and the manufacturer may simply state the ENA Notice Of Conformance or Approval Notice number in the boxes below and supply copies of the sheets used in the ENA assessment.

If NOT already ENA assessed then the manufacturer shall declare conformance or otherwise, clause by clause, using ENA standard conformance declaration codes below.

Conformance declaration codes:

N/A = Clause is not applicable/appropriate to the product
Cs1 = The test conforms fully with the requirements of this clause
Cs2 = The test conforms partially with the requirements of this clause
Cs3 = The test does not conform to the requirements of this clause
Cs4 = Test not performed, but alternative evidence/ technical case offered

Instructions for completion

- **When Cs1 code is entered then details of how compliance is achieved SHALL be provided in the remarks column.**
  This shall include details of type tests, where appropriate.
- **When any other code is entered; an explanation of the reason for non-conformance shall be entered**
- Prefix each remark with the relevant 'IEC' or 'ENATS' as appropriate

Manufacturer:		ENA Reference:
Product Reference:	Ratings:	
Name:	Signature:	Date:

IEC60265-1, IEC 62271-102				ENATS 41-36 - Part 3			
Clause / Sub-clause		Requirement	Conformance code	Clause / Sub-clause	Requirement	Conformance code	Remarks
IEC 60265-1	IEC 62271-102						
1	1	General		3.1	General		
				3.1	Switch disconnector		
				3.1	Class E3 - IEC 600265		
				3.1	10 closing ops at rated s/c		
				3.1	≤ 24kV- Class M2 - 5000 ops		
				3.1	36Kv - Class M1 -1000 ops		
2	2	Normal service and special service conditions		3.2	Normal service and special service conditions		
3	3	Definitions		3.3	Definitions		
4	4	Ratings		3.4	Ratings		
	4.101	Rated short-circuit making current					
4.101		Rated mainly active load breaking current		3.4.101	Rated mainly active load breaking current		
4.102		Rated closed-loop breaking current		3.4.102	Rated closed-loop breaking current		
4.103		Rated no-load transformer breaking current		3.4.103	Rated no-load transformer breaking current		
4.104		Rated cable-charge breaking current		3.4.104	Rated cable-charge breaking current		
4.105		Rated line-charging breaking current		3.4.105	Rated line-charging breaking current		
4.112		Rated short-circuit making current		3.4.112	Rated short-circuit making current		
4.113		Rated breaking and making currents Class E3 / 10 x TD5		3.4.113	Rated breaking and making currents Class E3 / 10 x TD5		
				3.4.201	Rated Mechanical Endurance		
5	5	Design and construction		3.5	Design and construction		
5.1	5.1	Requirements for liquids		3.5.1	Requirements for liquids		
5.2	5.2	Requirements for gasses		3.5.2	Requirements for gasses		
5.3	5.3	Earthing of high voltage switches		3.5.3	Earthing of high voltage switches and earthing facilities		
				3.5.3	Class E2 earthing switch		
				3.5.3	Earthing switch ratings		
5.4	5.4	Auxiliary and control equipment		3.5.4	Auxiliary and control equipment		
5.5	5.5	Dependent power closing		3.5.5	Dependent power closing		
5.6	5.6	Stored energy operation		3.5.6	Stored energy operation		
				3.5.6	Switch mechanisms		
				3.5.6	Earthing switch mechanism		
5.7	5.7	Independent manual operation		3.5.7	Independent manual operation		
5.8	5.8	Operation of releases		3.5.8	Operation of releases		
5.9	5.9			3.5.9	Low and high-pressure interlocking and monitoring devices		

IEC60265-1, IEC 62271-102				ENATS 41-36 - Part 3			
Clause / Sub-clause		Requirement	Conformance code	Clause / Sub-clause	Requirement	Conformance code	Remarks
IEC 60265-1	IEC 62271-102						
5.10	5.10	Nameplates		3.5.10	Nameplates and labelling		
				3.5.10	Mimic diagram		
				3.5.10	Test points		
				3.5.10	Mimic symbols/colours - Annex C		
				3.5.10	Labels - typically Fig 6		
5.11	5.11	Interlocking devices		3.5.11	Interlocking devices and padlocking facilities		
				3.5.11	Move before earthing device		
				3.5.11	Interlocks (a) to (f)		
5.12	5.12	Position indicating		3.5.12	Position indicating		
5.13	5.13	Degrees of protection by enclosures		3.5.13	Degrees of protection by enclosures		
5.14	5.14	Creepage distance		3.5.14	Creepage distance		
5.15	5.15	Gas and vacuum tightness		3.5.15	Gas and vacuum tightness		
5.16	5.16	Liquid tightness		3.5.16	Liquid tightness		
5.17	5.17	Flammability		3.5.17	Flammability		
5.18	5.18	Electromagnetic compatibility		3.5.18	Electromagnetic compatibility		
5.101		Making and breaking operations					
	5.101	Special requirements for earthing switches					
5.102	5.102	Requirements for switch-disconnectors					
5.103	5.103	Mechanical strength					
5.104		Securing the position					
	5.104	Operation of disconnectors and earthing switches – Position of the movable contact system and its indicating and signalling devices					
	5.104.1	Securing of position					
	5.104.2	Additional requirements for power-operated mechanisms					
	5.104.3	Indication and signalling of position					
	5.104.3.1	Indication of position					
	5.104.3.2	Electrical position signalling by auxiliary contacts					
5.105		Auxiliary contacts for signalling					
	5.105	Maximum force required for manual operation					
	5.105.1	Operation requiring more than one revolution					
	5.105.2	Operation requiring up to one revolution					

IEC60265-1, IEC 62271-102				ENATS 41-36 - Part 3			
Clause / Sub-clause IEC 60265-1	Clause / Sub-clause IEC 62271-102	Requirement	Conformance code	Clause / Sub-clause	Requirement	Conformance code	Remarks
	5.106	Dimensional tolerances					
				3.5.201	Test facilities		
				3.5.201	Separate		
				3.5.201	integral		
				3.5.201	Test symbol indication		
				3.5.201	Test symbol - Annex C		
				3.5.202	Transformer mounting		
6		Type tests		3.6	Type Tests		
				3.6	Table 3.2		
6.1		General					
6.2		Dielectric tests					
6.3		Radio interference voltage tests					
6.4		Measurement of resistance of the main circuit					
6.5		Temperature rise tests					
6.6		Short-time withstand current and peak withstand current tests					
6.7		Verification of the degree of protection					
6.8		Tightness test					
6.9		Electromagnetic compatibility (EMC) tests					
6.101		Making and breaking tests					
6.102		Mechanical operations test					
6.103		Operation under severe ice conditions					
7		Routine Tests		3.7	Routine Tests		
8		Guide to the Selection of high-voltage switches for service		3.8	Guide to the Selection of high-voltage switches for service		
9		Information to be Given with enquiries, tenders and orders		3.9	Information to be Given with enquiries, tenders and orders- schedule 3.1		
10		Rules for transport, storage, erection, operation and maintenance		3.10	Rules for transport, storage, erection, operation and maintenance		
11		Safety		3.11	Safety		

Appendix 3c – ENATS 41-36 - Schedule Part 3 – METAL ENCLOSED SWITCHES.

SELF CERTIFICATION CONFORMANCE DECLARATION

PART 3 – METAL ENCLOSED SWITCHES

TYPE TEST CONFORMANCE DECLARATION D3

Type tests for switch-disconnector including enclosure and earthing switch.

Manufacturer:

Product Reference: **Ratings:**

Name: **Signature:** **Date:**

Instructions for completion:

- Complete a separate table for each variant and rating
- ENA/SAP to complete columns 1 to 4
- Manufacturer to complete columns 5 to 10
- When test report also covers another rating insert 'See ???A unit' in the Remarks column
  Tests not requested may be shown as 'Additional tests' at the bottom of the table

Type test reports table based on ENATS 41-36 Table 3.2
*See bottom of table for conformance declaration codes
** I = Independent; M= Manufacturer; ENA= Energy Networks Association

N.B. All tests on ???A unit unless otherwise stated

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
	Test Requirement	**Specification and standards**	**Rated value**	**Test req'd Y or N**	**Conformance ***	**Test value**	**Date of test**	**Test station Report / Cert No**	**Witness I, M or ENA ****	**Remarks**
1	Dielectric - Panel, including switch-disconnector and earthing switch as appropriate Partial discharge ≤ 10pC For cable connected switches, tests to be representative of two cable termination systems, in addition to switchgear manufacturer's own system if any	IEC 60694. Sub-clause 6.2, IEC 60265: PART 1 . Sub-clause 6.2, IEC 62271-200. Sub-clause 6.2. Tables 1.1a and 1.1b of ENATS 41-36. IEC 62271-200. Sub-clause 6.2.9 and Annex FF ENATS 41-18 Sub-clauses 1.5.103.1 and 1.6 of ENATS 41-36								
2	" - Busbars	"								
3	Voltage Withstand - Isolating Gap (provision for dielectric tests on cables).	IEC 62271-200. Sub-clause 5.105 and 6.2.101. Sub-clause 1.4.2.2 of ENATS 41-36.								
4	DC Withstand Test on Test Devices, including all parts of main circuit which cannot be disconnected from the test connections	IEC 62271-200. Sub-clause 5.105. Sub-clause 1.5.201.1 of ENATS 41-36.								
5	Insulation level - electrically stressed gap due to possible movement of earthing switch contacts	Sub-clause 1.5.6 of ENATS 41-36								
6	Measurement of the resistance of main circuit – Panel	IEC 60694. Sub-clause 6.4, IEC 60265: PART 1 . Sub-clause 6.4, IEC 62271-200. Sub-clause 6.4								
7	" - Busbars	"								
8	Temperature Rise - Panel	IEC 60694. Sub-clause 6.5, IEC 60265: PART 1 . Sub-clause 6.5, IEC 62271-200. Sub-clause 6.5								
9	" - Busbars	"								
10	Short-time withstand current and peak withstand current tests - switch-disconnector and Enclosure.(3sec short time)	IEC 60694.Sub-clause 6.6, IEC 60265: PART 1 . Sub-clause 6.6, IEC 62271-200. Sub-clause 6.6.								
11	" - Busbars	"								
12	" - Earthing Switch	IEC 60694.Sub-clause 6.6, IEC 62271-102. Sub-clause 6.6, IEC 62271-200. Sub-clause 6.6.								
13	" -Single phase test of earth circuit	IEC 60694.Sub-clause 6.6, IEC 62271-102. Sub-clause 6.6, IEC 62271-200. Sub-clause 6.6.								
14	Verification of protection. (indoor – IP3X min) Weatherproofing for outdoor equipment. (IP3XDW min) Mechanical impact (indoor 2J, outdoor 5J)	IEC 60694.Sub-clause 6.7, IEC 60265: PART 1 . Sub-clause 6.7, IEC 62271-200. Sub-clause 6.7 IEC 529 Sub-clause 1.5.13 of ENATS 41-36.								
15	Tightness test	IEC 60694.Sub-clause 6.8, IEC 60265: PART 1 . Sub-clause 6.8, IEC 62271-200. Sub-clause 6.8.								
16	EMC tests	IEC 60694.Sub-clause 6.9, IEC 60265: PART 1. Sub-clause 6.9,								

