SUMET09
Maintain electrical systems and equipment (SQA Unit Code-H956 04)

Overview

This standard is for people who maintain electrical systems and equipment

The person carrying out this work must be able to carry out maintenance activities in accordance with procedures and the current versions of the appropriate industry standards and regulations, the specification; industry recognised working practices, the working environment and the natural environment.

They must understand and apply the correct methods and procedures for the maintenance of electrical systems and equipment, including:

- routine and non-routine maintenance
- the identification and use of the correct instruments
- how to identify and locate faults
- how to rectify the faults that are identified, located and diagnosed
- the completion of the relevant documentation
- the recording of relevant data and information.

Please note that industry specific terminology is identified by *italic* text and its explanation and/or definition can be found in the glossary of this standard

Performance criteria

To carry out this work in accordance with the current versions of *the appropriate industry standards and regulations, the specification, working practices*, the working environment and *the natural environment*

You must be able to:

P1 obtain clear and detailed information about the **electrical system** and **equipment** to be maintained from relevant:
- P1.1 sources of **information**
- P1.2 **documentation**

P2 confirm a programme of work with the **relevant people** in accordance with **organisational procedures**

P3 advise the **relevant people** clearly and accurately about the potential disruption and consequences of carrying out the maintenance activity

P4 determine and obtain the **resources** required, as relevant, to undertake the maintenance activity

P5 select the instruments to be used

P6 confirm that the instruments are fit for purpose and have a current calibration certificate

P7 identify the correct means of electrical isolation prior to commencing the maintenance activity

P8 complete safe-isolation as and when required to ensure the safe maintenance of, as appropriate, **electrical cables, conductors and/or wiring system** and the **associated equipment, accessories and components**

P9 comply with industry practices and **organisational procedures** to ensure the co-ordination of **site services** and the activities of other trades affected by the maintenance activity

P10 carry out maintenance activity

P11 repair, remove, replace and/or maintain in accordance with industry practices, as appropriate:
- P11.1 **electrical cables, conductors and/or wiring systems**
- P11.2 **equipment, accessories and components**

P12 ensure, if the maintenance activity cannot be completed immediately, the safety of the relevant:
- P12.1 **electrical cables, conductors and/or wiring systems**
- P12.2 **equipment, accessories and components**

P13 complete the specified maintenance activity in accordance with industry recognised methods and practices

P14 inspect and test, as appropriate and in accordance with industry recognised methods and practices the repaired, replaced and/or maintained:

P14.1 **electrical cables, conductors and/or wiring system**

P14.2 **equipment, accessories and components**

P15 provide clear and accurate **information** to **relevant people** about the **electrical system** and **equipment** in terms of:

hand over to the *customer/client*

P15.2 any variations to the original system and/or its equipment

P15.3 *customer/client* acceptance of the completed work in accordance with **organisational procedures**

P15.4 relevant **documentation** being completed and recorded in the appropriate **information** systems in accordance with **organisational procedures**

Knowledge and understanding

To carry out this work in accordance with the current versions of *the appropriate industry standards and regulations, the specification, working practices*, the working environment and *the natural environment*

You need to know and understand:

K1 the operation, applications, advantages and limitations of different **electrical systems**

K2 how to obtain clear and detailed information about the **electrical system** and **equipment** to be maintained from relevant:

- K2.1 sources of **information**
- K2.2 **documentation**

K3 the **organisational procedures** and industry practices when carrying out the maintenance activity for:

- K3.1 advising the **relevant people** about the potential disruption and consequences
- K3.2 confirming a programme of work with the **relevant people**
- K3.3 ensuring the coordination of **site services** and the activities of other trades affected

K4 how to determine and obtain the **resources** required, as relevant, to undertake the maintenance activity

K5 how to select the instruments to be used

K6 how to confirm that the instruments are fit for purpose and have a current calibration certificate

K7 the correct procedures for safe-isolation

K8 the techniques for the maintenance of **electrical systems** and **equipment** including how to identify, locate, diagnose and rectify faults

