Electricity Specification 400I3

Issue 3    September 2014

Combined Double Pole Switch
Fuse Isolator for use in Street
Lighting & Other Street Furniture

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Approved for issue by the
Technical Policy Panel

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### Issue and Amendment Summary

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| 0 28/06/94        | Issue 1  
Initial issue.  
Prepared by: DP Horsman  
Approved by: |
| 0 06/01/99        | Issue 2  
Introduction of 16A "Slimline" Isolator and document re-formatted.  
Remove and destroy issue 1 and replace with issue 2.  
Prepared by: DP Horsman  
Approved by: |
| 25/09/14          | Issue 3  
The latest template has been applied and the document has been updated to the latest editorial standard.  
New Conformance Declaration Appendix added.  
Prepared by: JP Scott  
Approved by the Technical Policy Panel and signed on its behalf by: |
COMBINED DOUBLE POLE SWITCH FUSE ISOLATOR FOR USE IN STREET LIGHTING & OTHER STREET FURNITURE

1. SCOPE

This document outlines the performance requirements for Double Pole Switch Fuse Isolators of up to 25A rating specifically designed for the protection of power supplies to highway lighting and street furniture, for use on the cable network owned and operated by Electricity North West Ltd (Electricity North West). The unit will be designed for use in the base compartment of a street lighting column and will have provision for mounting on to a wooden backboard. In addition the unit shall be designed to comply with the requirements of BS 7671 and The Electricity at Work Regulations 1989. The equipment is for use on single phase low voltage public electricity supply systems with a maximum voltage up to 255V RMS at a frequency of 50Hz. Refer to Appendix A for commodity code numbers.

2. DEFINITIONS

Approval: Sanction by the Electricity North West Underground Circuits Manager that specified criteria have been satisfied.

Contract: The agreement between Electricity North West and the Contractor for the execution of the Works including therein all documents to which reference may properly be made in order to ascertain the rights and obligations of the parties under the said agreement.

Contractor: The person or person's firm or company, including personal representatives, successors and permitted assigns, whose Tender has been accepted by Electricity North West.

Dependent Manual Operation: An operation solely by means of directly applied manual energy, such that the speed and force of the operation are dependent upon the action of the operator.

Fuse Switch: A load making/load breaking switch in which a fuse-link or a fuse carrier with fuse-link forms the moving contact of the switch.

Independent Manual Operation: A stored energy operation where the energy originates from manual power, stored and released in one continuous operation, such that the speed and force of the operation are independent of the action of the operator.

Isolating Distance: The clearance between open contacts meeting the safety requirements specified for disconnectors.

Isolator: A mechanical switching device which, for reasons of safety, provides in the open position an Isolating Distance in accordance with specified requirements. An Isolator is capable of opening and closing a circuit when either negligible current is broken or made, or when no significant change in the voltage across the terminals of each of the poles of the Isolator occurs.
Live Part: Any conductor or conductive part which is under a potential in normal use.

Specification: The Specifications and schedules (if any) agreed by the parties for the purpose of the Contract.

Supplier: Any person or person's firm or company who supplies goods to Electricity North West or to its Contractor.

Switch-Fuse: A switch in which one or more poles have a fuse in series.

Tender: An offer in writing to execute work or supply goods at a fixed price.

Tenderer: The person or person's firm or company, including personal representatives, successors and permitted assigns, invited by Electricity North West to submit a Tender.

3. GENERAL REQUIREMENTS FOR APPROVALS AND TESTING

3.1 Product not to be Changed

No change in the product, packaging or labelling shall be made after Approval has been granted without prior notice to the Electricity North West Underground Circuits Manager and receipt of a written agreement to the proposed change from the Electricity North West Underground Circuits Manager.

3.2 Electricity North West Technical Approval

The Tenderer shall submit, with this Tender, proposals for testing which will demonstrate, to the satisfaction of the Electricity North West Underground Circuits Manager, compliance with this Specification. Such tests shall be carried out without expense to Electricity North West.