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
	Test Requirement	**Specification and standards**	**Rated value**	**Test req'd Y or N**	**Conformance ***	**Test value**	**Date of test**	**Test station Report / Cert No**	**Witness I, M or ENA ****	**Remarks**
17	Short-circuit making and breaking tests - Switch-disconnector class E3 (7.2kV, 12kV, 24kV Test duty 5 = 10ops) (36kV test duty 5 = 5 ops)	IEC 60265: PART 1. Sub-clauses 6.101, (TD 1 to 5, Table 5) IEC 62271-200. Sub-clause 6.101 Sub-clause 3.4.113 of ENATS 41-36								
18	Short-circuit making tests - Earthing switch (class E2) Test duty 5 of IEC 60265 sub-clause 6.101.10 - 5 making operations.	IEC 62271-102. Sub-clause 6.101, IEC60265. Sub-clause 6.101.10								
19	Mechanical operations - Switch-disconnector - class M2 General purpose switch - 5000 operations. (including mechanical strength of kinematic chain between movable contacts and the position indicating device).	IEC 60265: PART 1. Sub-clause 6.102.4, IEC 62271-200. Sub-clause 6.102 IEC 62271-102. Sub-clause 6.105 and Annex A								
20	Mechanical operations - Earthing switch (including mechanical strength of kinematic chain between movable contacts and the position indicating device).	IEC 62271-102. Sub-clause 6.102 IEC 62271-200. Sub-clause 6.102 IEC 62271-102. Sub-clause 6.105 and Annex A								
21	Mechanical operations -Switching devices and removable parts- 50 ops -Interlocks-50 ops(mechanical and electro-mechanical)	IEC 62271-200. Sub-clause 6.102								
22	Low temperature tests	IEC 62271-102. Sub-clause 6.104								
23	High temperature tests- subject to design (see clause 1.6)	IEC 62271-102. Sub-clause 6.104, Clause 1.6 of ENATS 41-36								
24	Cable-charging breaking current tests	IEC 60265: PART 1. Sub-clause 6.101.8.4(f)								
25	Line-charging breaking current tests	IEC 60265: PART 1. Sub-clause 6.101.8.4(g)								
26	Internal Arc -- Switch-disconnector chamber, BB Chamber, Cable box (36kV cable boxes using screened separable connectors – min 5kA.)	IEC 62271-200. Sub-clause 6.106. Sub-clause 1.5.101 of ENATS 41-36								
27	Gas-filled Compartment Pressure Withstand	IEC 62271-200. Sub-clause 6.103								
28	Voltage presence indicating system (VPIS)	IEC 61958. Clause 6								
29	Voltage detecting device (VDS)	IEC 61243-5. Clause 5								
30	Tests on auxiliary and control circuits/ equipment - Dielectric - Measurement of resistance - Temperature rise - Functional - Electrical continuity or earthed metallic parts	Subclauses of IEC 60694 IEC 60694 incorporating Amd 2 Sub-clause 6.2.10 IEC 60694 incorporating Amd 2 Sub-clause 6.4.2 IEC 60694 Sub-clause 6.5.5 IEC 60694 incorporating Amd 2 Sub-clause 6.10.2 IEC 60694 incorporating Amd 2 Sub-clause 6.10.3								

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
	Test Requirement	**Specification and standards**	**Rated value**	**Test req'd Y or N**	**Conformance ***	**Test value**	**Date of test**	**Test station Report / Cert No**	**Witness I, M or ENA ****	**Remarks**
	- Verification of operational characteristics (Auxiliary contacts) - Ripple on d.c. input power port immunity - Environmental (Cold; Dry heat; Damp heat, steady state; Cyclic humidity; Vibration response & seismic; Final condition check)	IEC 60694 incorporating Amd 2 Sub-clause 6.10.4 IEC 60694 incorporating Amd 2 Sub-clause 6.10.5 IEC 60694 incorporating Amd 2 Sub-clause 6.10.7								
31	Finish	Performance to ENATS 98-1								
32	Process Control	ISO 9001 ER G79 Parts 1 & 2a								36 monthly surveillance checks to maintain validity of the Notice

N/A = Clause is not applicable/appropriate to the product
Cs1 = The test conforms fully with the requirements of this clause
Cs2 = The test conforms partially with the requirements of this clause
Cs3 = The test does not conform to the requirements of this clause
Cs4 = Test not performed, but alternative evidence/ technical case offered

* Conformance declaration codes

Ct1 = Independent witnessed tests
Ct2 = Not fully independent witnessed tests
Ct3 = Self verified tests
Ct4 = Alternative tests / evidence offered
Ct5 = Manufacturer has underwritten that the product meets the functional and performance requirements without further testing.
Ct6 = Not tested

Appendix 3d – ENATS 41-36 - Schedule Pt 10 – PROTECTION, INSTRUMENTATION & METERING EQUIPMENT.

SELF CERTIFICATION CONFORMANCE DECLARATION - NOTE: One sheet shall be completed for each item or variant submitted.

The following sheets replicate the self-declaration section of ENATS 41-36 and also include the clauses of the international Standards relevant to common specifications for high-voltage switchgear and control gear standards.

If the product has already been assessed by ENA then re-completion of these self-declaration sheets is not required and the manufacturer may simply state the ENA Notice Of Conformance or Approval Notice number in the boxes below and supply copies of the sheets used in the ENA assessment.

If NOT already ENA assessed then the manufacturer shall declare conformance or otherwise, clause by clause, using ENA standard conformance declaration codes below.

Conformance declaration codes:

N/A = Clause is not applicable/appropriate to the product
Cs1 = The test conforms fully with the requirements of this clause
Cs2 = The test conforms partially with the requirements of this clause
Cs3 = The test does not conform to the requirements of this clause
Cs4 = Test not performed, but alternative evidence/ technical case offered

Instructions for completion

- **When Cs1 code is entered then details of how compliance is achieved SHALL be provided in the remarks column.**
  This shall include details of type tests, where appropriate.
- **When any other code is entered; an explanation of the reason for non-conformance shall be entered**
- Prefix each remark with the relevant 'IEC' or 'ENATS' as appropriate

Manufacturer:		ENA Reference:
Product Reference:	Ratings:	
Name:	Signature:	Date:

ENATS 41-36 Part 10 Clause / Sub- clause	Requirements	Conformance code	Remarks
10.1	General		
10.1	Ratings as associated switching device		
10.1	ENATS 35-15		
10.2	Current transformers		
10.2.1	General		
10.2.1	CTs to IEC 60044 Part 1		
10.2.1	Characteristics to ENATS 35-15		
10.2.1	Position of CT data plates		
10.2.1	Secondary winding connections		
10.2.1	No common leads (metering CTs)		
10.2.1	Earth screen – accessible		
10.2.1	ER S15 and ENATS 50-18		
10.2.1	Individual test certificates		
10.2.1	Low energy output devices		
10.2.1	CT installation		
10.2.2	Performance characteristics ENATS 35-15		
10.3	Voltage transformers		
10.3.1	General		
10.3.1	VTs to IEC 60044-2		
10.3.1	Dry, encapsulated, isolatable		
10.3.1	VT design		
10.3.1	Low energy output devices		
10.3.1	Individual test certificates		
10.3.1	Prevent access to metering circuits		
10.3.2	Performance characteristics ENATS 35-15		
10.3.3	VT connections		
10.3.3.1	General		
10.3.3.1	Means of breaking primary connections		
10.3.3.1	Secondary windings fuses and links		
10.3.3.1	Removal of secondary fuse-links in service		
10.3.3.1	Means of breaking connections labelled		
10.3.3.1	Padlockable shutters – primary isolation		
10.3.3.1	Primary connection fuse links – BS 2692		
10.3.3.1	Fuse rating – 3.15A		
10.3.3.1	Fuses for oil insulated VT		
10.3.3.2	Star point connections compartment – fixed cover		
10.3.3.2	Fixed cover labelled		
10.3.4	Padlocking facilities		
10.3.4.1	Safety padlocking facilities a) to c)		
10.4	Metering equipment		
10.4	LV connections brought out		
10.4	Sealable terminal block		
10.4	VT accuracy class 1.0 (10MVA)		
10.4	VT accuracy class 0.5 (>10MVA)		

ENATS 41-36 Part 10 Clause / Sub- clause	Requirements	Conformance code	Remarks
10.4	Two windings as (a) or (b)		
10.4	CT accuracy class 0.5S (10MVA)		
10.4	CT accuracy class 0.2S (<100MVA)		
10.4.1	Self-contained metering unit		
10.4.1	Metal enclosed free standing		
10.4.1	Flange for ENATS 35-1 transformer		
10.4.1	Multicore cable box – BS6121 (E1W)		
10.5	Instruments		
10.5	ENATS 50-18		
10.5	Scale		
10.6.1	Earth fault passage indication		
10.6.1	Readily visible		
10.6.1	Core balance CT		
10.6.1	Insulated cable gland		
10.6.2	Remote earth fault indication		

Appendix 4– ENATS 41-40

SELF CERTIFICATION CONFORMANCE DECLARATION - NOTE: One sheet shall be completed for each item or variant submitted.

The following sheets replicate the self-declaration section of ENATS 41-40 and also include the clauses of the international Standards relevant to common specifications for high-voltage switchgear and control gear standards.

