Unit 19: Developing Electrical Installation Skills

Unit reference number: Y/502/3691
QCF level: 1
Credit value: 4
Guided learning hours: 40

Unit aim

This unit introduces learners to the hand tools, materials and personal protective equipment (PPE) used in electrical work, and offers learners opportunities to develop the skills used in basic electrical installation operations.

Unit introduction

Emphasis is placed on the correct selection and safe use of the appropriate tools and equipment required to carry out basic electrical installation procedures.

Learners will be given the opportunity to practise, under supervision, the electrical installation techniques used to wire a basic lighting rig and a basic ring main.

Although learners will work independently when performing electrical installation operations, they will also function as effective members of a team by contributing to the maintenance of a clean and tidy workshop, and by working responsibly with others.

When preparing for work in electrical installation it is important that learners are able to seek and respond to guidance from colleagues and tutors during the learning process. This unit will help learners to develop an understanding of the personal qualities that are valued by employers.

It is recommended that learners will either have successfully completed unit 10 *Health and Safety and Welfare in Construction* before starting this unit, or that they will be studying the unit alongside this one, using an integrated delivery and assessment approach.

Essential resources

Learners will require access to workbenches, hand tools and materials of a nature and standard typical of a proper work environment. The learning environment must be a safe place of work to carry out electrical tasks, with appropriate work areas and storage for tools, equipment and PPE.

Learners will also require access to a technical library with current textbooks on construction and the built environment. Internet access will give learners an opportunity to develop skills in e-learning but this will need careful management by the tutor.

Learning outcomes, assessment criteria and unit amplification

To pass this unit, the learner 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		Unit amplification
1	Know the hand tools used in basic electrical installation processes	1.1	List and describe appropriate hand tools to be used in basic electrical installation processes	□ *Hand tools*: e.g. electrician's screwdriver (parallel slotted and Phillips head), adjustable wrench, craft knife, pliers with insulated handles, wire strippers, junior hacksaw, digital multimeter, tape measure
2	Know the materials and components used in basic electrical installation processes	2.1	List and describe appropriate materials and components to be used in basic electrical installation processes	□ *Materials*: PVC insulated flex □ *Component*s: 13A fused sockets, light fittings, 60W light bulbs, 3A and 13A cartridge fuses
3	Know the personal protective equipment (PPE) used in basic electrical installation processes	3.1	List and describe appropriate PPE to be used in basic electrical installation processes	□ *Personal protective equipment*: e.g. safety gloves, goggles, safety boots/shoes, other PPE as appropriate □ *Basic electrical installation processes*: isolate power supply; mark out circuit; position and fix components; measure cables to length; strip cables and wires; fix wires to components; check connections for electrical and mechanical soundness; test system
4	Be able to apply safe working practices to perform electrical installation operations	4.1	Select and use hand tools safely to perform basic electrical installation operations	□ *Safe working practices*: compliance with advice and guidance given; safe maintenance, use and storage of tools and equipment □ *Electrical installation operations*: basic lighting rig with minimum of four light fittings in parallel; basic ring main with minimum four 13A fused and earthed sockets

Learning outcomes		Assessment criteria		Unit amplification
5	Be able to work responsibly with others	5.1	Maintain a clean and tidy work environment	□ *Behaviour*: e.g. responsibility, recognition of strengths and skills of self and other team members, cooperation, tidying 'as you go'
		5.2	Work responsibly in the workshop	
6	Be able to seek and respond to guidance when working as part of a team	6.1	Follow instructions when working with others	□ *Attitudes*: e.g. enthusiasm; approachability; communication skills, e.g. listening, questioning, speaking clearly; following instructions
		6.2	Communicate appropriately with others	

Information for tutors

Delivery

This unit will give learners their first experience of the practical skills associated with electrical installation, together with the knowledge required to underpin these practical skills. Learners must be given opportunities to develop their knowledge and practical skills through supervised practical workshop activities, group teaching and demonstrations of the tools, equipment, materials, techniques and PPE involved.

Learners and tutors are encouraged to view the unit as a 'taster', in that it gives the learner an opportunity to experience the type of work involved in electrical installation.

All building services craft tasks are problems to be solved (often in three dimensions) with available tools and materials and within a given timescale. The solutions to the problems are the conventional techniques, methods and procedures that building services craftspeople have developed to address the work they face on a daily basis. The learner will need to discuss the materials, components, tools, equipment, PPE and techniques to be used with a responsible and competent person and should respond positively to any advice given. They should then select the tools, equipment, materials, components and PPE appropriate for the task in hand, and use these to perform the specified electrical installation tasks.

Health and safety are of paramount importance in electrical work. Learners must understand that all the work they do must be carried out on systems that are isolated from any source of power, and they must be aware of the special problems caused by water and electricity. When systems are tested to see whether they work properly they must be tested on a low voltage supply, and the testing procedure must be supervised by the tutor.