Alternatively, the Tenderer may submit technical reports and other data that he considers will demonstrate, to the satisfaction of the Electricity North West Underground Circuits Manager, compliance with this Specification. Acceptance of this evidence shall be at the discretion of the Electricity North West Underground Circuits Manager but will not be unreasonably withheld.

Approval shall be ‘factory specific’ and is not transferable to another factory without the written Approval of the Electricity North West Underground Circuits Manager.

The Supplier and product shall comply with all the relevant requirements of Electricity North West documents EPD311 and CP311.

3.3 Quality Assurance

The Tenderer shall confirm whether or not Approval is held in accordance with a quality assurance scheme accredited under ISO 9000. If not, he shall submit a statement of the quality assurance procedures employed to control the quality of the product, including the performance of Suppliers and sub-contractors.
The right is reserved for the Electricity North West Underground Circuits Manager to require, from time to time, the repeat of such tests as he may deem to be reasonably necessary to demonstrate continued compliance with the Specification.

The Tenderer shall submit, with his Tender, a list of tests and inspections which are carried out on the product prior to despatch which shall demonstrate, to the satisfaction of the Electricity North West Underground Circuits Manager, fitness for installation and service.

The Tenderer shall provide free of charge to Electricity North West such samples as may, in the opinion of the Electricity North West Underground Circuits Manager, be reasonably required for inspection and/or retention as quality control samples. The Electricity North West Underground Circuits Manager will confirm the requirement for samples at the time of tendering.

The right is reserved for the Electricity North West Underground Circuits Manager to make, from time to time, such inspections of the Tenderer's facilities as he may deem to be reasonably necessary to ensure compliance with this Specification and any Contract of which it forms a part.

The Tenderer shall submit, with his Tender, such details of product packaging disposal, as will enable Electricity North West to comply with the requirements of BS EN ISO 14001: 2004 – Environmental Management Systems.

### 3.4 Formulation

The Tenderer shall submit, with his Tender, such details of the formulation and use of the product and associated substances as will enable Electricity North West to comply with the obligations of the Health and Safety at Work Etc Act 1974 and the Control of Substances Hazardous to Health Regulations 2002, in the use, storage and disposal of the product. The Tenderer may stipulate, prior to submission of such information, that he requires it to remain confidential and the Electricity North West Underground Circuits Manager will, if requested, confirm his agreement to this prior to receipt of the information.

### 3.5 Identification Markings

The Tenderer shall submit, with his Tender, details of markings which it is proposed to apply to the product or packaging to identify manufacturing batches or items. The forms and content of such markings shall be subject to the Approval of the Electricity North West Underground Circuits Manager, and shall in all cases include the Electricity North West Approved Description and Commodity Code Number.

The Tenderer shall submit, with his Tender, such details of marking gross weight on components, assemblies and packages, as will enable Electricity North West to comply with the Health and Safety Manual Handling Operation Regulations 1992, for components, assemblies and packages supplied with a gross weight over 1kg. The forms and content of such markings shall be subject to the Approval of the Electricity North West Underground Circuits Manager.

### 3.6 Minimum Life Expectancy

The minimum life expectancy of all products covered by this Specification is 60 years.
3.7 **Product Conformity**

Preference will be given to those Suppliers who can provide suitable Product Conformity Certification to a recognised or specified standard, or an equivalent certification.

3.8 **Confirmation of Conformance**

The Tenderer shall complete the conformance declaration sheets in Appendix B. Failure to complete these declaration sheets may result in an unacceptable bid.

### 4. REQUIREMENTS FOR TYPE AND ROUTINE TESTING

The Electricity North West Underground Circuits Manager shall set out the requirement of the following tests to be carried out by the Supplier at the Supplier's cost.

#### 4.1 Requirement for Type Tests at the Supplier's Premises

These are a series of one-off type tests, which are carried out to ensure the satisfactory performance of the product design, under extremes of operating stresses, and of endurance, as may be appropriate, to be determined by the Electricity North West Underground Circuits Manager.

