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### Overview

This standard is for people who install and connect electrical cables, conductors, wiring systems, equipment, accessories and components.

The person carrying out this work must be able to comply with the procedures and methods for installing and connecting electrical cables, conductors, wiring systems, equipment, accessories and components in accordance with 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 know and understand the different types of cables, conductors, wiring systems, equipment, accessories and components, their limitations, applications and the techniques for their positioning, fitting, fixing and connection.

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.

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Install and connect electrical cables, conductors, wiring systems and equipment (SQA Unit Code-H952 04)

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**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 confirm the existing electrical supply is suitable for the **electrical system**
- P2 produce a risk assessment and method statement for the work to be carried out, including the identification and use of *personal protective equipment*
- P3 verify that job information and documentation is current and relevant and that the **plant**, instruments, *access equipment* and tools are fit for purpose
- P4 select the associated **equipment, accessories and components** and confirm that they are:
  - P4.1 of the right type and size
  - P4.2 fit for purpose in accordance with the **electrical system's** design
- P5 select electrical cables, conductors, wiring systems and confirm that they are:
  - P5.1 of the right size and type
  - P5.2 fit for purpose in accordance with the **electrical system's** design
- P6 comply with industry practices and **organisational procedures** to ensure the co-ordination of **site services** and the activities of other trades
- P7 identify the correct means of electrical isolation prior to commencing installation and connection work
- P8 complete safe-isolation as and when required to ensure the safe installation and connection of **electrical cables, conductors and wiring systems** and their associated **equipment, accessories and components**
- P9 install, fix and connect electrical cables, conductors and wiring systems and their associated equipment, accessories and components in accordance with the requirements of:
  - P9.1 the **electrical system's** design
  - P9.2 industry recognised methods
  - P9.3 manufacturers' instructions
- P10 check that the connections and joints of the **electrical cables, conductors and wiring systems** and their associated **equipment, accessories and components** are of proper construction as regards to conductance, insulation, mechanical strength and protection, and ensure that they are identified correctly and clearly in accordance with the

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requirements of the **electrical system**

P11 confirm with the **relevant people**:

P11.1 those necessary variations to the planned programme of work that may have the potential to introduce a hazard and/or impact on the installation work to be undertaken

P11.2 the correct actions to be taken to ensure that any variations to the planned programme of work will not introduce a hazard and have minimum impact on the installation to be undertaken

P12 implement **organisational procedures** for the safe transport and/or disposal of waste material, substances and liquids in accordance with suppliers' and manufacturers' instructions

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### 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 the *appropriate industry standards and regulations* relevant to installing and connecting **electrical cables, conductors, wiring systems, associated equipment, accessories and components**
- K3 how to produce a risk assessment and method statement for the work to be carried out, including the identification and use of *personal protective equipment*, in accordance with:
  - K3.1 the **electrical system's** design
  - K3.2 organisational procedures
- K4 how to verify that job information and documentation is current and relevant, and that the **plant**, instruments, *access equipment* and tools are fit for purpose
- K5 the applications, advantages and limitations of types of *personal protective equipment*
- K6 the applications, advantages and limitations of types of **electrical cables, conductors, wiring systems, associated equipment, accessories and components**
- K7 the industry recognised methods for determining the type, size and rating of **electrical cables, conductors, wiring systems, associated equipment, accessories and components** in relation to the **electrical system's** design
- K8 how to interpret diagrams and drawings for the **electrical system** to locate **site services**
- K9 how to interpret diagrams and drawings for the **electrical system** to identify the planned location of the **electrical cables, conductors, wiring systems, associated equipment, accessories and components**
- K10 the methods and techniques for installing, fixing and connecting

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**electrical cables, conductors, wiring systems**, associated **equipment, accessories and components** in accordance with:

- K10.1 the **electrical system's** design
- K10.2 manufacturers' instructions
- K11 the different types and methods of joining and connecting **electrical cables, conductors, wiring systems**, their applications, advantages and limitations
- K12 the correct procedures for safe-isolation
- K13 the **organisational procedures** for confirming with the **relevant people** the appropriate actions to be taken to ensure that any variations to the planned programme of work will not introduce a hazard and have minimum negative impact on the installation work to be undertaken
- K14 the methods for the safe transport and/or disposal of waste material, substances and liquids in accordance with suppliers' and manufacturers' instructions

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**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 Site**

- 3.1 new build construction – building or structure
- 3.2 an existing building or structure

**4 Site services**

- 4.1 electricity



- 4.2 water
- 4.3 gas
- 4.4 oil
- 4.5 drainage
- 4.6 telecommunications
- 4.7 data transmission either underground or overhead

**5 Organisation procedures**

- 5.1 information management
- 5.2 project management
- 5.3 risk assessment
- 5.4 risk management
- 5.5 implementing and monitoring health and safety requirements and issues
- 5.6 implementing and monitoring issues relating to the *natural environment*
- 5.7 customer services
- 5.8 accident reporting
- 5.9 emergencies
- 5.10 communication with relevant people

**6 Plant**

- 6.1 generators
- 6.2 transformers for low voltage hand-tools
- 6.3 lifting equipment
- 6.4 *access equipment*

**Range related to****performance criteria**

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

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

- 1.1 thermosetting insulated cables including flexes
- 1.2 single and multicore thermoplastic and thermosetting insulated cables
- 1.3 flat profile cable
- 1.4 mineral insulated cables
- 1.5 single wire armoured cables
- 1.6 armoured/braided flexible cables and cords
- 1.7 data cables
- 1.8 pre-fabricated conductor, cable and wiring systems
- 1.9 fibre optic cable
- 1.10 fire resistant cable
- 1.11 bus-bar trunking

**2 Equipment, accessories and components**

- 2.1 consumer units
- 2.2 distribution boards and/or panels
- 2.3 isolators
- 2.4 circuit breakers
- 2.5 fuses
- 2.6 switches
- 2.7 socket-outlets
- 2.8 earthing protection
- 2.9 luminaries
- 2.10 motor control equipment
- 2.11 control panels – alarms; emergency lighting; environmental control
- 2.12 control devices – electrical; electronic; electro-mechanical
- 2.13 solar photovoltaic panels – control equipment, components and accessories
- 2.14 micro-wind turbine control equipment
- 2.15 cable glands

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**3 Relevant people**

3.1 *customers/clients*

3.2 client representatives

3.3 supervisors

3.4 site/contract manager

3.5 other contractors/trades

3.6 members of the public

3.7 work colleagues

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- 4.1 electricity
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## 5 **Organisation procedures**

- 5.1 information management
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## 6 **Plant**

- 6.1 generators
- 6.2 transformers for low voltage hand-tools
- 6.3 lifting equipment
- 6.4 *access equipment*

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knowledge and  
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**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
- 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)

### **Access equipment**

- scaffold
- ladders
- steps
- staging
- trestles
- mobile elevated work platform (MEWP)

### **Personal protective equipment (PPE)**

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- 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>

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<b>Relevant occupations</b>	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
<b>Suite</b>	Electrotechnical
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