K9 how to repair, remove, replace and maintain, in accordance with industry practices, as appropriate:

- K9.1 **electrical cables, conductors and/or wiring system**
- K9.2 **equipment, accessories and components**

K9 how to ensure, if the maintenance activity cannot be completed immediately, the safety of the relevant:

- K10.1 **electrical cables, conductors and/or wiring system**
- K10.2 **equipment, accessories and components**

K11 the methods and processes to inspect and test, as appropriate and in

accordance with industry practices the repaired, replaced and/or maintained:

K11.1 **electrical cables, conductors and/or wiring system**

K11.2 **equipment, accessories and components**

K12 how to provide clear and accurate **information** to **relevant people** about the **electrical system** and **equipment** in terms of:

K12.1 hand over to the *customer/client*

K12.2 any variations to the original system and/or its equipment

K12.3 *customer/client* acceptance of the completed work in accordance with **organisational procedures**

K12.4 relevant **documentation** being completed and recorded in the appropriate **information** systems in accordance with **organisational procedures**

Additional information

Scope related to performance criteria

The contexts and circumstances below identify where and when the NOS could apply.

1 **Working environments (internal and/or external)**

1.1 commercial

1.2 industrial

1.3 domestic

1.4 agricultural

1.5 horticultural

1.6 leisure and entertainment

1.7 residential medical and care facilities

1.8 public highways and parks

1.9 public services establishments

1.10 pre 1919 traditional/historic buildings

2 **Electrical system**

An electrical system, internal and/or external, in a building and/or structure that has an extra low voltage and/or low voltage single and/or multi-phase supply, circuits, equipment and components to provide:

2.1 control

2.2 communication

2.3 heating

2.4 lighting

2.5 power

3 **Organisational procedures**

3.1 information management

3.2 method statement

3.3 project management

3.4 risk assessment

3.5 risk management

3.6 implementing and monitoring health and safety requirements and issues

3.7 implementing and monitoring issues relating to the *natural environment*
3.8 customer services
3.9 accident reporting
3.10 emergencies
3.11 communication with *customers/clients*, and stakeholders

4 **Resources**
4.1 labour
4.2 plant and equipment
4.3 instruments
4.4 finance
4.5 IT
4.6 materials and other consumables

5 **Site services**
5.1 electricity
5.2 water
5.3 gas
5.4 oil
5.5 drainage
5.6 telecommunications
5.7 data transmission either underground or overhead

6 **Information**
6.1 technical – design documentation; plans; installation specifications; equipment specifications; manufacturers' data; manufacturers' instructions; BIM data
6.2 functional – operational instructions
6.3 *customer/client* information – drawings; diagrams; user instructions; specifications
6.4 contractual
6.5 statutory consents
6.6 health and safety
6.7 environmental considerations