These may or may not be destructive tests.

#### 4.2 Requirement for Routine Tests at the Supplier's Premises

These tests may be required to be carried out on every individual unit or component, as specified, or at some regular frequency to be determined by the Electricity North West Underground Circuits Manager.

The results of these tests may be required to be supplied to Electricity North West with each unit purchased or retained for inspection, at a period to be determined by the Electricity North West Underground Circuits Manager.

### 5. TECHNICAL PARTICULARS

#### 5.1 Classification

The Switch-Fuse Isolator type shall be classified as follows:

**5.1.1 Type 1.1 (Regular Size)**

A double pole unit incorporating separate incoming neutral and earth terminals, and one outgoing fuseway. It shall be possible for the separate incoming terminals to be combined by means of a suitably sized link to convert a Type 1 unit to a Type 2 at the time of installation.

**5.1.2 Type 1.2 (Regular Size)**

A double pole unit incorporating separate incoming neutral and earth terminals, and two outgoing fuseways. It shall be possible for the separate incoming terminals to be combined by means of a suitably sized link to convert a Type 1 unit to a Type 2 at the time of installation.
5.1.3 **Type 2.1 (Regular Size)**

A double pole unit incorporating combined incoming neutral and earth terminals, either as a single machined block or by a link method, and one outgoing fuseway.

5.1.4 **Type 2.2 (Regular Size)**

A double pole unit incorporating combined incoming neutral and earth terminals, either as a single machined block or by a link method, and two outgoing fuseways.

5.1.5 **Type 3 (Slimline)**

A double pole unit incorporating separate incoming neutral and earth terminals but provision for combined neutral and earth terminals either as a single machined block or by a link method, one outgoing fuseway. This unit may have an ampacity rating below 25A.

5.2 **Normal Service and Mounting Conditions (all Cut-Outs)**

The unit shall be suitable as specified in BS 5733: 1995 for installation and operation in street furniture.

A minimum of two fixing points shall be provided, adequately positioned to prevent the unit from rocking on warped backboards.

Screws used for securing the unit to the backboard must not be located beneath live conductors and must not be used to secure other covers on the unit.

The screw fixing points should be located outside current carrying chambers.

Sufficient stainless steel fixing screws to BS 1210: 1963 must be supplied with the unit.

5.3 **Construcational Requirements**

5.3.1 **Types 1.1, 1.2, 2.1 & 2.2 – 25A Regular size**

The unit will be designed such that it is impossible under normal conditions of allowing a maintenance operator to work on live circuits.

The combination unit will comprise a cable termination box and double pole switch isolator prior to the protection fuse(s).

The design should incorporate a separate incoming (primary) chamber with wire seal facility and outgoing (secondary) chamber whereby normal maintenance and operational requirements can be met without removing wire seals fitted by the Electricity North West, and without the need to access live chambers or remove shrouds to Live Parts for safety reasons. This applies particularly to the fuse and fuse carrier for inspection/maintenance purposes.

The combination unit should provide the facility for energising a spur supply controlled by a separate fuseway to external equipment such as a sign, bollard or remote column(s) from the base of the unit without disturbing the incoming supply connections.

Additional switched and fused terminals should be available to provide a downward facing termination point for the spur supply.
Access to spur terminals for connection and disconnection of the spur circuit should only be available from the secondary chamber such that there is no possibility of the incoming supply being directly connected to the spur circuit.

No access to the sealed primary supply chamber should be necessary during connection/disconnection of secondary chamber spur cables.

The isolation switch should be of the Dependent Manual Operation type, with a neutral lead/lag arrangement.

Contact opening is to be both clearly and reliably indicated when isolation has been achieved in both poles. The use of a spring biased rocker switch to force the contact open is not acceptable.

The design should eliminate as far as practicable any misunderstanding which may cause the operator to believe that the supply is isolated.