If the product has already been assessed by ENA then re-completion of these self-declaration sheets is not required and the manufacturer may simply state the ENA Notice Of Conformance or Approval Notice number in the boxes below and supply copies of the sheets used in the ENA assessment.

If NOT already ENA assessed then the manufacturer shall declare conformance or otherwise, clause by clause, using ENA standard conformance declaration codes below.

Conformance declaration codes:

N/A = Clause is not applicable/appropriate to the product
Cs1 = The test conforms fully with the requirements of this clause
Cs2 = The test conforms partially with the requirements of this clause
Cs3 = The test does not conform to the requirements of this clause
Cs4 = Test not performed, but alternative evidence/ technical case offered

Instructions for completion

- **When Cs1 code is entered then details of how compliance is achieved SHALL be provided in the remarks column.**
  This shall include details of type tests, where appropriate.
- **When any other code is entered; an explanation of the reason for non-conformance shall be entered**
- Prefix each remark with the relevant 'IEC' or 'ENATS' as appropriate

Manufacturer:		**ENA Reference:**
Product Reference:	**Ratings:**	
Name:	**Signature:**	**Date:**

Clause	Requirement	ENA TS 41-40 Code	BS EN Code	Remarks
1	Scope [BS EN 62271-1]			
2	Normative references			
3	Terms and definitions [BS EN 62271-1]			
4	Normal and special service conditions [BS EN 62271-1]			
4.1.2	Indoor switchgear and controlgear [BS EN 62271-1]			
4.1.3	Outdoor switchgear and controlgear [BS EN 62271-1]			
5	Ratings [BS EN 62271-1]			
5.3	Rated insulation level (Up & Ud) [BS EN 62271-1]			
5.4	Rated frequency (fr) [BS EN 62271-1]			
5.5	Rated continuous current (Ir) [BS EN 62271-1]			
5.6	Rated short-time withstand current (Ik) [BS EN 62271-1]			
5.6.201	Rated short-time withstand current of the earthing circuit (Ike)			
5.7	Rated peak withstand current (Ip) [BS EN 62271-1]			
5.8	Rated duration of short-circuit (tk) [BS EN 62271-1]			
5.8.201	Rated duration of short-circuit of the earthing circuit (tke)			
5.9	Rated supply voltage of auxiliary and control circuits (Ua) [BS EN 62271-1]			
5.1	Rated supply frequency of auxiliary and control circuits [BS EN 62271-1]			
5.11	Rated pressure of compressed gas supply for controlled pressure systems [BS EN 62271-1]			
5.101	Rated internal arc classification (IAC) [BS EN 62271- 200]			
5.101.1	General [BS EN 62271-200]			
5.101.2	Types of accessibility [BS EN 62271-200]			
5.101.3	Classified sides [BS EN 62271-200]			
5.101.4	Rated arc fault currents (IA, IAe) [BS EN 62271-200]			
5.101.5	Rated arc fault duration (tA, tAe) [BS EN 62271-200]			
5.102	Rated cable test access [BS EN 62271-200]			
5.102.1	General [BS EN 62271-200]			
5.102.2	Rated AC cable test voltage Uct (AC) [BS EN 62271- 200]			
5.102.3	Rated DC cable test voltage Uct (DC) [BS EN 62271- 200]			
5.3	Circuit-breaker requirements [BS EN 62271-100]			
5.300.100	General circuit-breaker requirements			
5.300.101	Rated short-circuit breaking current (Isc) [BS EN 62271- 100]			
5.300.102	Transient recovery voltage related to the rated short- circuit breaking current [BS EN 62271-100]			
5.300.103	Rated short-circuit making current (Ima) [BS EN 62271- 100]			
5.300.104	Rated operating sequence [BS EN 62271-100]			
5.300.105	Characteristics for short-line faults [BS EN 62271-100]			
5.300.106	Rated out-of-phase making and breaking currents [BS EN 62271-100]			
5.300.107	Rated capacitive switching currents [BS EN 62271-100]			
5.300.108	Inductive load switching [BS EN 62271-100]			
5.300.110	Number of mechanical operations [BS EN 62271-100]			
5.300.111	Classification of circuit-breakers as a function of electrical endurance [BS EN 62271-100]			
5.302	Disconnector requirements [BS EN 62271-102]			

Clause	Requirement	ENA TS 41-40 Code	BS EN Code	Remarks
5.302.102	Classification of earthing switches for short-circuit making [BS EN 62271-102]			
5.302.104	Rated values of the bus transfer current switching capability of disconnectors [BS EN 62271-102]			
5.302.106	Classification of disconnectors for mechanical endurance [BS EN 62271-102]			
5.302.107	Classification of earthing switches for mechanical endurance [BS EN 62271-102]			
5.303	Switches and earth switch requirements [BS EN 62271- 103]			
5.303.101	Rated mainly active load-breaking current (Iload) [BS EN 62271-103]			
5.303.102	Rated closed-loop breaking current (Iloop) [BS EN 62271- 103]			
5.303.103	Rated cable-charging breaking current (Icc) [BS EN 62271-103]			
5.303.104	Rated line-charging breaking current (Ilc) [BS EN 62271- 103]			
5.303.111	Rated short-circuit making current (Ima) [BS EN 62271- 103]			
5.303.116	Type and classes for a general purpose switch [BS EN 62271-103]			
5.303.201	Rated mechanical endurance of switches			
6	Design and construction			
6.0	Design and construction requirements			
6.2	Requirements for gases in switchgear and controlgear [BS EN 62271-1]			
6.3	Earthing of switchgear and controlgear [BS EN 62271-1]			
6.4	Auxiliary and control equipment and circuits [BS EN 62271-1]			
6.4.201	Identification			
6.4.202	Cables and wiring			
6.4.203	Terminals and terminations			
6.5	Dependent power operation [BS EN 62271-1]			
6.6	Stored energy operation [BS EN 62271-1]			
6.7	Independent unlatched operation (independent manual or power operation) [BS EN 62271-1]			
6.7.201	Independent manual or power operation (independent unlatched operation)			
6.7.202	Dependent manual operation			
6.8	Manually operated actuators [BS EN 62271-1]			
6.9	Operation of releases [BS EN 62271-1]			
6.9.300	Operation of releases – circuit-breaker [BS EN 62271- 100]			
6.10	Pressure/level indication [BS EN 62271-1]			
6.11	Nameplates [BS EN 62271-1]			
6.11.201	Labelling			
6.11.201.1	General			
6.11.201.2	Motorised disconnectors			
6.11.201.3	Phase identification			
6.11.201.4	Circuit labels			
6.11.202	Mimic diagrams			
6.11.302	Disconnector nameplates [BS EN 62271-102]			
6.11.303	Switch nameplates [BS EN 62271-103]			
3				
6.12	Locking devices [BS EN 62271-1]			

Clause	Requirement	ENA TS 41-40 Code	BS EN Code	Remarks
6.12.201	Interlocking devices			
6.12.201.1	General			
6.12.201.2	3-position device			
6.12.201.2.1	Move before earth 3-position device			
6.12.201.3	Test access			
6.12.201.4	Test devices			
6.12.202	Padlocking facilities			
6.12.202.1	Safety padlocking			
6.12.202.2	Operational padlocking			
6.13	Position indication [BS EN 62271-1]			
6.14	Degrees of protection provided by enclosures [BS EN 62271-1]			
6.14.1	General [BS EN 62271-1]			
6.14.2	Protection of persons against access to hazardous parts and protection of the equipment against ingress of solid foreign objects (IP coding) [BS EN 62271-1]			
6.14.4	Protection of equipment against mechanical impact under normal service conditions (IK coding) [BS EN 62271-1]			
6.16	Gas and vacuum tightness [BS EN 62271-1]			
6.20	X-ray emission [BS EN 62271-1]			
6.22	Filling levels for insulation, switching and/or operation [BS EN 62271-1]			
6.101	Internal arc fault [BS EN 62271-200]			
6.102	Enclosure [BS EN 62271-200]			
6.102.1	General [BS EN 62271-200]			
6.102.2	Covers and doors [BS EN 62271-200]			
6.102.2.201	Surface preparation and coating			
6.102.2.202	Foundation arrangements			
6.102.2.203	Heater			
6.102.3	Partition or shutter being part of the enclosure [BS EN 62271-200]			
6.102.4	Inspection windows [BS EN 62271-200]			
6.102.5	Ventilating openings, vent outlets [BS EN 62271-200]			
6.103	High voltage compartments [BS EN 62271-200]			
6.103.1	General			
6.103.1.201	Connection compartments [BS EN 62271-200]			
6.103.2	Fluid filled compartments (gas or liquid) [BS EN 62271- 200]			
6.103.2.2	Design [BS EN 62271-200]			
6.103.2.3	Tightness [BS EN 62271-200]			
6.103.2.4	Pressure relief of fluid-filled compartments [BS EN 62271-200]			
6.103.3	Partitions and shutters [BS EN 62271-200]			
6.103.201	Busbars and busbar connections			
6.103.202	Gas insulated equipment			
6.103.203	Requirements for combinations of switching devices			
6.103.203.1	General			
6.103.203.2	Facilities for disconnecting the circuit			

Clause	Requirement	ENA TS 41-40 Code	BS EN Code	Remarks
6.103.203.3	Facilities for earthing circuits and busbars			
6.103.203.4	Facilities for earthing circuits			
6.103.203.5	Facilities for earthing busbars			
6.103.203.6	Facilities for testing primary circuits and busbars			
6.103.202.3.4	Facilities for checking and testing			
6.103.203.7	Testing via primary circuits			
6.103.203.8	Testing via secondary circuits			
6.103.203.9	Fault location, voltage withstand and protection testing			
6.103.203.10	Facilities for checking voltage and phase identification			
6.103.203.11	Facilities for measuring voltage			
6.201	CT and VT general requirements			
6.201.1	CT requirements			
6.201.1.1.1	CT performance characteristics			
6.201.2	VT general requirements			
6.201.2.1	VT performance characteristics			
6.201.2.2	VT general connections			
6.201.2.3	Star point connection			
6.201.3	Safety padlocking facilities			
6.202	Metering requirements			
6.203	Instrument requirements			
6.204	Fault passage indication			
7	Type tests [BS EN 62271-1]			
7.2	Dielectric tests [BS EN 62271-1] (including tests on 2 cable systems)			
7.2.201	Dielectric type test for cable connected equipment with AC test voltages [BS EN 62271-1]			
7.2.202	Test facilities [BS EN 62271-1]			
7.11	X-radiation test procedures for vacuum interrupters [BS EN 62271-1]			
7.101	Verification of making and breaking capacities [BS EN 62271-200]			
7.102	Mechanical operation tests [BS EN 62271-200]			
7.102.0	General mechanical operation tests			
7.102.1	Mechanical operation type test for interlocks [BS EN 62271-200]			
7.201	Voltage transformer type tests			
7.300	Circuit-breaker requirements [BS EN 62271-100]			
7.300.111	Capacitive switching type tests [BS EN 62271-100]			
7.302	Disconnector type tests [BS EN 62271-102]			
7.303	Switch type tests [BS EN 62271-103]			
7.303.101	Making and breaking tests			
7.303.102	Mechanical endurance type test [BS EN 62271-103]			
8	Routine tests [BS EN 62271-1]			
8.101	Partial discharge measurement [BS EN 62271-200]			
9	Guide to the selection of switchgear and controlgear [BS EN 62271-1]			
9.101	Selection of design and construction [BS EN 62271-200]			
11	Transport, storage, installation, operating instructions and maintenance [BS EN 62271-1]			

