# Unit 500: Initial verification of electrical installations

## Sample scheme of work

Please revise the following text to suit your requirements.

This sample scheme of work covers both classroom and workshop based learning for 2391-50 Unit 500. It is based on 1.5 hours per session for 28 sessions. It is an example only of a possible scheme of work and is based on theory and practical within an FE centre, but can be amended to suit all learning facilities with the necessary adjustments to meet individual learners' needs.

Unit 500 is designed as a stand-alone unit and should be used in conjunction with the standards set for the qualification, to ensure full coverage of the learning requirements.

**You can use the sample scheme of work as it is, adjust it or extract content to create a scheme of work to suit your delivery needs. It can also be adjusted by adding theory and practical workshops to support learners who have/need additional learning time.**

Reference is made within the scheme of work to **worksheets and PowerPoint presentations** (in **black bold**) that are available on SmartScreen.co.uk for tutors to use with learners. Any other resources listed are not provided on SmartScreen, but provide guidance for the tutor as to others they may produce. Delivery timings are given, however, these can be amended to suit the group. The content of presentations, discussions, explanations etc are left to the professionalism of the course tutor.

Centres should also incorporate the following themes, where appropriate, as strands running through each of the sections within the qualification. Although they are not specifically referred to in the section content section, City & Guilds regards these as essential in the teaching of the qualification:

- health and safety considerations, in particular the need to impress upon learners the fact that they must preserve the health and safety of others as well as themselves
- Functional Skills (mathematics, English and ICT)
- extension tasks and differentiation, inclusion, entitlement and equality issues
- spiritual, moral, social and cultural issues
- environmental education and related European issues
- British Values
- use of information learning technology (ILT).

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# Unit 500: Initial verification of electrical installations

## Sample scheme of work

**Course/qualification**: _____ **Tutor's name**: _____

**Number of sessions**: 28 **Delivery hours**: approximately 42 **Venue**: _____ **Group**: _____

| **Aims** | **To enable learners to**: |
|---|---|
| • This unit is designed to enable learners to understand principles, practices and legislation for initial verification of electrical installations with statutory and non-statutory regulations and requirements. Its content is the knowledge needed by a learner to underpin the application of skills for the inspection, testing, commissioning and certification of electrical installations. | • Understand the requirements for initial verification of electrical installations<br>• Understand safety management procedures when undertaking initial verification<br>• Understand the requirements for the initial inspection of an electrical installation<br>• Understand the requirements for testing electrical installations at initial verification<br>• Perform inspection and testing of electrical installations. |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 1 | 1. Understand the requirements for initial verification of electrical installations<br><br>1.1 State the situations that require initial verification**.** | **Activities:**<br>Tutor led discussion on the situations that require initial verification, to include:<br>• new electrical installation<br>• new circuits or accessories added to existing installation<br>• alterations to existing installations<br>**Resources:**<br>• **PowerPoint presentation 1**<br>• BS 7671<br>• Guidance Note 3 | **Worksheet 1** |
| 1 | 1. Understand the requirements for initial verification of electrical installations<br><br>1.2 State the purpose of initial verification | **Activities:**<br>• Tutor led discussion on what BS 7671 regulation 641.1 and BS 7671 regulation 134.2 means<br>• Tutor led discussion on Guidance note 3 section 2.1<br>**Resources:**<br>• **PowerPoint presentation 1**<br>• BS 7671<br>• Guidance Note 3 | **Group Q & A** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 1 | 1. Understand the requirements for initial verification of electrical installations<br><br>1.3 Identify the statutory and non-statutory documents that affect the initial verification process. | **Activities:**<br>Tutor led discussion to identify the key requirements of statutory documents that affect initial verification including:<br>• Health and Safety at Work etc Act 1974<br>• Electricity at Work Regulations 1989<br><br>Tutor led discussion on the non-statutory documents that can help provide guidance on the process of initial verification including:<br>• BS 7671<br>• Guidance Note 3<br>• HSE GS38<br>**Resources:**<br>• **PowerPoint presentation 1**<br>• BS 7671<br>• Guidance Note 3 | **Worksheet 1** |
| 2 | 1. Understand the requirements for initial verification of electrical installations<br><br>1.4 Identify information required by an inspector in order to carry out initial verification in accordance with BS 7671 and Guidance Note 3 | **Activities:**<br>• Tutor led discussion on the requirements of BS 7671 regulations 641.2 and 313.1 using Guidance Note 3 section 2.3 as reference.<br>• Explain the importance of the information including the responsibilities of the DNO and the designer with regards to the provision of this information<br>**Resources:**<br>• **PowerPoint presentation 2**<br>• BS 7671<br>• Guidance Note 3 | **Worksheet 2** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 2 | 1. Understand the requirements for initial verification of electrical installations<br><br>1.5 Describe the purpose of certificating documents and the requirements for recording and retention in accordance with BS 7671 | **Activities:**<br>Tutor led discussion on the need for documenting electrical work and the purpose and use of each document in accordance with BS 7671 chapter 64, including:<br>• the Electrical installation certificate<br>• the Schedule of inspections<br>• the Schedule of test results<br>• the Minor electrical installation works certificate<br>**Resources:**<br>• **PowerPoint presentation 2**<br>• BS 7671<br>• Guidance Note 3<br>• Electrical installation certificate (both forms 1 and 2)<br>• Schedule of inspections<br>• Schedule of test results<br>• Minor electrical installation work certificate | **Worksheet 3** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 2 | 1. Understand the requirements for initial verification of electrical installations<br><br>1.6 Define the responsibilities of the relevant signatories in relation to certification. | **Activities:**<br>Tutor led discussion on the responsibilities of the following roles with regards to the initial verification process:<br>• The designer (Design)<br>• The installer (Construction)<br>• The inspector (Inspection and Testing)<br><br>**Resources:**<br>• **PowerPoint presentation 2**<br>• BS 7671<br>• Guidance Note 3<br>• Electrical installation certificate | **Group Q & A** |
