

## Unit 73: Electrical Installation Standards and Components in Building Services Engineering

Unit code: H/600/0408

QCF Level: 3

Credit value: 10

Guided learning hours: 60

### Unit aim

The aim of this unit is to give learners knowledge of legal requirements and standards relevant to electrical installations, and different wiring techniques. It also provides learners with an understanding of earthing and bonding principles and the need for final circuits and circuit protection when designing electrical services installations.

### Learning outcomes and assessment criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

Learning outcomes	Assessment criteria
1 Know the regulations and legislation applicable to electrical installations	1.1 Describe the main regulations and legislation relating to electrical installations
2 Know the different wiring techniques used in electrical installations	2.1 Describe the operational features, characteristics and applications of cables and cords
	2.2 Describe the operational features, characteristics and applications of containment methods
	2.3 Describe the operational features, characteristics and applications of installation methods
3 Understand earthing and bonding principles	3.1 Explain the requirements, operational features, characteristics and applications of electrical earth and shock protection
4 Understand the need for final circuits and circuit protection	4.1 Explain the operational features, characteristics and applications of residual current device

	4.2	Discuss the use of final circuits
	4.3	Apply the principles of diversity to final circuits
	4.4	Explain the principle and applications of overcurrent and short-circuit protection devices
5 Understand the requirements for special installations	5.1	Explain the application of regulations in locations containing baths, showers and electric floor heating systems

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## Unit content

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### 1 Know the regulations and legislation applicable to electrical installations

*Regulations:* Institution of Electrical Engineers (IEE) Wiring Regulations; scope and objective; fundamental principles for safety; assessment of purposes; supplies and structure, external influences, compatibility and maintainability

*Legislation:* Electricity Supply Quality Continuity Regulations; Health and Safety at Work Act 1974; Electricity at Work Regulations 1989; Building Regulations; CDM Regulations; Electricity Equipment Safety Regulations 1994; The Electromagnetic Compatibility Regulations 1992

### 2 Know the different wiring techniques used in electrical installation

*Wiring techniques:* containment; segregation of circuits; non-flexible low voltage cables; flexible cords, extra low and low voltage cables for power, data and security; switching

*Containment:* features; materials; standard sizes; assembly and installation procedures; capacity; comparative costs and benefits of various ducts, bus-bar, conduit and trunking, basket, ladder rack, uni-strut systems; criteria for selection

*Segregation of circuits:* categories of circuits

*Non-flexible low voltage cables:* details of construction; features and materials; advantages and disadvantages; support; protection; jointing and termination; cross-linked polyethylene (XLPE); low smoke and fumes (LSF); identification of fixed wiring

*Flexible cords, extra low and low voltage cables for power, data and security:* details of their construction; features and materials used including fibre optic cables; advantages and disadvantages; use and levels of insulation for extra low and low voltage power; audio and high frequency applications

*Switching:* switch position; functional switching; switching off for mechanical maintenance; emergency switching and isolation; modular wiring techniques

### 3 Understand earthing and bonding principles

*Earthing and bonding principles:* protection against electric shock; principles of earthing; protective conductors; other protection methods; residual current devices  
Protection against electric shock: nature of electric shock; resistance of electric shock; basic protection and fault protection; protection for users of exterior equipment

*Principles of earthing:* advantages, disadvantages; system classification; fault loop; earth electrodes; protective multiple earthing (PME); impedance values  
Protective conductors: earthing; bonding; main equipotential; supplementary; types; sizes; calculations associated with protective conductors

*Other protection methods:* class 2 equipment; non-conducting locations; earth-free local equipotential bonding; electrical separation

*Residual current devices:* principle of operation; use and limitations

#### 4 Understand the need for final circuits and circuit protection

Final circuits: types eg fused plug, socket outlet, ring circuit, radial and tree circuits, industrial socket outlets, lighting, cooker, off-peak; final circuit arrangements; application of diversity; maximum demand

*Circuit protection:* against thermal effects, burns and fire; against overcurrent and short circuits; characteristics and limitations of devices such as fuses and circuit breakers

#### 5 Understand the requirements for special installations

*Special installations:* regulations; standard installations; other installations  
Regulations: BS7671:2008 – IEE Regulations Requirements for Installations or Locations (Part 7)

*Standard installations:* locations containing a bath or shower; swimming pools and other basins; rooms and cabins containing sauna heaters; construction and demolition site installations; agricultural and horticultural premises; conducting locations with restricted movement; electrical installations in caravan/camping parks and similar locations; marinas and similar locations; solar photovoltaic power supply systems; mobile or transportable units; floor and ceiling heating systems

*Other installations:* highway supplies and street furniture; heating appliances and their installation; electrode boilers; instantaneous water heaters; high voltage discharge lighting; reduced voltage systems

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