Clause	Requirement	ENA TS 41-40 Code	BS EN Code	Remarks
11.2	Conditions during transport, storage and installation [BS EN 62271-1]			
11.4	Operation [BS EN 62271-1]			
11.5	Maintenance [BS EN 62271-1]			
11.201	Extension limitations			
11.202	Replacement & disposal			
12	Safety [BS EN 62271-1]			
12.1	General safety			
12.101	Procedures [BS EN 62271-200]			
12.102	Internal arc aspects [BS EN 62271-200]			
13	Influence of the product on the environment [BS EN 62271-1]			
Annex A (informative)	Explanatory notes			
A.1	Test devices			
A.2	Small inductive breaking current			
A.2.1	Circuit-breakers			
A.2.1.1	General			
A.2.1.2	Transformer magnetising current for circuit-breakers with rated voltage (Ur) of 100kV and above			
A.2.1.3	Transformer magnetising current for circuit-breakers with rated voltage (Ur) below 100kV			
A.2.2	Switches			
A.3	Mimic diagrams and symbols			
Annex B	Self-Certification Conformance Declaration			
Annex C	Symbols for mimic diagrams			
C.1	Position indication			
C.1.1	Position indication for circuit-breaker, disconnector and earthing switch			
C.1.2	Position indication for switch-disconnector / earthing switch			
C.1.3	Position indication of earthing switch when integral earth star point is removed for testing purposes			
C.2	Graphical symbols for equipment			
C.2.1	VT symbol – IEC 60617-6 symbol No. 06-13-01A			
C.2.2	VT with VT HV disconnector – IEC 60617-7 symbol no. 07-13-06			
C.2.3	Primary test point			
C.2.4	Capacitively coupled test point			
C.3	Typical pictogram for busbar earthing			
Annex D	Standard labels			

Appendix 5 – Self Certification Conformance Declarations Against ENATS 48-05 Requirements

CLAUSE BY CLAUSE CONFORMANCE WITH ENATS 48-5 – 'Environmental Test Requirements for protection Relays and Systems'

Protection relays shall comply with the latest issues of the relevant International and British Standards. ENATS 48-05 is intended to amplify and/or clarify the requirements of those Standards.

This check sheet identifies the clauses in ENATS 48-05 relevant to Environmental Test Requirements for protection relays and systems.

If the product has already been assessed by ENA then re-completion of these self-declaration sheets is not required and the manufacturer may simply state the ENA Notice Of Conformance or Approval Notice number in the boxes below and supply copies of the sheets used in the ENA assessment.

If NOT already ENA assessed then the manufacturer shall declare conformance or otherwise, clause by clause, using ENA standard conformance declaration codes below.

Conformance declaration codes:

N/A = Clause is not applicable/appropriate to the product
Cs1 = The test conforms fully with the requirements of this clause
Cs2 = The test conforms partially with the requirements of this clause
Cs3 = The test does not conform to the requirements of this clause
Cs4 = Test not performed, but alternative evidence/ technical case offered

Instructions for completion

- **When Cs1 code is entered then details of how compliance is achieved SHALL be provided in the remarks column.**
  This shall include details of type tests, where appropriate.
- **When any other code is entered; an explanation of the reason for non-conformance shall be entered**
- Prefix each remark with the relevant 'IEC' or 'ENATS' as appropriate

Manufacturer:		ENA Reference:
Product Reference:	Ratings:	
Name:	Signature:	Date:

Protection Relay Type Testing – Atmospheric Environment Requirements				
Standard	**Test**	**Requirement**	**Conformance Code**	**Remarks**
IEC 60068-2-1	Temperature Cold Heat	-25°C, 96 hours, operate and storage		
IEC 60068-2-2	Temperature Dry Heat	-70°C, 96 hours, operate and storage		
IEC 60068-2-3	Relative Humidity			
IEC 60068-2-30	Relative Humidity Alternative	100% RH, 40ºC, 56 cycles of +25°C to +55°C		
BS EN 60529	Enclosure	IP54		

Protection Relay Type Testing Continued – Mechanical Environment Requirements				
Standard	**Test**	**Requirement**	**Conformance Code**	**Remarks**
IEC 60255-21-1	Vibration	Response and Endurance Class 1		
IEC 60255-21-2	Shock	Response and Endurance Class 1		
IEC 60255-21-2	Bump	Class 1		
IEC 60255-21-3	Seismic	Class 1		

Protection Relay Type Testing Continued – Electrical Requirements				
Standard	**Test**	**Requirement**	**Conformance Code**	**Remarks**
IEC 60255-6	48 V DC Supply Voltage	Table 1, 38.5 to 53 V with a maximum of > 60 V		
IEC 60255-11	Voltage Dips, Short Interruptions and Voltage Immunity Test	10ms interruption, 12% AC ripple		
	DC Supply Voltage General	Ramp up and down over 1 minute or similar		
ENA TS 48-4	Low Burden Trip Relays	Captive discharge ENA 1		
ENA TS 48-4	High Burden Trip Relays	Captive discharge ENA 1		
ENA TS 48 – 5	Thermal requirement of CT inputs	2.4 x In, continuous 3.0A, 20 mins 3.5A, 10 mins 4.0A, 5 mins 5.0A, 3 mins 6.0A, 2 mins		
ENA TS 48 – 5	Thermal requirements of VT inputs	120% of Vn, continuous		
ENA TS 48 – 5	Dielectric	Test values selected according to insulation voltage. High Impedance circulating current schemes, test at 2.5kV. Circuits connected to instrument transformers or batteries, rated insulation not below 250V, test at 2.0kV. Open output relay contacts 1kV.		
IEC 60255 – 5	Impulse Voltage	Test at 5kV, 0.5J		

Electromagnetic Compatibility (EMC) Requirements				
Standard	**Test**	**Requirement**	**Conformance Code**	**Remarks**
IEC 60255	Oscillatory waves immunity test (High Frequency Disturbance)	Class III, 1MHz 2.5kV common, 1 kV diff. Applied to all ports, except diff on comms at the discretion of the approving panel		
IEC 60255	Electrostatic Discharge Immunity Tests	Class III. 6kV, contact, 8kV air. Applied to the enclosure		
IEC 60255	Radiated electromagnetic Field Disturbance test (RFI)	10V/m, 1kHz, 80 to 1000MHz sweep and 80, 160, 450, 900 Mhz spot frequencies. Applied to the enclosure		
IEC 60255	Radiated electromagnetic field from digital radio telephones immunity test	10V/m, 900 and 1890Mhz. Applied to the enclosure		
IEC 60255	Electrical fast transient/burst immunity	Level IV, 4kV. Applied to all ports		
	Surge immunity	Level III, 2kV common, 1kV diff. (Level 4, 4kV, 2kV preferred for CT and VT inputs) Applied to all ports		
IEC 60255	Conducted electromagnetic field disturbance tests	10Vrms, 80% mod, 1kHz. 0.15 to 80MHz sweep and 27 and 68 MHz spot frequencies. Applied to all ports		
EN 61000-4-8 (IEC 61000-4-8)	Power frequency magnetic field immunity test	1000 A/m for 1 sec and 100 A/m for 1 min. Applied to all ports		
EN 61000-4-9 (IEC 61000-4-9)	Pulse magnetic field immunity test	6.4/16 µs magnetic pulse, 1000 A/m. Applied to enclosure. Not currently mandatory		
EN 61000-4-10 (IEC 61000-4-10)	Damped oscillatory magnetic field immunity test	0.1 and 1.0 MHz, 100A/m. Applied to the enclosure. Not currently mandatory		
IEC 60255-22-7 & EATS 48-5	Power Frequency	Level 4, 300V for 1 s at 50Hz, common mode. Appendix A, EATS 48-5 for differential, at discretion of panel		
IEC 60834-1 & IEC 60834-2	Communication channel Noise immunity			
IEC 60255-25	Conducted and radiated Emission	Class A, conducted, power supply: 0.15 to 0.5 MHz, 79dB(µV) quasi peak, 66dB (µV) average, 0.5 to 30 MHz, 71dB(µV) quasi peak, 60dB (µV) average. Radiated, enclosure at 10M: 30 to 230 MHz, 40dB(µV) quasi peak, 230 to 1000 MHz, 47dB(µV) quasi peak,		

Appendix 6 – Self Certification Conformance Declarations Against ENATS 48-6-6 Requirements

CLAUSE BY CLAUSE CONFORMANCE WITH ENATS 48-6-6 Functional Test Requirements – Overcurrent & Earth Fault Protection

Protection relays shall comply with the latest issues of the relevant International and British Standards. ENATS 48-05 is intended to amplify and/or clarify the requirements of those Standards.

This check sheet identifies the clauses in ENATS 48-05 relevant to Environmental Test Requirements for protection relays and systems.

If the product has already been assessed by ENA then re-completion of these self-declaration sheets is not required and the manufacturer may simply state the ENA Notice Of Conformance or Approval Notice number in the boxes below and supply copies of the sheets used in the ENA assessment.

If NOT already ENA assessed then the manufacturer shall declare conformance or otherwise, clause by clause, using ENA standard conformance declaration codes below.