| 3 | 2. Understand safety management procedures when undertaking initial verification of electrical installations<br><br>2.1 Identify health and safety requirements which apply when carrying out initial verification | **Activities:**<br>Tutor led discussion on the key health and safety requirements that need to be considered and applied including:<br>• Working in accordance with risk assessments / permits to work / method statements<br>• Safe use of tools and equipment<br>• Safe and correct use of measuring instruments<br>• Provision and use of PPE<br>• Reporting of unsafe situations and the appropriate steps to be taken<br>**Resources:**<br>• **PowerPoint presentation 3**<br>• BS 7671<br>• Guidance Note 3 | **Group Q & A** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 3 | 2. Understand safety management procedures when undertaking initial verification of electrical installations<br><br>2.2 Outline the relevant requirements of the Electricity at Work Regulations for safe inspection and testing of electrical installations | **Activities:**<br>Tutor led discussion on the requirements of the regulations with regards to those carrying out the work and those others who may be present while the work is being undertaken including:<br>• Regulation 4 all installations to be safe.<br>• Regulation 12 means of isolation.<br>• Regulation 13 prevention of accidental re-energisation.<br>• Regulation 14 working on or near live conductors.<br>• Regulation 15 access and lighting.<br>• Regulation 16 competence.<br>**Resources:**<br>• **PowerPoint presentation 3** | **Worksheet 4** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 3 | 2. Understand safety management procedures when undertaking initial verification of electrical installations<br><br>2.3 Describe the procedure for completing safe isolation in accordance with HSE guidance | **Activities:**<br>Tutor to demonstrate how to perform safe isolation on electrical systems including:<br>• single phase circuits<br>• single phase distribution boards<br>• three phase circuits<br>• three phase distribution boards<br>**Resources:**<br>• **single phase demonstration rig**<br>• **three phase demonstration rig**<br>Candidates may benefit from obtaining copies of the HSE guidance document HSE GS85 from:<br>http://www.hse.gov.uk/pubns/books/hsg85.htm<br>Candidates may also benefit from access to the Electrical Safety First best practice guide for safe isolation (Best Practice Guide 2) which can be accessed from:<br>https://www.electricalsafetyfirst.org.uk/electrical-professionals/best-practice-guides/ | **Worksheet 5** |
| 3 | 2. Understand safety management procedures when undertaking initial verification of electrical installations<br><br>2.4 Explain why safe isolation is carried out for the protection of the inspector and other persons | **Activities:**<br>Tutor led discussion on reasons for performing safe isolation including:<br>• compliance with EAWr 89 regulation 14<br>• potential risks involved in initial verification.<br>**Resources:**<br>• **PowerPoint presentation 3** | **Group Q & A** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 3 | 2. Understand safety management procedures when undertaking initial verification of electrical installations<br><br>2.5 Identify the implications of not carrying out safe isolation | **Activities:**<br>Tutor led discussion to identify the implications of not carrying out safe isolation and the implications of performing safe isolation including how it affects:<br>• the inspector's safety<br>• the safety of other personnel present<br>• customers and clients<br>• members of the public<br>• other building systems<br>**Resources:**<br>• **PowerPoint presentation 3** | **Worksheet 6** |
| 3 | 5. Perform inspection and testing of electrical installations<br><br>5.1 Establish a safe system of work appropriate to initial verification**.** | **Activities:**<br>Candidates to identify a safe system of work for both a domestic single phase installation and a commercial three phase installation. Candidates could produce a risk assessment and method statement for each type of installation. Consideration should be given to the following:<br>• the inspector's safety<br>• the safety of other personnel present<br>• customers and clients<br>• members of the public<br>• other building systems<br>**Resources:**<br>• BS 7671<br>• Guidance Note 3 | **Risk assessment and method statement** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 3 | 5. Perform inspection and testing of electrical installations<br><br>5.2 Carry out the relevant safe isolation procedure in accordance with HSE guidance | **Activities:**<br>Candidates are to perform safe isolation procedures for a variety of installation requirements including:<br>• a single phase circuit<br>• a three phase circuit<br>• a single phase DB<br>• a three phase DB<br>**Resources:**<br>• simulation test rig<br>• voltage indicator and proving unit<br>• lock off kit c/w signs and notices | **Observation and demonstration** |
| 4 | 3. Understand the requirements for the initial inspection of an electrical installation<br><br>3.1 State why inspection is carried out before testing | **Activities:**<br>Tutor led discussion to outline the requirements of BS 7671 with regards to regulation 641.1 including the need to inspect installations:<br>• both during and after construction and the reasons<br>• before testing commences and the reasons<br>**Resources:**<br>• **PowerPoint presentation 4**<br>• BS 7671<br>• Guidance Note 3 | **Group Q & A** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 4 | 3. Understand the requirements for the initial inspection of an electrical installation<br><br>3.2 Identify the items to be inspected during initial verification in accordance with the schedule of inspections for new installations**.** | **Activities:**<br>Tutor led discussion on the things to be inspected on a typical domestic installation consisting of a single phase TN-C-S supply with a location containing a bath or shower.<br>Tutor to use Guidance Note 3 section 2.5 to outline some of the aspects that would be inspected as part of an initial verification.<br>**Resources:**<br>• **PowerPoint presentation 4**<br>• BS 7671<br>• Guidance Note 3 | **Group Q & A** |