Range related to performance criteria

The contexts and circumstances below identify where and when the NOS must apply

1 **Relevant people**

1.1 *customers/clients*

1.2 client representatives

1.3 supervisors

1.4 site/contract manager

1.5 other contractors/trades

1.6 members of the public

1.7 work colleagues

2 **Enclosures for cables, conductors and wiring systems**

2.1 PVC and steel conduit

2.2 PVC and steel trunking

2.3 cable tray

2.4 basket and ladder systems

2.5 ducting systems

2.6 bus-bar trunking

2.7 pre-fabricated conductor, cable and wiring systems

3 **Electrical cable, conductors and wiring systems**

3.1 thermosetting insulated cables including flexes

3.2 single and multicore thermoplastic and thermosetting insulated cables

3.3 flat profile cable

3.4 mineral insulated cables

3.5 single wire armoured cables

3.6 armoured/braided flexible cables and cords

3.7 data cables

3.8 pre-fabricated conductor, cable and wiring systems

3.9 fibre optic cable

3.10 fire resistant cable

3.11 bus-bar trunking

4 **Equipment, accessories and components**

4.1 consumer units

4.2 distribution boards and/or panels

4.3 isolators

4.4 circuit breakers

4.4 fuses

4.6 switches

4.7 socket-outlets

4.8 earthing protection

4.9 luminaries

4.10 motor control equipment

4.11 control panels – alarms; emergency lighting; environmental control

4.12 control devices – electrical; electronic; electro-mechanical

4.13 solar photovoltaic panels – control equipment, components and accessories

4.14 micro-wind turbine control equipment

4.15 cable glands

5 **Documentation**

5.1 electrical installation certificates

5.2 electrical installation condition report

5.3 minor electrical installation works certificates

5.5 schedules of inspections

5.5 schedules of test results

5.6 operational instructions

5.7 manufacturers' instructions

5.8 handover agreements

Scope related to knowledge and understanding

The contexts and circumstances below identify where and when the NOS could apply

1 **Working environments** (internal and/or external)

1.1 commercial

1.2 industrial

1.3 domestic

1.4 agricultural

1.5 horticultural

1.6 leisure and entertainment

1.7 residential medical and care facilities

1.8 public highways and parks

1.9 public services establishments

1.10 pre 1919 traditional/historic buildings

2 **Electrical system**

An electrical system, internal and/or external, in a building and/or structure that has an extra low voltage and/or low voltage single and/or multi-phase supply, circuits, equipment and components to provide:

2.1 control

2.2 communication

2.3 heating

2.4 lighting

2.5 power

3 **Organisation procedures**

3.1 information management

3.2 project management

3.3 risk assessment

3.4 risk management

3.5 implementing and monitoring health and safety requirements and issues

3.6 implementing and monitoring issues relating to the *natural environment*

3.7 customer services

3.8 accident reporting

3.9 emergencies

3.10 communication with relevant people

4 **Resources**

4.1 labour

4.2 plant and equipment

4.3 instruments

4.4 finance

4.5 IT

4.6 materials and other consumables

5 **Site services**

5.1 electricity

5.2 water

5.3 gas

5.4 oil

5.5 drainage

5.6 telecommunications

5.7 data transmission either underground or overhead

6 **Information**

6.1 technical – design documentation; plans; installation specifications; equipment specifications; manufacturers' data; manufacturers' instructions; BIM data

6.2 functional – operational instructions

6.3 *customer/client* information – drawings; diagrams; user instructions; specifications