Conformance declaration codes:

N/A = Clause is not applicable/appropriate to the product
Cs1 = The test conforms fully with the requirements of this clause
Cs2 = The test conforms partially with the requirements of this clause
Cs3 = The test does not conform to the requirements of this clause
Cs4 = Test not performed, but alternative evidence/ technical case offered

Instructions for completion

- **When Cs1 code is entered then details of how compliance is achieved SHALL be provided in the remarks column.**
  This shall include details of type tests, where appropriate.
- **When any other code is entered; an explanation of the reason for non-conformance shall be entered**
- Prefix each remark with the relevant 'IEC' or 'ENATS' as appropriate

Manufacturer:		ENA Reference:
Product Reference:	Ratings:	
Name:	Signature:	Date:

ENATS 48-6-6 clause / Sub-clause	Requirements	Conformance code	Remarks
10.3.4.1	Safety padlocking facilities a) to c)		
10.4	Metering equipment		
10.4	LV connections brought out		
10.4	Sealable terminal block		
10.4	VT accuracy class 1.0 (10MVA)		
10.4	VT accuracy class 0.5 (>10MVA)		
10.4	Two windings as (a) or (b)		
10.4	CT accuracy class 0.5S (10MVA)		
10.4	CT accuracy class 0.2S (<100MVA)		
10.4.1	Self-contained metering unit		
10.4.1	Metal enclosed free standing		
10.4.1	Flange for ENATS 35-1 transformer		
10.4.1	Multicore cable box – BS6121 (E1W)		
10.5	Instruments		
10.5	ENATS 50-18		
10.5	Scale		
10.6.1	Earth fault passage indication		
10.6.1	Readily visible		
10.6.1	Core balance CT		
10.6.1	Insulated cable gland		
10.6.2	Remote earth fault indication		

Appendix 7 – Declaration of Compliance with NPS/003/006 Technical Specification for Primary 11 & 20kV Switchgear

Switchgear range name and voltage range:			
NPS/003/006 Clause		**Full Compliance (Yes or No)**	**Details/Remarks/Description** *For ALL clauses; provide a short summary in this column*
3.1	Compliance with IEC, BSEN, BS, etc.		
3.2	Compliance with ENA TS 41-36		
3.2	Compliance with ENA TS 41-43		
3.2	ENA Assessed		ENA assessment ref:
3.3	Indoor design		
3.4	Level of remote control provision available		
3.5.1	Relays compliant with ENA TS-48-5 and ENA TS 48-6-6		
3.5.1	Relays ENA assessed		ENA assessment ref:
3.5.1	Relays IEC 60255 compliance		
3.5.1	Relays compliant with requirements (a) to €		
3.6	Test voltages		

Appendix 7 continued…

Switchgear range name and voltage range:				
NPS/003/006 Clause			Compliance (Yes or No)	Details/Remarks/Description *For ALL clauses; provide a short summary in this column*
ENATS 41-36	*ENATS 41-40*	**Variations from ENATS 41-36 & 41-40:**		
1.4.2.1	*5.3 Table 1*	95kV BIL for 12kV eqpt		
1.4.2.1	*5.3 Table 1*	125kV BIL for 24kV eqpt		
1.4.4.1	*5.5*	Busbars as per Appendix 1 & 7.		
1.4.5	*5.6*	Short-time withstand: 12kV >=20kA 24kV >=16kA		
1.4.8	*5.9*	Auxiliary and Control Circuits:		
1.4.8	*5.9*	Closing and Tripping – 110V DC		
1.4.8	*5.9*	Indication – 110V DC		
1.4.8	*5.9*	SCADA/Telecontrol/ Supervisory – 24V DC		
1.4.8	*5.9*	Spring Charge – 110V DC		
1.5.0.3.2		Diagrams provided		
1.5.0.4.4	*6.103.203.3*	Testing facilities		
1.5.0.4.5.1	*6.103.203.7*	VPIS/VDS on all circuits		
1.5.0.4.7	*6.103.203.10*	Test voltage withstand		
1.5.1	*6.1*	Non-oil filled switchgear or Metering Units		
1.5.2	*6.2*	SF6 topping up live & associated instructions		
1.5.13.2		Water ingress IPX1 or IPX2		
1.5.101	*6.101*	Internal arc relief ducting away and/or arc quenching option		
1.5.103.1.101	*6.103.1.201*	Cable bushing interface		
1.10	*11*	UK legislation compliance, including Working at Heights		
1.10	*11*	Manual handling instructions		

Appendix 7 continued…

Switchgear range name and voltage range:				
NPS/003/006 Clause			Compliance (Yes or No)	Details/Remarks/Description *For ALL clauses; provide a short summary in this column*
ENATS 41-36	*ENATS 41-40*	**Variations from ENATS 41-36 and ENATS 41-40:**		
2		**Metal enclosed circuit breakers**		
2.4		Line charging/breaking		
2.4.101		Isc for 12kV: ≥ 20kA@75ms (X/R of 24)		
2.4.101		Isc for 24kV: ≥16kA@75ms (X/R of 24) or ≥12.5kA@120ms (X/R of 37)		
	5.300.101	Isc for 12kV ≥ 25kA@45ms (X/R of 14)		
	5.300.101	Isc for 24kV: ≥20kA@45ms (X/R of 14) or ≥12.5kA@120ms (X/R of 38)		
2.4.103	5.300.103	Rated Short Circuit Making current: 2.7x r.m.s value of short circuit breaking current		
2.4.104	5.300.104	Reclose operating sequence O-0.3s-CO-10s-CO		
2.5.8	6.9.300	Operation of Releases from 25m away		
2.5.10.1	6.11	Rating plate include ENA TS compliance and ENA NOC ref.		
10		**Additional Clauses for Miscellaneous Equipment**		
10.3.3.1	6.201.2.2	VT's connected to Primary conductors by Fuse Links.		

Appendix 8 - Protection, Secondary Wiring and Metering Requirements

PROTECTION SCHEMES MIGHT BE SITE SPECIFIC. THE INFORMATION CONTAINED IN THIS APPENDIX IS TO ALLOW COMPARISONS OF TENDER RETURNS BASED ON TYPICAL SCENARIOS AND REQUIREMENTS.

NORTHERN POWERGRID DRAWING C1040116 GIVES A GUIDE FOR THE VARIOUS TYPES OF CIRCUIT PROTECTION SCHEMES THAT ARE REQUIRED.

General requirements are specified in Section 1 of this Appendix.

1.0 PROTECTION, SECONDARY WIRING AND METERING REQUIREMENTS - GENERAL

A8.1.1 CT secondary terminations shall be of the spring loaded or "cage clamp" design. Stud type CT terminations shall be fitted with spring washers.

A8.1.2 Where CT secondary wiring is to be run into adjacent circuits such as Bus Zone protection schemes the terminals shall also have a shorting/disconnecting facility where the link is of the screw-down type.

A8.1.3 Secondary terminals on SCADA connections should include knife terminals equipped with test 2.3mm sockets. (A maximum of 20 per panel will be required)

A8.1.4 CT's will be continuously rated for 110% of the switchgear continuous rating and will have a 3s rating to match the short time rating of the switchgear. VT's will have a Voltage factor of 1.2x Continuous and 1.9x for a minimum of 8 Hours. All VT/CT test certificates will be issued in electronic form with the dispatch of the switchgear to the nominated Northern Powergrid Project Engineer. Factory test documentation is not acceptable, only documentation supplied by the CT/VT manufacturer is acceptable and samples will be provided during contract negotiations.

A8.1.5 Protective relays shall be of types that are included in the current edition of ENA Engineering Equipment Approvals List ALP1 - "Protective Relays and Systems" and shall comply with relevant current European/British Standards, ENA Technical Specifications and be pre-approved for use based on the Northern Powergrid current relay panel contract

A8.1.6 Relays used on the switchgear must be from the Northern Powergrid approved list. This gives details of exact model types and firmware versions that are accepted for use on the Northern Powergrid system. All relays should be suitable for a nominal DC voltage of 110v, but also be able to withstand overvoltages of 200v

A8.1.7 Internal Cabling shall be coloured white, except for earth cables, which shall be Green/Yellow in addition:

- AC Wiring (240v) (Double Insulated)
- Pilot Wiring (5kV Insulated up to 66kV and 15kV over 66kV)

All small wiring shall generally comply with Clause 5.4.4.5.1 of IEC 62271-1 and ENA TS 50-18 issue 3, clause 5.1

All fuses and carriers shall be to Ref. A1-A4 of BS 88 (EN 60269, IEC 60269) and in accordance with ENATS 50-18.

Small wiring cable shall be single core multistranded, copper conductor, PVC insulated and comply with BS 6231. In the interest of mechanical strength, the nominal minimum conductor size shall be 1.5mm2 for applications e.g. SCADA, where smaller sizes are appropriate, their use shall be the subject to agreement with the Northern Powergrid project engineer.

Current transformer secondary connections shall have a minimum conductor cross sectional area of 2.5mm2.

A8.1.8 Terminal blocks and terminations shall comply with the relevant provisions detailed in IEC 62271-1 clause 5.4.4.5.2 , BSEN 60947-7-1 and ENA TS 50-18 issue 3 clause 5.2.1 and 5.2.2. They shall generally be either screw or stud type for use with an approved ring type crimped termination or spring loaded insertion type incorporating an approved hook type crimped connector.

- Telecontrol / SCADA Terminal Blocks SAKR or equivalent

- AC/DC Terminal Blocks RSF3 or equivalent
- CT/VT Terminal Blocks RSF1 or equivalent
- Buswiring and Supply Terminal Blocks (J1/J2) RSF1 or equivalent
- Pilot Isolation Links for Legacy Applications RSF2 or equivalent

A8.1.9 Relay Test Blocks
All relays will have suitable test points that will ensure that all current / voltage elements can be injected in isolation from an external source.

Test points shall be provided for all trip and close outputs, these will generally be in series with the output contact but may be in a 'tag off' connection. Test points should be available on both sides of the contact.

Any connections which are open circuited by the removal of a cover should only be used for 'tee off' connections.

All trip relays will have the operate coil available at test block connections to enable injection of the coil.