| 4 | 3. Understand the requirements for the initial inspection of an electrical installation<br><br>3.3 Explain how the items on the Schedule of Inspections would be verified. | **Activities:**<br>Tutor led discussion to identify the purpose of the marks permitted on the schedule such as:<br>• tick for compliance with BS 7671<br>• N/A for not applicable<br>**Resources:**<br>• **PowerPoint presentation 4**<br>• BS 7671<br>• Guidance Note 3<br>• blank Schedule of Inspections | **Group Q & A** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 4 | 3. Understand the requirements for the initial inspection of an electrical installation<br><br>3.4 Describe the appropriate human sense required for a particular inspection | **Activities:**<br>Tutor led discussion to outline the human senses used during initial verification:<br>• touch - to check for security of fixings, tightness of terminations<br>• sight - to check for correctness of equipment and terminations, presence of components and labels and the like, absence of burs and sharp edges etc.<br><br>Tutors are to stress that touch should not be used for checking for sharp edges and burs as this may cause injury to the inspector. Tutors to stress that the senses of hearing, smell and taste are not used during initial verification, but may be used during fault finding or other forms of inspection and testing.<br>**Resources:**<br>• **PowerPoint presentation 4**<br>• BS 7671<br>• Guidance Note 3 | **Worksheet 7** |
| 4 | 3. Understand the requirements for the initial inspection of an electrical installation<br><br>3.5 Describe how to deal with an item that is found unsatisfactory during the inspection process. | **Activities:**<br>Tutors to ensure they outline the correct actions to be taken if a non-compliance were to be found, if the inspector was:<br>• not responsible for the build<br>• responsible for the build<br>**Resources:**<br>• **PowerPoint presentation 4** | **Group Q & A** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 4 | 3. Understand the requirements for the initial inspection of an electrical installation<br><br>3.6 Describe how the IP classification system is used for electrical equipment. | **Activities:**<br>Tutors to outline the International Protection code system in accordance with BS EN 60529 including:<br>• The meaning of the first character and the range<br>• The meaning of the second character and the range<br>• The meaning of the third character and the range<br>• The use of the letter X in any position<br><br>Tutor to ensure candidates can identify standard IP codes used within BS 7671 and know the meaning of the codes.<br>**Resources:**<br>• **PowerPoint presentation 4**<br>• BS 7671<br>• Guidance Note 3 | **Worksheet 8** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 5 | 5. Perform inspection and testing of electrical installations<br><br>5.3 Carry out an initial inspection in accordance with BS 7671 and IET Guidance Note 3. | **Activities:**<br>Candidates to perform an initial inspection on a single phase installation consisting of multiple circuits.<br>**Resources:**<br>• simulation rig of a single phase commercial installation<br>• BS 7671<br>• Guidance Note 3<br>• blank Schedule of inspections | **Observation and demonstration** |
| 5 | 5. Perform inspection and testing of electrical installations<br><br>5.4 Complete a schedule of inspections in accordance with BS 7671 and IET Guidance Note 3. | **Activities:**<br>Candidates to record their findings of an initial inspection on a single phase installation consisting of multiple circuits.<br>**Resources:**<br>• simulation rig of a single phase commercial installation<br>• BS 7671<br>• Guidance Note 3<br>• blank Schedule of inspections<br>• | **Observation and demonstration** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 6 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.1 State the reasons for instruments to be maintained and comply with standards such as BS 7671 and GS38. | **Activities:**<br>Tutors led discussion on the need for safe and accurate instruments including:<br>• the requirement for all test instruments to comply with BS EN 61010 / BS EN 61557<br>• the need for instrument readings to be reliable and accurate<br>• basic instrument accuracy level to be observed<br>• the requirement for test leads to comply with GS38<br>**Resources:**<br>• **PowerPoint presentation 5**<br>• Guidance Note 3 | **Group Q & A** |
| 6 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.2 Describe the characteristics of instruments and leads used for each test. | **Activities:**<br>Using Guidance Note 3 chapter 4 and section 2.6.4 candidates are to identify the following:<br>• the name of the test<br>• the name of the instrument<br>• the section of BS EN 61557 it is to comply with<br>• the voltage range (where specified)<br>• the measurement range (where specified)<br>• what requirements of GS38 are applicable<br>**Resources:**<br>• **PowerPoint Presentation 5**<br>• Guidance Note 3<br>• HSE GS38 | **Worksheet 9** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 6 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.3 Explain why there is a recommended test sequence for initial verification. | **Activities:**<br>Tutor led discussion to outline the requirements of BS 7671 regulation 643.1 which states the sequence of testing, and outline the reasons including:<br>• the need to keep the inspector safe at all times<br>• the need to confirm that all the installation is tested<br>• that the results of each preceding test act as platform for the next test<br>**Resources:**<br>• **PowerPoint presentation 5**<br>• BS 7671<br>• Guidance Note 3 | **Group Q & A** |
| 7 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.4 Explain the purpose of each test<br>• Continuity of protective conductors | **Activities:**<br>Tutor to outline the purpose of the test and the conductors involved including:<br>• the circuit protective conductors<br>• main and supplementary bonding conductors<br>• earthing conductor when available<br>• line conductors<br>**Resources:**<br>• **PowerPoint presentation 6**<br>• BS 7671<br>• Guidance Note 3 | **Worksheet 10** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 7 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.5 Describe how each test is carried out<br>• Continuity of protective conductors | **Activities:**<br>Tutor to identify the correct procedure to be followed in accordance with Guidance Note 3 including:<br>• test method 1<br>• test method 2<br>**Resources:**<br>• **PowerPoint presentation 6**<br>• demonstration rig<br>• low resistance ohmmeter c/w leads<br>• temporary link lead set<br>• BS 7671<br>• Guidance Note 3 | **Worksheet 11** |