The isolation gap must be in accordance with BS EN 60947, Part 3.

There should be no possibility of the isolation gap failing under any circumstances (eg welding of contacts) without it being immediately obvious that isolation has not been achieved when attempted.

The isolation switch is to be demountable from the termination box so that in the event of damage due to vandalism the switch unit can be replaced without disconnection of incoming terminations from the electricity company.

Facilities must be available to lock the Isolator in the 'Off' position. The use of a dummy cover is only permissible if the status of the Isolator is visible with the cover in place.

The design must be capable of providing a PME Termination facility, either by a link method or a combined neutral/earth block. PME conductors must be held captive by two grub screws per PME conductor (does not include the phase conductor).

The unit shall have facilities for rapid and safe testing which allow the following tests to be executed without the removal or displacement of shrouds which can then be left off or discarded:

- Live, Neutral and Earth supply polarity and continuity
- Earth Loop Impedance readings
- Voltage measurement.

The unit shall have a removable front cover which can be replaced by a custom designed Test Lid which will allow the prescribed electrical tests detailed in BS7671 to be carried out without disconnection of supply or circuit conductors thus maintaining the electrical integrity of sound circuits and minimising contractual time spent on testing.

Test facilities should also preclude the need to disconnect installed conductors so as to avoid introducing faults.

Third party test certification shall be supplied and Electricity Association Approvals Notices.
5.3.2 **Type 3 Slimline**

The unit will be designed such that it is impossible under normal conditions of allowing a maintenance operator to work on live circuits.

The unit will comprise a cable termination box and double pole switch Isolator prior to the protection fuse(s).

The design should incorporate a chamber which will allow feed-in and loop-out wiring facilities. The chamber must be provided with a seal facility.

The isolation switch should be of the Dependent Manual Operation type, with a neutral lead/lag arrangement.

Contact opening is to be both clearly and reliably indicated when isolation has been achieved in both poles. The use of a spring biased rocker switch to force the contact open is not acceptable.

The design should eliminate as far as practicable any misunderstanding which may cause the operator to believe that the supply is isolated.

The isolation gap must be in accordance with BS EN 60947, Part 3.

Facilities must be available to lock the Isolator in the 'Off' position. The use of a dummy cover is only permissible if the status of the Isolator is visible with the cover in place.

The unit shall have facilities for rapid and safe testing which allow the following tests to be executed without the removal or displacement of shrouds which can then be left off or discarded:

- Live, Neutral and Earth supply polarity and continuity
- Earth Loop Impedance readings
- Voltage measurement.

The unit shall have a removable front cover which can be replaced by a custom designed test lid which will allow the prescribed electrical tests detailed in BS 7671 to be carried out without disconnection of supply or circuit conductors thus maintaining the electrical integrity of sound circuits and minimising contractual time spent on testing.

Test facilities should also preclude the need to disconnect installed conductors so as to avoid introducing faults.

Third party test certification shall be supplied and Electricity Association Approvals Notices.

5.4 **Materials**

All materials used shall comply with relevant British Standards as appropriate.

Parts made from insulating materials shall comply with the requirements of BS 5733. Current carrying parts shall be made of brass, copper or phosphor bronze.
5.5 **Fuse Carriers**

Fuse carriers must be designed such that protection against accidental contact with Live Parts within the unit is not possible until the carrier has been fully withdrawn.

Fuse carriers shall have a continuous current rating of 25A (see 2.2.5). Fuse carriers shall be suitable for accepting fuses to BS 88 Part 1 tag type or ferrule mounting. The dimensions shall be in accordance with BS 7654: 1997 figure 101.

The means provided for clamping the fuse shall not interfere with the requirement that constant pressure is always maintained between the fuse contacts and fixed terminals.

Undue force shall not be required to withdraw the fuse carrier from the base.

The fuse carrier shall be clearly and permanently marked in accordance with BS 88 Part 1.