A8.1.10 General Ancillary Equipment
All equipment supplied for the scheme that is not covered by the ENA assessment procedure should be pre-approved for use by Northern Powergrid Protection staff. This will include but is not limited to:

Terminal Blocks
Panel Supply Monitors
Shunt Trip Diodes
Dropper Resistors
Lamps, LEDs and Semaphore Indications
Non-Approved equipment will be liable to removal from the panel during any FAT or site testing with replacement at the cost to the supplier

A8.1.11 Labels
All labels used on protection panels, including those applied to fuses and links, shall be of the black on white engraved type. On fuse and link arrangements each fuse/link shall have an individual label such that it is possible to change any individual label without having to replace the entire row.

The size of letters and numerals shall be determined by the distance from which the label is normally to be read, and by the length and importance of the inscription. The minimum height of letters or numerals shall be 2mm and a gap between lines of lettering shall be approximately half the height of upper case letters.

The label holder will be placed at a suitable position so it is not obscured by wiring or the fuse holder, and it can be seen from ground level

A8.1.12 Relay and Fuse Mounting
Relays shall be mounted on racking plates which will be arranged so that any unused space will be blanked of for future relay installation.

Fuse and link arrangements shall be mounted internally to the control cubicle. Fuses and links that are associated with secondary side of VT's will have a locking bar across the first set of fuses per winding for secondary circuit isolation.

A8.1.13 Metering Equipment
Metering CTs and VTs shall comply with the latest version of the UK Balancing and Settlement Code; BSC PROCEDURE BSCP02 Proving Test Requirements for Central Volume Allocation Metering Systems

A copy of this can be obtained from: https://bscdocs.elexon.co.uk/bsc-procedures.

Metering CT's and VT's may be required to be fitted on all circuit breaker panel types. This will be specified on a project by project basis.

A8 1.2 Feeder Types
There are four main base types of feeder as follows

- Cable (Non-Directional) – Type N
- Overhead (Non-Directional) – Type NR
- Cable (Directional) – Type D
- Overhead (Directional) – Type DR

Key – N - Non-directional; D - Directional; R - auto Reclose

Additive extensions

- Additional Low set IDMT elements for a parallel feeder (L extension) e.g. non-unit parallel feeders would be Type DL (this will have three additional isolation links and wiring per feeder so has the extension to avoid the additional links and wiring for non-parallel generator feeders)
- Addition of Fibre type unit protection (F extension) e.g. fibre unit protection feeder would be Type DLF (includes Low set IDMT)
- Addition of Copper unit protection (C extension) e.g. copper unit protection feeder would be Type DLC (includes Low set IDMT)
- Addition of protection elements to cater for Low Impedance loops (Z Extension) e.g. Parallel cable connections with less than 50mts of power cable) to cater for the Directionalised BBZ scheme would be DLFZ or DLCZ
- Addition of Metering (M extension) e.g. metered cable feeder would be Type NM or DM

The 'N' type variants will only be supplied onto legacy switchboards without BBZ Blocking schemes. New switchboards will typically utilise 'D' type variants

A8 1.3 Busbar Zone Scheme

For new substations an overall Blocking/CB Fail scheme will be implemented to cover for Busbar Faults and stuck Feeder CB's. The scheme will generally be to Northern Powergrid drawing C1037796. This drawings details all of the connections required between the switchgear and remote protection panels, it is the switchgear suppliers responsibility to ensure that all of the required connection sand buswiring is provided.

A8 1.4 Voltage Selection Scheme

To facilitate the use of the BBZ scheme and the requirements for Directional Analogues a Bus Bar voltage selection scheme is required that will use the Incomer VT supplies to provide a bus wired voltage reference on each bar. The scheme will generally be to Northern Powergrid drawing C1037797

2.0 PROTECTION AND SUPERVISORY REQUIREMENTS:

A8.2.1 Common equipment required on all feeder Types

All feeders to contain the following common equipment:

- Each feeder CB shall be equipped with trip circuit supervision. This shall be based on the ENA Engineering Recommendation S15, standard scheme H7. Status inputs with safety resistors on the main protection relay shall be used to supervise the trip circuit with the associated circuit breaker open or closed.
- Facilities are required for both the local (switchgear end) and remote (telecontrol and substation common control panel) open/close operation and indication of the circuit breaker.
- Local // Telecontrol/Remote control selection facility with padlocking feature with spare contact for Local Alarm
- Open/close control facility with padlocking feature
- SPRING CHARGE SUPERVISION RELAY, 125V DC, with 4CO contacts, 125V DC

- Spare auxiliary contacts for Northern Powergrid use of the following minimum combination

1.	CB Open	7NC
2.	CB Closed	7NO
3.	CB Spring Charged	3NO
4.	CB Spring Charged	3NC
5.	CB In Service	5NO
6.	CB Out of Service	5NC
7.	CB Selector in Earth	3NO
8.	CB Selector Not Earthed	3NC

  These contacts will be direct from the CB/Selector mechanism and not be in use for the Circuit Breaker/Selector control scheme.

- Telecontrol interposing open/close relay with self-reset contacts, test button and no operation indicator, this being operated from the Northern Powergrid SCADA system. Both relays should be equipped with 4 CO contacts, all with heavy duty rating. These relays will be internally mounted.
- All OC and EF relays shall provide blocking signals and CB fail capability to be used in conjunction with a Northern Powergrid standard busbar zone and backtripping protection scheme.
- Set of side frames, supports, small wiring, interlocks, auxiliary relays contactors, labels, multicore cable box and glands, fuses, links, and all sundries
- DNP Communications cable (1 pair twisted and screened) should be wired to and from every compatible relay so that the relay will form a ring when connected to adjacent panels. Interconnecting twisted pair buswires will also be provided.
- If the switchgear utilises SF6 gas in the scheme, suitable relays should be provided to provide alarms to SCADA and the local alarm scheme, typically 3 CO contacts would be required from each stage.

2.2 – Nominal CT Specifications for use with Northern Powergrid standard protection schemes. These may be amended on a project by project basis.

The CT order shall be as the table below (Top: Busbar end. Bottom: Circuit end)			
2000A/1250A Board			
Panel Type	CT Application	Continuous Current	Ratio
2000A/1250A Transformer Incomer	REF	2200A	1500/1A Class PX Vk >(24Rct +88) Ie < 9.9mA @ (9Rct+35) Rct < 4.8Ω
	LVOC/DOC	2200A	1500/1A 5VA 5P10/ 5VA Class 1.0, Rct < 11Ω
630A Feeder Type N / NR / D / DR / DL / DLR	OCEF	693A	600/1A 2.5VA 5P20/ 2.5VA Class 1.0 Rct < 3.8Ω
630A Unit Prot'n Feeder Type DLF/DLC	Unit Protection	693A	600/1A Class PX Vk > (42Rct+52) Ie < 50mA @ 50V and Ie < 100mA @ Vk Rct<3.5Ω
	OCEF	693A	600/1A 2.5VA 5P20/ 2.5VA Class 1.0 Rct < 3.8Ω
Addition for Metering Feeder Type M	Metering	693A	600/400/5A 15VA 0.2S (Subject to customer requirements)
800A Feeder Type N / NR / D / DR / DL / DLR	OCEF	880A	600/1A 2.5VA 5P20/ 2.5VA Class 1.0 Rct < 3.8Ω
800A Unit Prot'n Feeder Type DLF/DLC	Unit Protection	880A	600/1A Class PX Vk > (42Rct+52) Ie < 50mA @ 50V and Ie < 100mA @ Vk Rct <3.5Ω
	OCEF	880A	600/1A 2.5VA 5P20/ 2.5VA Class 1.0 Rct < 6.9Ω
Addition for Metering Feeder Type M	Metering	880A	750/400/5A 15VA 0.2S (Subject to customer requirements)
Neutral CTs	Standby E/F	500A	500/1A 2.5VA 5P5 3second rating 800%
	REF	2200A	1500/1A Class PX Vk >(24Rct +88) Ie < 9.9mA @ (9Rct+35) Rct < 4.8 ohm

A8.**2.3** **Type N Overcurrent, Earth Fault and SEF type Cable feeder**

To be equipped as follows :

- 3 PHASE OVERCURRENT AND EARTH FAULT relay, self-supervised and DNP 3 communications, 3/10 IDMT characteristics with minimum setting range 50% - 200% O/C, 2% - 80% E/F, PLUS capability to provide SENSITIVE EARTH FAULT function down to 5% setting, secondary rating 1A, (Alstom P14NB21C4C0500AA or equivalent).
- Test block, Alstom MIDOS type MMLG01 (or equivalent)
- ABB CT-MFE Timer relay with Protection Faulty LED (Amber)
- A high speed multi contact self-reset tripping relay with NO Operation Flag complying with ENA TS 48-4 Class ESI1 for Protection Trip duties. Operating speed better or equal to 10ms at 110v DC. Contacts 2NO minimum (e.g. Arteche RD-2R or equivalent)

A8.**2.4** **Type D Directional Overcurrent and Earth Fault and SEF type Cable feeder**

To be equipped as follows:

- 3 PHASE DIRECTIONAL OVERCURRENT AND EARTH FAULT relay, self-supervised and DNP 3 communications, 3/10 IDMT characteristics with minimum setting range 50% - 200% O/C, 2% - 80% E/F, PLUS capability to provide SENSITIVE EARTH FAULT function down to 5% setting, secondary rating 1A, (Alstom P14DB21C4C0540AA or equivalent).
- Test block, Alstom MIDOS type MMLG01 (or equivalent)
- ABB CT-MFE Timer relay with Protection Faulty LED (Amber) or equivalent
- A high speed multi contact self-reset tripping relay with NO Operation Flag complying with ENA TS 48-4 Class ESI1 for Protection Trip duties. Operating speed better or equal to 10ms at 110v DC. Contacts 2NO minimum (e.g. Arteche RD-2R or equivalent)
- Test block, Alstom MIDOS type MMLG01 (or equivalent)

NOTE:

1. This panel may also require the addition of Loss of Mains Signalling equipment. This would be specified on a project by project basis
2. This panel will require additional link connections to the CB Fail buswiring

A8.**2.5** **Type NR Overcurrent, Earth Fault and SEF type Overhead feeder with Auto Reclose**

- 3 PHASE OVERCURRENT AND EARTH FAULT relay, self-supervised with DNP 3 Communications 3/10 IDMT characteristics with minimum setting range 50% - 200% O/C, 2% - 80% E/F, PLUS capability to provide SENSITIVE EARTH FAULT function down to a 5% setting, PLUS INSTANTANEOUS O/C & E/F capability Inst O/C 200 - 800%, Inst E/F 20-160%, PLUS Multishot Auto Reclose secondary rating 1A, Alstom P14NZ21C4C0500A (or equivalent).
- Test block, Alstom MIDOS type MMLG01 (or equivalent)
- ABB CT-MFE Timer relay with Protection Faulty LED (Amber) or equivalent
- AUTO RECLOSE CLOSE AUXILIARY RELAY, 125V DC, with two heavy duty make contacts, 125V DC (Alstom Prima or equivalent)
- A high speed multi contact self-reset tripping relay with NO Operation Flag complying with ENA TS 48-4 Class ESI1 for Protection Trip duties. Operating speed better or equal to 10ms at 110v DC. Contacts 2NO minimum (e.g. Arteche RD-2R or equivalent)

NOTE:

1. This panel may also require the addition of Loss of Mains Signalling equipment. This would be specified on a project by project basis.