| 7 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.6 Identify factors that affect the result of each test<br>• Continuity of protective conductors | **Activities:**<br>Tutor to explain what factors could affect the results including:<br>• parallel paths<br>• conductor temperature<br>• material, length and CSA of conductor<br>• loose/poor connections<br>• 'nulling' of test leads<br>**Resources:**<br>• **PowerPoint presentation 6**<br>• Guidance Note 3 | **Group Q & A** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 8 | 5. Perform inspection and testing of electrical installations<br><br>5.5 Carry out tests in accordance with BS 7671 and IET Guidance Note 3<br>• Continuity of protective conductors | **Activities:**<br>Candidates to perform test in accordance with agreed procedure on a mix of circuits including:<br>• final lighting circuit<br>• radial final circuit<br>• main protective bonding<br>• supplementary bonding conductors<br>**Resources:**<br>• **simulation rig**<br>• low resistance ohmmeter c/w leads<br>• Guidance Note 3 | **Observation and demonstration** |
| 8 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.7 Interpret the result of each test<br>4.8 Explain how test results are verified for compliance<br>• Continuity of protective conductors | **Activities:**<br>Tutor to explain the use of Guidance Note 3 Table B1 to identify the expected values of resistance based on known factors including:<br>• the conductor material, length and CSA<br>• the conductor known temperature range<br>**Resources:**<br>• **PowerPoint Presentation 7**<br>• BS 7671<br>• Guidance Note 3 | **Worksheet 12** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 8 | 5. Perform inspection and testing of electrical installations<br><br>5.6 Verify test results for compliance | **Activities:**<br>Candidates to use the measured values of resistance, to identify by calculation, if the results are acceptable, based on known factors including:<br>• the conductor CSA<br>• the conductor length<br>• acceptable variances<br>**Resources:**<br>• BS 7671<br>• Guidance Note 3 | **Observation and demonstration** |
| 8 | 5. Perform inspection and testing of electrical installations<br><br>5.7 Complete documentation in accordance with BS 7671 and IET Guidance Note 3 | **Activities:**<br>Candidates to record results in the relevant sections of the schedule of test results and Electrical Installation Certificate.<br>**Resources:**<br>• Guidance Note 3<br>• Schedule of test results | **Observation and demonstration** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 9 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.4 Explain the purpose of each test<br><br>• Continuity of ring final circuits | **Activities:**<br>Tutor to outline the purpose of the test and the conductors involved including:<br>• the line conductor<br>• the neutral conductor<br>• the circuit protective conductor<br><br>Tutor to explain the purpose of performing the test in the correct sequence<br>**Resources:**<br>• **PowerPoint presentation 8**<br>• BS 7671<br>• Guidance Note 3 | **Group Q & A** |
| 9 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>**4.**5 Describe how each test is carried out<br>• Continuity of ring final circuits | **Activities:**<br>Tutor to identify the correct procedure to be followed in accordance with guidance note 3 including:<br>• stage 1<br>• stage 2<br>• stage 3<br>**Resources:**<br>• **PowerPoint Presentation 8**<br>• demonstration rig<br>• low resistance ohmmeter c/w leads<br>• temporary link leads and socket adaptor<br>• Guidance Note 3 | **Worksheet 13** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 9 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.6 Identify factors that affect the result of each test<br>• Continuity of ring final circuits | **Activities:**<br>Tutor to explain what factors could affect the results including:<br>• parallel paths<br>• conductor temperature<br>• material, length and CSA of conductor<br>• loose / poor connections<br>• spurs<br>• “nulling” of test leads<br>**Resources:**<br>• **PowerPoint presentation 8**<br>• BS 7671<br>• Guidance Note 3 | **Group Q & A** |
| 10 | 5. Perform inspection and testing of electrical installations<br><br>5.5 Carry out tests in accordance with BS 7671 and IET Guidance Note 3<br>• Continuity of ring final circuits | **Activities:**<br>Candidates to perform test in accordance with agreed procedure on a ring final circuit<br>**Resources:**<br>• simulation rig<br>• low resistance ohmmeter c/w leads<br>• temporary link leads and socket adaptor<br>• Guidance Note 3 | **Observation and demonstration** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 10 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.7 Interpret the result of each test<br>4.8 Explain how test results are verified for compliance<br>• Continuity of ring final circuits | **Activities:**<br>Tutor to explain the use of tables to identify the expected values of resistance based on known factors including:<br>• the conductor material, length and CSA<br>• the conductor known temperature range<br>**Resources:**<br>• **PowerPoint presentation 9**<br>• BS 7671<br>• Guidance Note 3 | **Worksheet 14** |
| 10 | 5. Perform inspection and testing of electrical installations<br><br>5.6 Verify test results for compliance | **Activities:**<br>Candidates to use the measured values of resistance to identify by calculation if the results are acceptable based on known factors including:<br>• the conductor CSA<br>• the conductor length<br>• acceptable variances<br>**Resources:**<br>• BS 7671<br>• Guidance Note 3 | **Observation and demonstration** |
| 10 | 5. Perform inspection and testing of electrical installations<br><br>5.7 Complete documentation in accordance with BS 7671 and IET Guidance Note 3 | **Activities:**<br>Candidates to record results in the relevant section of the schedule of test results.<br>**Resources:**<br>• BS 7671<br>• Guidance Note 3<br>• Schedule of test results | **Observation and demonstration** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 11 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.4 Explain the purpose of each test<br>• Insulation resistance (to include testing electrically separated circuits) | **Activities:**<br>Tutor to outline the purpose of the test and the special precautions involved including:<br>• protecting equipment<br>• protecting people<br><br>Tutor to explain why installations are tested with as many final circuits connected as possible and distribution circuits tested separately.<br>**Resources:**<br>• **PowerPoint presentation 10**<br>• BS 7671<br>• Guidance Note 3 | **Group Q & A** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 11 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.5 Describe how each test is carried out<br>• Insulation resistance (to include testing electrically separated circuits) | **Activities:**<br>Tutor to identify the correct procedure to be followed in accordance with Guidance Note 3 including:<br>• testing installations with all final circuits connected<br>• testing distribution circuits<br>• testing installations with electrically separated circuits<br>• testing installations with integrated SPDs<br>• circuits with time clocks or DOL starters<br>• single and three phase circuits<br>• installations with RCDs and/or RCBOs installed<br>**Resources:**<br>• **PowerPoint presentation 10**<br>• demonstration rig<br>• insulation resistance tester c/w leads and probes<br>• BS 7671<br>• Guidance Note 3 | **Worksheet 15** |