5.6 **Terminals**

5.6.1 **Constructional Requirements**

Units shall be equipped with two incoming bottom terminals for live, neutral and earth connections. PME links should not accommodate one of the two incoming bottom terminals. Additional terminals may be added to allow for PME connections.

The incoming terminals shall be suitable for all types of service cable up to and including 25mm$^2$ cross section stranded copper and 35mm$^2$ solid aluminium conductors.

Units shall be equipped with one outgoing connection per fuseway for each separate live, neutral and earth connection.

The unit will be designed such that the outgoing cable does not enter from the rear of the unit.

Where only one fuseway is provided, the top connections shall be suitable for terminating cables from 1.5mm$^2$ (types 1, 2 &3) single strand copper up to and including 25mm$^2$ cross section stranded copper and 35mm$^2$ solid aluminium conductors (types 1 & 2).

An internal earth terminal shall be provided for through connection of the earth path to the load.

The unit shall comply with the detailed requirements of BS 7654: 1997 for the constructional requirements except as indicated above.

5.6.2 **Identification & Marking**

The function of all terminals must be clearly identified by permanent means.

The line conductor terminals shall be indicated by the letter "L" and those for the neutral conductors shall be indicated by the letter "N".

The terminals for the earth conductors shall be indicated by the earth symbol.

Markings shall be easily legible and durable.
5.6.3 **Connecting Capacity**

The addition of a cable spreader box, with or without additional terminals, must be allowed for in the design to accommodate looped incoming service cables up to 25mm$^2$ cross section stranded copper and 35mm$^2$ solid aluminium conductors and outgoing spur supply cable up to 25mm$^2$ cross section stranded copper and 35mm$^2$ solid aluminium conductors, ie a total of 3 cables (types 1 & 2).

Provision shall be available to make off the armouring of steel wire armoured cable for the spur supply (types 1 & 2).

5.6.4 **Terminal Torque**

All terminals shall be capable of being subjected to a clamping torque of 3.5Nm when tightened on to a hard drawn copper rod of 6mm diameter for a period of one hour.

5.6.5 **Terminal Screws**

All terminal screws must be accessible with the use of an insulated screwdriver with an uninsulated blade of 5mm.

5.7 **Enclosures**

5.7.1 **Design**

It must not be possible to remove any part of the enclosure without first isolating the supply to the load ie enclosure covers for secondary chamber and cable extension box must be interlocked so that the Isolator is operated before removal of either (types 1 & 2).

Note: The following applies to types 1, 2 & 3.

Any barriers used to shield Live Parts in order to meet the requirements of BS 7671: 1992 must be so constructed such that they can only be removed by use of a tool, and cannot be displaced temporarily for testing.

It must also be impossible for the barriers to be left off in re-assembly without their removal preventing use of the equipment or as a minimum being externally obvious that the unit is being left in an unsafe condition.

The enclosure design must include a permanent means of indicating the 'Off' condition when isolation has been reliably achieved in both poles. All immediately accessible Live Parts are to be electrically safe at all times, with the design preventing as far as reasonably practicable the possibility of inadvertent contact due to close proximity of Live Parts.

The harness cable must enter the enclosure at least 30° to the horizontal to prevent condensation travelling along the cable onto live terminals. This drip loop requirement must be permanently moulded into the enclosure - the use of grommet inserts which can be discarded or distorted is not permitted.

5.7.2 **Cable Termination Cover**

A cable termination box or cover with wire seal facility shall be available for the protection of incoming cables. It may be an integral part of the unit or it may interlock into the base of the unit such that the cover cannot be removed until isolation has been effected. It should not be possible for the external wire seal to enter the primary live chamber when fitted and touch Live Parts (types 1, 2 & 3).
The box or cover shall have a split gland plate facility to accommodate the incoming service supply cable and the outgoing spur cable to enable work to proceed on the latter without disruption to the former. Access apertures for supply cables must be adequate and be able to facilitate suitable gland plates for all types of cables including Steel Wire Armoured (SWA) up to 25mm² cross section stranded copper and 35mm² solid aluminium conductors with full access for lock rings or locknuts (types 1 & 2).