A8.**2.6** **Type DR Directional Overcurrent, Earth Fault and SEF type for Overhead feeder with Auto Reclose**

- 3 PHASE DIRECTIONAL OVERCURRENT AND EARTH FAULT relay, self-supervised with DNP 3 Communications 3/10 IDMT characteristics with minimum setting range 50% - 200% O/C, 2% - 80% E/F, PLUS capability to provide SENSITIVE EARTH FAULT function down to a 5% setting, PLUS INSTANTANEOUS O/C & E/F capability Inst O/C 200 - 800%, Inst E/F 20-160%, PLUS Multishot Auto Reclose secondary rating 1A, Alstom P14DL21C4C0500A (or equivalent).
- Test block, Alstom MIDOS type MMLG01 (or equivalent)
- ABB CT-MFE Timer relay with Protection Faulty LED (Amber) or equivalent
- AUTO RECLOSE CLOSE AUXILIARY RELAY, 125V DC, with two heavy duty make contacts, 125V DC (Alstom Prima or equivalent)
- A high speed multi contact self-reset tripping relay with NO Operation Flag complying with ENA TS 48-4 Class ESI1 for Protection Trip duties. Operating speed better or equal to 10ms at 110v DC. Contacts 2NO minimum (e.g. Arteche RD-2R or equivalent)
- Test block, Alstom MIDOS type MMLG01 (or equivalent)

NOTE:

1. This panel may also require the addition of Loss of Mains Signalling equipment. This would be specified on a project by project basis.
2. This panel will require additional link connections to the CB Fail buswiring

A8.2.7 Type DL Directional Overcurrent and Earth Fault type feeder for Parallel Cable Feeders

To be equipped as follows :

- 3 PHASE DIRECTIONAL OVERCURRENT AND EARTH FAULT relay, self-supervised and DNP 3 communications, 3/10 IDMT characteristics with minimum setting range 50% - 200% O/C, 2% - 80% E/F, PLUS capability to provide SENSITIVE EARTH FAULT function down to 5% setting, secondary rating 1A, (Alstom P14DB21C4C0540AAor equivalent).
- Test block, Alstom MIDOS type MMLG01 (or equivalent)
- ABB CT-MFE Timer relay with Protection Faulty LED (Amber) or equivalent
- A high speed multi contact self-reset tripping relay with NO Operation Flag complying with ENA TS 48-4 Class ESI1 for Protection Trip duties. Operating speed better or equal to 10ms at 110v DC. Contacts 2NO minimum (e.g. Arteche RD-2R or equivalent)
- Test block, Alstom MIDOS type MMLG01 (or equivalent)

NOTES:

1. This panel will have buswired signalling connections between the parallel feeders on the busbar to un-block the opposite panels Low Set elements.
2. This panel will require additional link connections to the CB Fail buswiring

A8.2.8 Type DLC Directional Overcurrent and Earth Fault type for Parallel Cable Feeder with Copper Pilots

To be equipped as follows:

- 3 PHASE DIRECTIONAL OVERCURRENT AND EARTH FAULT relay, self-supervised and DNP 3 communications, 3/10 IDMT characteristics with minimum setting range 50% - 200% O/C, 2% - 80% E/F, PLUS capability to provide SENSITIVE EARTH FAULT function down to 5% setting, secondary rating 1A, (Alstom P14DB21C4C0540AAor equivalent).
- Test block, Alstom MIDOS type MMLG01 (or equivalent)
- ABB CT-MFE Timer relay with Protection Faulty LED (Amber) or equivalent
- A high speed multi contact self-reset tripping relay with NO Operation Flag complying with ENA TS 48-4 Class ESI1 for Protection Trip duties. Operating speed better or equal to 10ms at 110v DC. Contacts 2NO minimum (e.g. Arteche RD-2R or equivalent)

- Solkor Rf Differential feeder protection relay with 5kV Insulation
- Test block, Alstom MIDOS type MMLG01 (or equivalent)

NOTES:

1. This panel will have buswired signalling connections between the parallel feeders on the busbar to un-block the opposite panels Low Set elements – L Extension
2. This panel may also require additional wired connections for the Low Impedance Loop protection – Z extension
3. This panel will require additional link connections to the CB Fail buswiring
4. There will be options required here to cater for connections to existing Unit protected feeders, these will be as follows. These extra items will be specified on a project by project basis

    i. Supervised Solkor pilots with Receive or Send End Equipment
    ii. Fully Auto panel with 30v MVAW11 Settings selector relay

A8.2.9 Type DLF Directional Overcurrent and Earth Fault type for Parallel Cable feeder with Fibre Pilots

To be equipped as follows:

- 3 PHASE DIRECTIONAL OVERCURRENT AND EARTH FAULT relay, self-supervised and DNP 3 communications, 3/10 IDMT characteristics with minimum setting range 50% - 200% O/C, 2% - 80% E/F, PLUS capability to provide SENSITIVE EARTH FAULT function down to 5% setting, secondary rating 1A, (Alstom P14DB21C4C0540AAor equivalent).
- Test block, Alstom MIDOS type MMLG01 (or equivalent)
- ABB CT-MFE Timer relay with Protection Faulty LED (Amber) or equivalent
- A high speed multi contact self-reset tripping relay with NO Operation Flag complying with ENA TS 48-4 Class ESI1 for Protection Trip duties. Operating speed better or equal to 10ms at 110v DC. Contacts 2NO minimum (e.g. Arteche RD-2R or equivalent)
- Solkor N Differential feeder protection relay 1310nm fibre connections (Siemens 7SG1813-7CC10-0EC0 or equivalent)
- Test block, Alstom MIDOS type MMLG01 (or equivalent)

NOTES:

1. This panel will have buswired signalling connections between the parallel feeders on the busbar to un-block the opposite panels Low Set elements – L extension
2. This panel will require additional link connections to the CB Fail buswiring
3. This panel may also require additional wired connections for the Low Impedance Loop protection – Z extension

A8.**2.10** **Type DLR Directional Overcurrent, Earth Fault and SEF type for Parallel Overhead feeder with Auto Reclose**

- 3 PHASE OVERCURRENT AND EARTH FAULT relay, self-supervised with DNP 3 Communications 3/10 IDMT characteristics with minimum setting range 50% - 200% O/C, 2% - 80% E/F, PLUS capability to provide SENSITIVE EARTH FAULT function down to a 5% setting, PLUS INSTANTANEOUS O/C & E/F capability Inst O/C 200 - 800%, Inst E/F 20-160%, PLUS Multishot Auto Reclose secondary rating 1A, Alstom P14DL21C4C0500A (or equivalent).
- Test block, Alstom MIDOS type MMLG01 (or equivalent)
- ABB CT-MFE Timer relay with Protection Faulty LED (Amber) or equivalent
- AUTO RECLOSE CLOSE AUXILIARY RELAY, 125V DC, with two heavy duty make contacts, 125V DC (Alstom Prima or equivalent)
- A high speed multi contact self-reset tripping relay with NO Operation Flag complying with ENA TS 48-4 Class ESI1 for Protection Trip duties. Operating speed better or equal to 10ms at 110v DC. Contacts 2NO minimum (e.g. Arteche RD-2R or equivalent)
- Test block, Alstom MIDOS type MMLG01 (or equivalent)

NOTES:

1. This panel will have buswired signalling connections between the parallel feeders on the busbar to un-block the opposite panels Low Set elements.
2. This panel will require additional link connections to the CB Fail buswiring

A8.2.11 Transformer Incomer Circuit Breakers

Automatic protection for these circuit breakers shall be located on separate relay panels within the substation. The following equipment is required on the CB:

- Voltage Transformer, 3 phase 5 Limb (or individual single phase equivalents), System Phase to Phase Voltage/110V, 50VA per phase, Class 1.0 6P, rated voltage factor 1.9 for 8 Hours complete with isolatable and lockable output LV fuses/CBs and lockable LV fuses/links for voltage control, voltage selection scheme and protection service (Three sets of Three phase and Neutral Fuse/Links required)

A8.2.12 Bus Section/Bus Coupler Circuit Breakers

This CB will not be equipped with automatic protection although the CB is required to be equipped for operation of the busbar zone protection scheme.