| 11 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.6 Identify factors that affect the result of each test<br>• Insulation resistance (to include testing electrically separated circuits) | **Activities:**<br>Tutor to explain what factors could affect the results including:<br>• number of circuits connected<br>• neon and pilot lights left in circuit<br>• motor and transformer windings left in circuit<br>• long cable runs<br>**Resources:**<br>• **PowerPoint presentation 10**<br>• BS 7671<br>• Guidance Note 3 | **Group Q & A** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 12 | 5. Perform inspection and testing of electrical installations<br><br>5.5 Carry out tests in accordance with BS 7671 and IET Guidance Note 3<br>• Insulation resistance (to include testing electrically separated circuits) | **Activities:**<br>Candidates to perform test in accordance with agreed procedure on circuits including:<br>• lighting final circuits with dimmers and 2 way switching<br>• final circuits with sensitive equipment and pilot lights<br>• a DOL motor starter circuit, and<br>• three phase circuits<br>**Resources:**<br>• simulated installation<br>• insulation resistance tester c/w leads and probes<br>• BS 7671<br>• Guidance Note 3 | **Observation and demonstration** |
| 12 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.7 Interpret the result of each test<br>4.8 Explain how test results are verified for compliance<br>• Insulation resistance (to include testing electrically separated circuits) | **Activities**<br>Candidates to use table 64 of BS 7671 to identify the minimum acceptable values of insulation resistance<br>**Resources:**<br>• **PowerPoint presentation 11**<br>• BS 7671<br>• Guidance Note 3 | **Worksheet 16** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 12 | 5. Perform inspection and testing of electrical installations<br><br>5.6 Verify test results for compliance | **Activities:**<br>Candidates to confirm the measured values of insulation resistance are in accordance with table 64 of BS 7671<br>**Resources:**<br>• BS 7671<br>• Guidance Note 3<br>• Schedule of test results | **Observation and demonstration** |
| 12 | 5. Perform inspection and testing of electrical installations<br><br>5.7 Complete documentation in accordance with BS 7671 and IET Guidance Note 3 | **Activities:**<br>Candidates to record results in the relevant section of the Schedule of test results.<br>**Resources:**<br>• BS 7671<br>• Guidance Note 3<br>• Schedule of test results<br>• | **Observation and demonstration** |
| 13 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.4 Explain the purpose of each test<br>• Polarity | **Activities:**<br>Tutor to outline the purpose of the test including:<br>• the dead tests on final circuits<br>• the live test on the incoming supply<br>Tutor to explain the purpose of performing the tests at different times in the initial verification sequence.<br>**Resources:**<br>• **PowerPoint presentation 12**<br>• BS 7671<br>• Guidance Note 3 | **Group Q & A** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 13 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.5 Describe how each test is carried out<br>• Polarity | **Activities:**<br>Tutor to identify the correct procedure to be followed in accordance with Guidance Note 3 including:<br>• lighting circuits<br>• radial final circuits<br>• ring final circuits<br>• supply polarity to a DB<br>**Resources:**<br>• **PowerPoint presentation 12**<br>• demonstration rig<br>• low resistance ohmmeter c/w leads and probes<br>• a set of shorting links<br>• approved voltage indicator<br>• BS 7671<br>• Guidance Note 3 | **Worksheet 17** |
| 13 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.6 Identify factors that affect the result of each test<br>• Polarity | **Activities:**<br>Tutor to explain what factors could affect the results including:<br>• electronic dimmer switches<br>• Edison screw lamp holders<br>• Incorrectly wired distribution circuits<br>• Incorrect incoming supply<br>**Resources:**<br>• **PowerPoint presentation 12**<br>• BS 7671<br>• Guidance Note 3 | **Group Q & A** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 14 | 5. Perform inspection and testing of electrical installations<br><br>5.5 Carry out tests in accordance with BS 7671 and IET Guidance Note 3<br>• Polarity | **Activities:**<br>Candidates to perform dead polarity tests in accordance with agreed procedure on final circuits including:<br>• lighting circuits with 2 way switching<br>• ring final circuits<br>Candidates to perform live polarity tests in accordance agreed procedure on the incoming supply of a single phase DB.<br>**Resources:**<br>• simulation rig<br>• low resistance ohmmeter c/w leads and probes<br>• a set of shorting links<br>• approved voltage indicator<br>• BS 7671<br>• Guidance Note 3 | **Observation and demonstration** |
| 14 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.7 Interpret the result of each test<br>• Polarity | **Activities:**<br>Tutor to explain the expected results. Tutor also to outline how other tests can be used to confirm polarity including:<br>• continuity of protective conductors, and insulation resistance<br>• phase sequence test<br>**Resources:**<br>• **PowerPoint presentation 12**<br>• BS 7671<br>• Guidance Note 3 | **Group Q & A** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 14 | 4. Understand the requirements for testing electrical installations at initial verification<br>5. Perform inspection and testing of electrical installations<br>4.8 Explain how test results are verified for compliance<br>5.6 Verify test results for compliance | **Activities:**<br>Candidates to confirm results obtained were as per expected.<br>**Resources:**<br>• **BS 7671**<br>• Guidance Note 3 | **Observation and demonstration** |