6.4 contractual

6.5 statutory consents

6.6 health and safety

6.7 environmental considerations

Range related to knowledge and understanding

The contexts and circumstances below identify where and when the NOS must apply

1 **Relevant people**

1.1 *customers/clients*

1.2 client representatives

1.3 supervisors

1.4 site/contract manager

1.5 other contractors/trades

1.6 members of the public

1.7 work colleagues

2 **Enclosures for cables, conductors and wiring systems**

2.1 PVC and steel conduit

2.2 PVC and steel trunking

2.3 cable tray

2.4 basket and ladder systems

2.5 ducting systems

2.6 bus-bar trunking

2.7 pre-fabricated conductor, cable and wiring systems

3 **Electrical cable, conductors and wiring systems**

3.1 thermosetting insulated cables including flexes

3.2 single and multicore thermoplastic and thermosetting insulated cables

3.3 flat profile cable

3.4 mineral insulated cables

3.5 single wire armoured cables

3.6 armoured/braided flexible cables and cords

3.7 data cables

3.8 pre-fabricated conductor, cable and wiring systems

3.9 fibre optic cable

3.10 fire resistant cable

3.11 bus-bar trunking

4 **Equipment, accessories and components**

4.1 consumer units

4.2 distribution boards and/or panels

4.3 isolators

4.4 circuit breakers

4.4 fuses

4.6 switches

4.7 socket-outlets

4.8 earthing protection

4.9 luminaries

4.10 motor control equipment

4.11 control panels – alarms; emergency lighting; environmental control

4.12 control devices – electrical; electronic; electro-mechanical

4.13 solar photovoltaic panels – control equipment, components and accessories

4.14 micro-wind turbine control equipment

4.15 cable glands

5 **Documentation**

5.1 electrical installation certificates

5.2 electrical installation condition report

5.3 minor electrical installation works certificates

5.5 schedules of inspections

5.5 schedules of test results

5.6 operational instructions

5.7 manufacturers' instructions

5.8 handover agreements

Glossary

Appropriate industry standards and regulations for**:**

- electricity at work
- the quality of buildings and building work in England, Northern Ireland, Scotland and Wales
- requirements for electrical installations
- electricity safety, quality and continuity
- working at heights managing health and safety at work
- workplace health and safety and welfare
- personal protection at work
- provision and use of work equipment
- manual handling operations
- construction design and management
- controlling noise at work
- controlling asbestos in the work place
- controlling substances hazardous to health
- recycling and disposal of waste electrical and electronic equipment

Specification

A verbal and/or documented instruction that is an explicit set of requirements for installing, maintaining and/or servicing identified systems, equipment or products, to be satisfied by materials, components, design, processes, procedures, data management and/or service(s).

Clients/customers

- purchaser of installation and/or maintenance services
- other trades and services at the work site
- colleagues within the same organisation
- architect
- contract manager
- main/sub-contractor
- consultant
- local authority representatives
- work colleagues

A **public services establishment** can be a:

- hospital/medical centre
- school/college/university
- museum/library
- prison
- military base
- car park
- church or other place of worship

Natural environment

The climate, weather and natural resources that effect and are affected by human life and economic activity

Working practices

Methods, techniques and procedures that are adopted for carrying out specific tasks that ensures workers' exposure to hazardous situations is controlled in a safe manner when:

- working with equipment, tools and plant
- working with materials and substances (hazardous and non-hazardous)
- manual handling lifting
- using lifting equipment
- using personal protective equipment (PPE)

Personal protective equipment (PPE)

- safety helmets/hats
- hairnets
- gloves
- safety steel toe capped boots/shoes
- safety spectacles/goggles
- face shields/visors
- ear plugs/muffs
- conventional or disposable overalls, boiler /chemical suits, aprons

- respiratory protective equipment (RPE)
- high visibility clothing

Links to other NOS

SUMETS1 Plan, prepare and install environmental technology systems
SUMETS7 Service and maintain environmental technology systems
SUMETS10 Inspect and commission environmental technology systems
SUMETS11 Diagnose and rectify faults in environmental technology systems

External Links

Links correct at time of NOS approval:

- Health & Safety Executive Documents http://www.hse.gov.uk/pubns
- The quality of buildings and building work in England https://www.gov.uk/government/policies/providing-effective-building-regulations-so-that-new-and-altered-buildings-are-safe-accessible-and-efficient
- The quality of buildings and building work in Wales http://wales.gov.uk/topics/planning/buildingregs/?lang=en
- The quality of buildings and building work in Northern Ireland http://www.dfpni.gov.uk/building-regulations
- The quality of buildings and building work in Scotland http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards
- British Standard 7671 – Requirements for Electrical Installations http://www.theiet.org/resources/wiring-regulations/
- Carriage of dangerous goods authorisations https://www.gov.uk/government/publications/carriage-of-dangerous-goods-authorisations
- The requirements and information on microgeneration https://www.gov.uk/government/publications/microgeneration-strategy

SUMET09
Maintain electrical systems and equipment (SQA Unit Code-H956 04)

Developed by	SummitSkills
Version number	1
Date approved	March 2014
Indicative review date	April 2018
Validity	Current
Status	Original draft
Originating organisation	SummitSkills
Original URN	EL16
Relevant occupations	Highway Electrical Systems Installer; Installation Electrician; Maintenance Electrician; Electrical Trades; Electrician; Highway Electrical Systems Commissioning Electrician; Highway Electrical Systems Service & Maintenance Electrician; Industrial and Commercial Systems Engineer
Suite	Electrotechnical
Key words	Identify and rectify faults; electrical systems and equipment; industry standards; regulations; specification; working environment; natural environment; faults; electrical; electrotechnical; electrical maintenance