5.7.3 Dimensions

5.7.3.1 Types 1 & 2 Regular Size

Physical overall dimensions of the unit shall not be more than 250mm length, 80mm width & 65mm depth. The addition of a cable spreader box should be allowed for, up to an additional maximum length of 100mm.

5.7.3.2 Type 3 Slimline

Physical overall dimensions of the unit shall not be more than 185mm length, 65mm width & 45mm depth. Minimum gland plate thickness 2.5mm.

5.7.3.3 Degree of Protection

The enclosure shall be designed to provide a degree of protection as specified in BS EN 60529:1992 to IP rating 42 (types 1 & 2) and IP22 (type 3) when fully assembled, with cables terminated and the fuse carrier in place.

5.8 Performance requirements

5.8.1 Temperature Rise

The unit shall withstand the temperature rise tests as described in BS 7654.

5.8.2 Long Term Contact Stability

The unit shall withstand the cyclic loading temperature tests as described in BS 7654.

5.8.3 Mechanical Endurance

The unit shall withstand the mechanical endurance tests as described in BS 7654.

5.8.4 Dielectric Properties

The unit shall withstand the lightning impulse withstand voltage tests described in BS 7654.

5.8.5 Performance on Overload and Short Circuit

The unit shall withstand the overload test and short circuit test described in BS 7654.

5.8.6 Flammability

The material used for the main enclosure components should be flame retardant. However since the addition of flame retardant additives often lowers the comparative tracking index in most modern plastics, the degree of flame retardancy in this environment is not regarded as critical compared to the requirement to meet the CTI index. Specimens of the material shall withstand the flammability test as described in BS 7654.
5.8.7 **Tracking Resistance**

The material is considered to be satisfactory if it has a Comparative Tracking Index (CTI) of not less than 500 when tested in accordance with BS 5901: 1980.

5.8.8 **Impact Test**

The unit shall withstand the impact test described in BS 7654.

5.9 **Installation Instructions**

Installation instructions are to be provided with each unit, and shall include procedures for terminating cables manufactured in accordance with ENA TS 09-7 and BS 4553: 1991.

6. **DOCUMENTS REFERENCED**

Electricity at Work Regulations 1989.


Control of Substances Hazardous to Health Regulations 2002.


- BS EN ISO 9000: Quality management systems.
- BS EN 60947: Specification for low-voltage switchgear and control gear.
- BS 88: Cartridge fuses for voltages up to and including 1000V a.c. and 1500V d.c.
- BS 5901: 1980: Method of test for determining the comparative and the proof tracking indices of solid insulating materials under moist conditions.

ENA TS 09-7: PVC insulated concentric service cables with stranded copper or solid aluminium phase conductors and copper concentric conductors.

EPD311 Approval of Equipment.

CP311 Equipment Approval Process.

7. KEYWORDS

Cut-out; fuse.
### APPENDIX A

**LIST OF CONSUMABLES**

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APPENDIX B
CONFORMANCE DECLARATION

SECTION-BY-SECTION CONFORMANCE WITH SPECIFICATION

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

Conformance Declaration Codes:

N/A = Section is not applicable/appropriate to the product/service.

C1 = The product/service conforms fully with the requirements of this section.

C2 = The product/service conforms partially with the requirements of this section.

C3 = The product/service does not conform to the requirements of this section.

C4 = The product/service does not currently conform to the requirements of this section, but the manufacturer proposes to modify and test the product in order to conform.

Manufacturer:

Product/Service description:

Product/Service reference:

Assessor details

Name:

Company:

Signature:

Date:
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## SECTION-BY-SECTION CONFORMANCE

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* Applicable specifications shall be stated in the Remarks column where alternatives are quoted within a section. The Remarks column shall also be used to indicate cases where the products or services exceed the quoted specifications.

**Additional Notes:**

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