| 14 | 5. Perform inspection and testing of electrical installations<br>5.7 Complete documentation in accordance with BS 7671 and IET Guidance Note 3 | **Activities:**<br>Candidates to record results in the relevant sections of the Schedule of test results and Electrical Installation Certificate<br>**Resources:**<br>• BS 7671<br>• Guidance Note 3<br>• Electrical Installation Certificate<br>• Schedule of test results | **Group Q & A** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 15 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.4 Explain the purpose of each test<br>• Earth electrode | **Activities:**<br>Tutor to outline the purpose of the test and when this test is required to be performed including:<br>• on a TT system<br>• when the system has a generator installed<br>• when the installation includes campsites<br>• when the installation is a TN-C-S and there is an external vehicle charging point<br>• when the installation is taken to an outhouse or similar<br>**Resources:**<br>• **PowerPoint presentation 13**<br>• BS 7671<br>• Guidance Note 3 | **Group Q & A** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 15 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.5 Describe how each test is carried out<br>• Earth electrode | **Activities:**<br>Tutor to identify the correct procedure to be followed in accordance with guidance note 3 including:<br>• where no supply is available<br>• where a supply is available<br><br>Tutor to include the use of three lead and four lead electrode resistance testers and the need to ensure safe isolation is kept in place at all times of the test.<br>**Resources:**<br>• **PowerPoint presentation 13**<br>• BS 7671<br>• demonstration rig<br>• earth electrode resistance tester c/w leads and probes<br>• earth fault loop impedance tester c/w leads and probes<br>• Guidance Note 3 | **Worksheet 18** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 15 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.6 Identify factors that affect the result of each test<br>• Earth electrode | **Activities:**<br>Tutor to explain what factors could affect the results including:<br>• parallel paths<br>• weather<br>• depth of burial<br>• type of electrode<br>• soil composition and moisture<br>• ground temperature<br>**Resources:**<br>• **PowerPoint presentation 13**<br>• BS 7671<br>• Guidance Note 3 | **Group Q & A** |
| 16 | 5. Perform inspection and testing of electrical installations<br><br>5.5 Carry out tests in accordance with BS 7671 and IET Guidance Note 3<br>• Earth electrode | **Activities:**<br>Candidates to perform a test in accordance with agreed procedure on a single phase supply, either a TT arrangement or a TN.<br>**Resources:**<br>• BS 7671<br>• Guidance Note 3<br>• simulation rig<br>• earth fault loop impedance tester c/w GS38 leads and probes | **Observation and demonstration** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 16 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.7 Interpret the result of each test<br>4.8 Explain how test results are verified for compliance<br>• Earth electrode | **Activities:**<br>Tutor to explain the use of Table 41.5 of BS 7671 to identify the maximum values of resistance, based on the rating of the RCD fitted.<br>**Resources:**<br>• **PowerPoint presentation 14**<br>• BS 7671<br>• Guidance Note 3 | **Group Q & A** |
| 16 | 5. Perform inspection and testing of electrical installations<br><br>5.6 Verify test results for compliance | **Activities:**<br>Candidates to use the measured values of resistance to identify if their results are acceptable.<br>Tutor to provide candidates with a scenario where test results have been measured using an earth electrode resistance tester and candidates are to establish if the three readings result in an acceptable result, taking into account the average and standard deviation of the three readings.<br>**Resources:**<br>• BS 7671<br>• Guidance Note 3 | **Worksheet 19** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 16 | 5. Perform inspection and testing of electrical installations<br><br>5.7 Complete documentation in accordance with BS 7671 and IET Guidance Note 3 | **Activities:**<br>Candidates to record results in the relevant section of the Electrical installation certificate<br>**Resources:**<br>• BS 7671<br>• Guidance Note 3<br>• Electrical installation certificate | **Group Q & A** |
| 17 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.4 Explain the purpose of each test<br><br>• Earth fault loop impedance | **Activities:**<br>Tutor to outline the purpose of the tests involved including:<br>• measurement of Ze<br>• measurement of Zs@DB<br>• measurement of Zs<br><br>Tutor to explain that each test may have to be performed at a different stages and that the Ze test can be used in place of performing an earth electrode resistance test on a TT supply earth electrode.<br>**Resources:**<br>• **PowerPoint presentation 15**<br>• BS 7671<br>• Guidance Note 3 | **Group Q & A** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 17 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.5 Describe how each test is carried out<br>• Earth fault loop impedance | **Activities:**<br>Tutor to identify the correct procedure to be followed in accordance with Guidance Note 3 including:<br>• measurement of Ze<br>• measurement of Zs@DB<br>• measurement or calculation of Zs for final circuits<br><br>Tutor to use Guidance Note 3 to explain when candidates should use Ze and when to use Zs@DB when calculating Zs for final circuits.<br>**Resources:**<br>• **PowerPoint presentation 15**<br>• BS 7671<br>• Guidance Note 3<br>• demonstration rig<br>• earth fault loop impedance tester c/w GS38 leads and probes | **Worksheet 20** |
| 17 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.6 Identify factors that affect the result of each test<br>• Earth fault loop impedance | **Activities:**<br>Tutor to explain what factors could affect the results including:<br>• parallel paths<br>• conductor temperature<br>• use of measured values as opposed to calculated<br>**Resources:**<br>• **PowerPoint presentation 15**<br>• BS 7671<br>• Guidance Note 3 | **Group Q & A** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 18 | 5. Perform inspection and testing of electrical installations<br><br>5.5 Carry out tests in accordance with BS 7671 and IET Guidance Note 3<br>• Earth fault loop impedance | **Activities:**<br>Candidates to perform tests in accordance with agreed procedure including:<br>• measurement of Ze<br>• measurement of Zs@DB<br>• measurement or calculation of Zs for final circuits<br>**Resources:**<br>• BS 7671<br>• Guidance Note 3<br>• simulation rig<br>• earth fault loop impedance tester c/w GS38 leads and probes | **Observation and demonstration** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 18 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.7 Interpret the result of each test<br>4.8 Explain how test results are verified for compliance<br>• Earth fault loop impedance | **Activities:**<br>Tutor to explain the use of Tables 41.2, 41.3 and 41.4 and appendix 3 of BS 7671 to identify the maximum permitted values of impedance based on known factors including:<br>• type of circuit<br>• type of protective device<br>• conductor temperature during test<br><br>Tutor to explain difference in values contained in the On-Site Guide when compared to values obtained using BS 7671.<br>Tutor to also outline what actions need to be taken in accordance with regulations 419.3 and 411.4.204 when maximum values cannot be complied with.<br>**Resources:**<br>• **PowerPoint presentation 16**<br>• BS 7671<br>• Guidance Note 3 | **Worksheet 21** |