- 4 Electrical Set / Reset relays for Voltage Selection / Plant Status repeat duties. Each relay should comprise of 8 CO contacts, with Mechanical/LED operation indicator and Manual test button (Arteche BJ-8BB for 125v DC operation or equivalent)

NOTES:

1. This panel will have the Voltage Selection scheme installed in the circuit breaker wiring compartment; it shall be to NPg Drawing C1037797

Appendix 9 - Technical Summary Information Details

	MANUFACTURER: Switchgear Range/Type:	ENATS 41-36 reference where applicable	UNIT	Incomer CB	Bus Section	
1	ENATS Certificate of Conformance					
2	Number of poles					
3	Class – indoor/outdoor	1.2				
	Type reference of vacuum bottles (if applicable)					
	Type reference of interrupter (if applicable)					
4	Rated voltage	1.4.1	kV			
5	Rated Insulation level. (lightning impulse voltage)	1.4.2	kV			
6	Rated Frequency	1.4.3	Hz			
7	Rated Normal Current Busbar Circuit-breaker (TX incomer) Circuit breaker (Bus Section) Circuit Breaker (Feeder)	1.4.4	A			
8	Rated Short-time withstand current	1.4.5	kA			
9	Rated duration of short circuit	1.4.7	S			
10	Rated supply voltage of opening and closing devices and auxiliary and control circuits. Closing and tripping Indication Control	1.4.8	V			
11	Rated supply frequency of closing and auxiliary circuits.	1.4.9	Hz/DC			
12	Rated short-circuit breaking current	2.4.101	kA			
13	DC time constant.		msec			
14	Rated short-circuit making current	2.4.103	kA			
15	Rated operating sequence.	2.4.104				
16	Rated capacitive switching currents: Rated cable charging current.	2.4.107	A			
17	Classification of mechanical operations M1 or M2	2.4.110				
18	Classification of electrical endurance – tested for autoreclose duty – not tested for autoreclose duty	2.4.111				
19	Mechanism type	2.5.5 –2.5.7				
20	Key interlock	2.5.11				
21	Gas monitoring	1.5.9	Type			

	MANUFACTURER: Switchgear Range/Type:	ENATS 41-36 reference where applicable	UNIT	Incomer CB	Bus Section	
22	Voltage presence indicating system (VPIS) fitted	1.5.19.1	Yes/No			
	VPIS: location of capacitor bushing					
23	Insulation Medium					
24	Arc extinguishing medium					
35	Colour of Paint					
	Power cable connection type					
26	Power cable: max number, size and type of cables/phase Transformer incomer Feeder					
27	Test bushing: Location of connection. Type of connection					
	OPERATING MECHANISM DETAILS					
28	Manufacturer and Type Reference of Operating Mechanism.					
29	Mechanism travel.		mm			
30	Closing Coils Number and type Type reference Power consumption		W			
31	Operating Coil-Open Number and type Type reference Power consumption		W			
32	Operating time – Close		msec			
33	Operating time – Open		msec			
34	Closing spring recharge time (motor driven); if applicable		sec			
35	Spring charge motor: power consumption ; if applicable		W			
36	Closing actuator current; if applicable.		A			
37	Maximum dynamic floor loading		kN			
	SF6 GAS DETAILS					
38	Design pressure of gas system at 20°C Insulation Interrupters		Barg			

	MANUFACTURER: Switchgear Range/Type:	ENATS 41-36 reference where applicable	UNIT	Incomer CB	Bus Section	
39	Operating pressure of pressure relief device		Barg			
40	Normal pressure at 20°C		Barg			
41	Gas pressure level 1 (alarm)		Barg			
42	Gas pressure level 2 (lockout)		Barg			
43	Minimum close pressure		Barg			
44	Minimum trip pressure *(if fault clearance /load break/no load open are different please state all values)*		Barg			
45	Quantity of gas (mass and volume at 20°C) State values per compartment and total		kg & cc			
46	Method of monitoring pressure and temperature compensation					
	DIMENSIONS AND WEIGHTS					
49	Width					
50	Depth					
51	Height					
52	Weight					
53	Minimum clearances required to achieve internal arc performance from: Rear Side Ceiling Front					

Appendix 10 - Pre-commission Testing, Routine Inspection and Maintenance Requirements

A9.1 Suppliers shall provide information regarding periodic inspection and maintenance requirements to be undertaken during the lifetime of the product.
Detailed inspection and maintenance instructions shall be provided.

A9.2 Suppliers shall provide details of the recommended pre-commission testing and inspection required, including proposed testing schedule (typical), test methods, test values and pass/fail criteria.
Tests shall normally include, but are not restricted to, those listed below.

	INSTALLATION/ERECTION TESTS
Mechanical	
All HV connections	Security and clearance of all connections.
Circuit Breaker Panel	Check size and alignment of isolating-contacts. Check racking operation. Check shutter operation and locking. Check status indication. (Open, closed, isolated etc.) Check mechanical interlocks. Interchange ability of like circuit breakers.
Voltage Transformer	Check alignment and size of isolating contacts. Check shutter operation and locking. Check interlocks
Earthing	Security and size of all earthing connections including relay/control panels. Check earthing gear sizes and operation in conjunction with interlocks.
Test Bushings	Check test bushing sizes and operation including interlocks.
Secondary wiring	Security of all secondary connections. Check wiring size and colours. Confirmation that all secondary wiring conforms to the latest revision of schematic or wiring diagram.
Control locking facilities.	That these operate correctly.
Circuit Breaker Operation	Timing test of circuit breaker operation
Electrical	
HV conductors	Micro-ohm resistance check on busbar sections, joints and isolator contacts using 100A Ductor (or similar).
Circuit Breaker and cubicle	Check operation of electrical interlocks. Check operation electrical controls.
COMMISSIONING TESTS	
HV connections	Refer ENATS 41-36 clause 1.7
Circuit Breaker	Refer ENATS 41-36 clause 1.7
Voltage Transformer	Electrical pressure test (16/30 kV AC for 1min) Polarity and Ratio Test
Protection and Control	DC Resistance and Magnetisation checks of CTs. Polarity and Ratio test of CTs. Burden checks on CTs. Insulation check on DC wiring (500v DC for 1min). Calibration of instruments. Check fuse and link designation. Check fuse size. Check control operation (+&-) Check protection operation (+&-) Check automatic switching operation
Earthing	Continuity of all earthing connections; Micro-ohm resistance check using 100A Ductor (or similar).

Appendix 11 - Addendum to Supplier Requirement, including Logistical Requirements

Supporting evidence of compliance with type tests shall be submitted with the completed tender documents. This shall include the cover sheet and the scope/summary sheet of the type tests.

Manufacturers may provide alternative tenders for items not complying with the above specification. This shall be clearly stated together with detailed descriptions of any variation from the specification, together with drawings and test results.

The supplier shall provide with the tender full technical details of the equipment offered and shall indicate any divergence from these standards or specifications.

To enable Northern Powergrid to store the product(s) in accordance with the manufacturer's recommendations the Tenderer should provide details of the recommended storage environment with respect to each tendered product.

Details should be provided of the minimum and maximum exposure levels, frequency of exposure and duration of exposure of the packaged item with respect to;

* Ambient temperature
* Humidity
* Water
* Dust
* Atmospheric corrosion
* Impact
* Vibration
* Solar radiation

The Tenderer shall ensure that each item is suitably packaged and protection to maintain the product and packaging as "fit for service" prior to installation taking account of the potential for an outdoor storage environment. All packaging shall be sufficiently durable giving regard to the function, reasonable use and contents of the packaging. Where product packages tendered are made up of sub packages all the sub packages shall unless varied by this specification, be supplied securely packaged together. Where items are provided in bagged/boxed form the material from which the bags are manufactured shall be capable of sustaining the package weight and resisting puncture by the materials within. Tenderer shall submit at the time of tendering the details of the proposed packaging (i.e. materials composition and structure) to be used for each product. Where the Tenderer is unable to provide packaging suitable for outdoor storage then this should be stated at the time of tender.

Palletised goods shall be supplied on standard 1200mm x 1000mm pallets.

Clearly legible, easily identifiable, durable and unambiguous labelling shall be applied to each individual and where relevant multiple package of like products. Where products packages tendered are made up of sub packages each sub packages shall be marked. As a minimum requirement the following shall be included;

* Manufacturer's trademark or name
* Supplier's trademark or name
* Description of item
* Date of packaging and/or batch number
* Northern Powergrid product code
* Weight

Tenderer shall submit at the time of tendering a sample of the proposed labelling for each product package type.

Appendix 12 - Check Sheet of Technical Information to be Supplied

ALL of the following information shall be provided by the supplier/tenderer to Northern Powergrid.

Requirement	Provided (Yes/No)	Key / Reference(s) for provided document(s) *(To help Northern Powergrid understand what the submitted documents relate to)*
This sheet: Appendix 11 – **Check sheet of technical information to be supplied**		
Copy of pricing schedule **template populated with product names and codes**		
General overview/descriptions of products offered, technical catalogues, brochures, etc.		
General arrangement drawings of products offered		
Appendix 8 - Individual item **summary technical details**		
Electrical wiring diagrams for each variant		
Appendix 6- Completed self-certification conformance **declaration against this NPS/003/006**		
Declaration of significant **technical non-conformances** for each product		
Appendix 2 – Declaration of **product conformance against test values & acceptance of testing**		
Appendix 3 - Completed self-certification conformance **declaration against ENA TS 41-36**		
Appendix 3a – ENATS 41-36 - schedule part 1 – **common clauses**. **Clause by clause conformance** with ENATS 41-36 – part 1		
Appendix 3b – ENATS 41-36 - schedule part 2 – **metal enclosed circuit breakers**. **Clause by clause conformance** with ENATS 41-36 – part 2		
Appendix 3b – ENATS 41-36 - schedule part 2 – **metal enclosed circuit breakers**. **Type test conformance** declaration		
Appendix 3c – ENATS 41-36 - schedule part 3 – **metal enclosed switches**. **Clause by clause conformance** with ENATS 41-36 – part 3		

Requirement	Provided (Yes/No)	Key / Reference(s) for provided document(s) *(To help Northern Powergrid understand what the submitted documents relate to)*
Appendix 3c – ENATS 41-36 - schedule part 3 – **metal enclosed switches**. **Type test conformance** declaration d3		
Appendix 3d – ENATS 41-36 - schedule pt 10 – **protection, instrumentation & metering.** **clause by clause conformance** with ENATS 41-36 – part 10		
Appendix 4 - Completed self-certification conformance **declaration against ENA TS 41-40**		
Appendix 5 - Completed self-certification conformance **declaration against ENA TS 48-05**		
Appendix 6 - Completed self-certification conformance **declaration against ENA TS 48-6-6**		
Type test evidence: summary list and copies of all type test evidence		
Statement and drawings of **placement and/or options required to achieve AF and AFL arc relief**		
Summary of activities at each of the main manufacturing facilities and **Copies of ISO 9001 certificates** of accreditation for main manufacturing facilities		
Appendix 10 - **Pre-commission testing, routine inspection and maintenance requirements**		
Routine test plan example (including test values, duration, pass/fail criteria and tolerances)		
Appendix 11 - **Addendum to supplier requirements**, including logistics requirements		
Instructions/Manuals for: manual and mechanical handling, storage, installation, commissioning, operation, maintenance, end of life recycling and disposal. And Packaging/delivery information		
Associated **COSHH sheets**		
UK DNO **references/previous customers** that have been supplied with these products.		