Outline learning plan

The outline learning plan has been included in this unit as guidance.

Topic and suggested assignments/activities
Know the hand tools used in basic electrical installation processes. Whole-class, tutor-led discussion about hand tools. Individual work on tool identification sheets. Requisition tools from store.
Know the materials and components used in basic electrical installation processes. Site visit. Presentation from qualified working electrician. Trip to electrical supplies merchant.
Know the personal protective equipment (PPE) used in basic electrical installation processes. Whole-class, tutor-led discussion about PPE, when and where it is necessary and how it works. Individual work on PPE identification sheets. Learners complete requisition sheets to obtain PPE from store. Learners given opportunities to select and wear the full range of the PPE used in electrical installation.

Topic and suggested assignments/activities
Practise the processes used to perform basic electrical installation processes. Practical demonstration of how to keep individual work areas tidy. The skills associated with electrical installation are best taught by the tutor demonstrating the skills required, followed by the learners practising the skills. The tutor should monitor the learners as they practise their skills and provide guidance and advice, and correction or praise, as appropriate.
Be able to apply safe working practices to perform electrical installation operations. Assessment–two hours for learners to demonstrate knowledge of the hand tools, materials and PPE to be used in the practical assessment tasks. Evidence of selection or de-selection of each required. This can be achieved by completion of in-house requisition forms or similar. Four hours to demonstrate use of safe working practices to perform basic electrical installation operations.
Be able to work responsibly with others. Use of health and safety videos/DVDs to demonstrate the dangers of a dirty and untidy workplace. Discussion of important role played by on-site personnel behaving in a cooperative and responsible manner. Constant encouragement from tutors to 'tidy as you go' during practical electrical installation sessions.
Be able to seek and respond to guidance when working as part of a team. Tutors should encourage learners to ask questions about their work. This could be prompted by tutors asking learners to explain what they are doing, and why they are doing it, or to name a tool or an item of PPE as they work. Learners should be aware that their attitude, and the nature of their responses to any advice provided, will comprise part of the evidence required to achieve the unit. This requires no formal allocation of time and should occur during practice and assessment.

Assessment

Achievement of assessment criteria should be evidenced through contextualised, vocationally related practical experiences with tasks specifically designed with the assessment criteria in mind. Many of the assessment criteria will need to be assessed directly by the tutor during practical activities. Where this approach is used, suitable evidence from guided activities would require observation records and/or witness statements.

The use of two assessment instruments is suggested to allow full coverage of the outcomes. The first assessment instrument would comprise 1.1, 2.1 and 3.1 and should focus upon the correct selection of the tools, materials and PPE required to complete the electrical installation tasks and the reason why each is appropriate. The second assessment instrument would comprise 4.1, 5.1, 5.2, 6.1 and 6.2 and should focus upon the completion of the practical electrical installation tasks.

For 1.1, learners must list and describe commonly used hand tools. This will be evidenced most clearly by completion of appropriate requisition orders.

For 2.1, learners must list and describe the correct materials to be used to complete the electrical installation tasks. This will be evidenced most clearly by completion of appropriate requisition orders.

For 3.1, learners must list and describe the appropriate PPE to be worn or used when performing electrical installation tasks. This will be evidenced most clearly by completion of appropriate requisition orders.

For 4.1, learners must be able to use the selected tools, materials, components and PPE to perform electrical installation tasks to an acceptable standard. Learners must be aware of the need for all connections to be safe and correct and all light fittings and sockets to be securely mounted in a regular arrangement, but there are no specified tolerances at this level. It is anticipated that learners will be given considerable guidance. Photographs, observation records and witness statements could be provided as evidence. Learners need to follow safe working practices.

For 5.1 and 5.2, learners must maintain a clean and tidy workspace and work responsibly with others. Learners should be aware of any hazards associated with the practical tasks they perform but they need not produce risk assessments or suggest control measures. The evidence could take the form of a witness statement.

For 6.1 and 6.2, learners must demonstrate responsibility by seeking and listening to guidance and clarification from tutors as and when appropriate, and by acting upon the guidance received. They should communicate appropriately with both tutors and other learners at all times. The evidence could take the form of a witness statement.

Suggested resources

Books

Greeno R and Hall F – *Building Services Handbook* (5th Edition, Butterworth-Heinemann, 2009) ISBN 9781856176262

IEE Wiring Regulations 17th Edition (BS 7671, 2008) ISBN 9780863418440

Scaddan B – *Electrical Wiring*: *Domestic* (Newnes, 2003) ISBN 9780750687355

Topliss S and Murray-Smith J – *BTEC Entry 3/Level 1 Construction Student Book* (Pearson, 2010) ISBN 9781846909207

Websites

www.cibse.org

www.citb.org.uk

www.electrical-online.com

www.householdersguide.com

www.hse.gov.uk

www.iosh.co.uk

www.rospa.co.uk