| 18 | 5. Perform inspection and testing of electrical installations<br><br>5.6 Verify test results for compliance | **Activities:**<br>Candidates to check measured values against maximum permitted values to confirm compliance.<br>**Resources:**<br>• BS 7671<br>• Guidance Note 3<br>• Schedule of test results | **Group Q & A** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 18 | 5. Perform inspection and testing of electrical installations<br><br>5.7 Complete documentation in accordance with BS 7671 and IET Guidance Note 3 | **Activities:**<br>Candidates to record results in the relevant sections of the Schedule of test results and Electrical installation certificate.<br>**Resources:**<br>• BS 7671<br>• Guidance Note 3 | **Observation and demonstration** |
| 19 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.4 Explain the purpose of each test<br>• Prospective fault current | **Activities:**<br>Tutor to outline the purpose of the tests involved including:<br>• prospective short circuit current (PSCC)<br>• prospective earth fault current (PEFC)<br>• confirmation that protective devices can clear the fault<br><br>Tutor to explain the difference in protective device breaking capacities including the difference between<br>• Icn<br>• Ics<br>**Resources:**<br>• **PowerPoint presentation 17**<br>• BS 7671<br>• Guidance Note 3 | **Group Q & A** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 19 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.5 Describe how each test is carried out<br>• Prospective fault current | **Activities:**<br>Tutor to identify the correct procedure to be followed in accordance with Guidance Note 3 including:<br>• single phase using a single phase instrument<br>• three phase using a single phase instrument<br>• three phase using a three phase instrument<br>• at main DB<br>• at sub-boards<br><br>Tutor to explain how backup protection can be utilised in accordance with regulation 434.5.1 of BS 7671.<br>Tutor also to identify that on a three phase supply, only the prospective short circuit current need be established.<br>**Resources:**<br>• **PowerPoint presentation 17**<br>• BS 7671<br>• Guidance Note 3<br>• demonstration rig<br>• earth fault loop impedance tester c/w GS38 leads and probes | **Worksheet 22** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 19 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.6 Identify factors that affect the result of each test<br>• Prospective fault current | **Activities:**<br>Tutor to explain what factors could affect the results including:<br>• single phase vs three phase<br>• single phase earthing arrangement<br>• using a no-trip test<br>**Resources:**<br>• **PowerPoint presentation 17**<br>• BS 7671<br>• Guidance Note 3<br>• | **Group Q & A** |
| 20 | 5. Perform inspection and testing of electrical installations<br><br>5.5 Carry out tests in accordance with BS 7671 and IET Guidance Note 3<br>• Prospective fault current | **Activities:**<br>Candidates to perform tests in accordance with agreed procedure including:<br>• on a single phase supply<br>• on a three phase supply<br>• on a single phase sub board<br>**Resources:**<br>• BS 7671<br>• Guidance Note 3<br>• simulation rig<br>• earth fault loop impedance tester c/w GS38 leads and probes | **Observation and demonstration** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 20 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.7 Interpret the result of each test<br>4.8 Explain how test results are verified for compliance<br>• Prospective fault current | **Activities:**<br>Tutor to explain the use of table 2.8 of Guidance Note 3 to identify if the device is able to break the prospective fault current and where to look on the device.<br>**Resources:**<br>• **PowerPoint presentation 17**<br>• BS 7671<br>• Guidance Note 3 | **Worksheet 23** |
| 20 | 5. Perform inspection and testing of electrical installations<br><br>5.6 Verify test results for compliance | **Activities:**<br>Candidates to check measured values against maximum permitted values to confirm compliance.<br>**Resources:**<br>• BS 7671<br>• Guidance Note 3 | **Group Q & A** |
| 20 | 5. Perform inspection and testing of electrical installations<br><br>5.7 Complete documentation in accordance with BS 7671 and IET Guidance Note 3 | **Activities:**<br>Candidates to record results in the relevant section of the schedule of test results.<br>**Resources:**<br>• BS 7671<br>• Guidance Note 3<br>• Schedule of test results | **Group Q & A** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 21 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.4 Explain the purpose of each test<br>• Phase sequence | **Activities:**<br>Tutor to outline the purpose of the tests involved, ensuring correct terminology is used.<br>Tutor also to outline the consequences of incorrect phase sequence.<br>**Resources:**<br>• **PowerPoint presentation 18**<br>• BS 7671<br>• Guidance Note 3 | **Group Q & A** |
| 21 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.5 Describe how each test is carried out<br>• Phase sequence | **Activities:**<br>Tutor to identify the correct procedure to be followed in accordance with Guidance Note 3 including:<br>• use of different equipment<br>• locations where the test is to be performed within an installation<br>**Resources:**<br>• **PowerPoint presentation 18**<br>• BS 7671<br>• Guidance Note 3<br>• demonstration rig<br>• phase rotation testers (disk type and indicator type) | **Worksheet 24** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 21 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.6 Identify factors that affect the result of each test<br>• Phase sequence | **Activities:**<br>Tutor to explain what factors could affect the results including:<br>• incorrect supply polarity<br>• incorrect phase sequence<br>• loss of one phase<br>**Resources:**<br>• **PowerPoint presentation 18**<br>• BS 7671<br>• Guidance Note 3 | **Group Q & A** |
| 22 | 5. Perform inspection and testing of electrical installations<br><br>5.5 Carry out tests in accordance with BS 7671 and IET Guidance Note 3<br>• Phase sequence | **Activities:**<br>Candidates to perform tests in accordance with agreed procedure including:<br>• at the origin<br>• on a three phase board<br>• on a three phase isolator or DOL starter<br>**Resources:**<br>• BS 7671<br>• Guidance Note 3<br>• simulation rig<br>• phase rotation tester | **Observations and demonstration** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 22 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.7 Interpret the result of each test<br>4.8 Explain how test results are verified for compliance<br>• Phase sequence | **Activities:**<br>Tutor to outline common causes for incorrect phase sequence including:<br>• cross polarity on line conductors<br>• incoming supply not correct<br><br>Tutor to identify what correct phase sequence should be and explain the impact on a motor if incorrect phase sequence is present.<br>**Resources:**<br>• **PowerPoint presentation 18**<br>• BS 7671<br>• Guidance Note 3 | **Group Q & A** |
| 22 | 5. Perform inspection and testing of electrical installations<br><br>5.6 Verify test results for compliance | **Activities:**<br>Candidates to check phase sequence against required sequence and that it is consistent throughout.<br>**Resources:**<br>• BS 7671<br>• Guidance Note 3 | **Group Q & A** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 22 | 5. Perform inspection and testing of electrical installations<br><br>5.7 Complete documentation in accordance with BS 7671 and IET Guidance Note 3 | **Activities:**<br>Candidates to record results in the relevant section of the Schedule of test results.<br>**Resources:**<br>• BS 7671<br>• Guidance Note 3<br>• Electrical installation certificate<br>• Schedule of test results | **Observation and demonstration** |
| 23 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.4 Explain the purpose of each test<br>• RCD tests (fault protection and additional protection) | **Activities:**<br>Tutor to outline the purpose of the tests involved including:<br>• testing of RCDs for general purpose<br>• testing of RCDs for additional protection<br>Tutor to explain that each test may have to be performed at different locations including:<br>• at socket outlets<br>• at distribution boards<br>• on lighting final circuits<br>Tutor to explain that the test only needs to be performed once on each RCD.<br>**Resources:**<br>• **PowerPoint presentation 19**<br>• BS 7671<br>• Guidance Note 3 | **Group Q & A** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 23 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.5 Describe how each test is carried out<br>• RCD tests (fault protection and additional protection) | **Activities:**<br>Tutor to identify the correct procedure to be followed in accordance with Guidance Note 3 including:<br>• no trip values 0 and 180 degrees<br>• rated trip values 0 and 180 degrees<br>• 30mA RCDs at 5IΔn 0 and 180 degrees<br>Tutor to explain why we perform tests at 0 and 180 degrees.<br>**Resources:**<br>• **PowerPoint presentation 19**<br>• BS 7671<br>• Guidance Note 3<br>• demonstration rig<br>• RCD tester c/w GS38 leads and probes | **Group Q & A** |
| 23 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.6 Identify factors that affect the result of each test<br>• RCD tests (fault protection and additional protection) | **Activities:**<br>Tutor to explain what factors could affect the results including:<br>• high Zs value of circuit<br>• incorrect test current applied<br>• worn RCD device<br>• stuck RCD device<br>• broken neutral conductor<br>**Resources:**<br>• **PowerPoint presentation 19**<br>• BS 7671<br>• Guidance Note 3 | **Group Q & A** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 24 | 5. Perform inspection and testing of electrical installations<br><br>5.5 Carry out tests in accordance with BS 7671 and IET Guidance Note 3<br>• RCD tests (fault protection and additional protection) | **Activities:**<br>Candidates to perform tests in accordance with agreed procedure including:<br>• ½ times the device rating<br>• 1 times the device rating<br>• additional protection, 5 times the device rating<br>• manual test button<br>**Resources:**<br>• **BS 7671**<br>• Guidance Note 3<br>• simulation rig<br>• RCD Tester c/w GS38 leads and probes | **Observation and demonstration** |
| 24 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.7 Interpret the result of each test<br>4.8 Explain how test results are verified for compliance<br>• RCD tests (fault protection and additional protection) | **Activities:**<br>Tutor to explain the use of table 3A in appendix 3 of BS 7671 and regulation 643.8 of BS 7671 to identify the maximum permitted operating times for the RCD including:<br>• RCDs with a rating 30mA or less<br>• RCDs with a rating above 30mA<br><br>Tutor to explain the difference in purpose of RCDs<br>**Resources:**<br>• **PowerPoint presentation 19**<br>• BS 7671<br>• Guidance Note 3 | **Worksheet 25** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 24 | 5. Perform inspection and testing of electrical installations<br><br>5.6 Verify test results for compliance | **Activities:**<br>Candidates to check measured values against maximum permitted values to confirm compliance.<br>**Resources:**<br>• BS 7671<br>• Guidance Note 3 | **Observation and demonstration** |
| 24 | 5. Perform inspection and testing of electrical installations<br><br>5.7 Complete documentation in accordance with BS 7671 and IET Guidance Note 3 | **Activities:**<br>Candidates to record results in the relevant section of the Schedule of test results.<br>**Resources:**<br>• BS 7671<br>• Guidance Note 3<br>• Schedule of test results | **Group Q & A** |
| 25 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.4 Explain the purpose of each test<br>• Functional testing | **Activities:**<br>Tutor to outline why we perform functional tests including:<br>• to confirm all equipment operates correctly<br>• to confirm the equipment and installation performs to customer expectations<br>• to ensure all adjustable settings are set and recorded<br>**Resources:**<br>• **PowerPoint presentation 20**<br>• BS 7671<br>• Guidance Note 3 | **Group Q & A** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 25 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.5 Describe how each test is carried out<br>• Functional testing | **Activities:**<br>Tutor to identify the correct procedure to be followed in accordance with Guidance Note 3 including:<br>• operation of ventilation fans linked to lighting circuits<br>• operation of water and space heaters<br>• setting of overload trips on circuit breakers<br>• setting of sensors and PIRs etc<br><br>Tutor to outline settings of devices that need to be recorded.<br>**Resources:**<br>• **PowerPoint presentation 20**<br>• BS 7671<br>• Guidance Note 3<br>• demonstration rig | **Group Q & A** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 25 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.6 Identify factors that affect the result of each test<br>• Functional testing | **Activities:**<br>Tutor to explain what factors could affect the results including:<br>• incorrectly set overload devices<br>• incompatible dimmer switches<br>• incorrectly set timers or sensors<br>• broken heating elements<br>• defective equipment<br>• open circuit on neutral conductor(s)<br>• borrowed neutrals<br>**Resources:**<br>• **PowerPoint presentation 20**<br>• BS 7671<br>• Guidance Note 3 | **Group Q & A** |
| 26 | 5. Perform inspection and testing of electrical installations<br><br>5.5 Carry out tests in accordance with BS 7671 and IET Guidance Note 3<br>• Functional testing | **Activities:**<br>Candidates to perform tests in accordance with agreed procedure including:<br>• switching lights on and off<br>• activation of dimmers<br>• operation of heating elements<br>• operation of fan timers<br>**Resources:**<br>• Guidance Note 3<br>• BS 7671<br>• simulation rig | **Observation and demonstration** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 26 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.7 Interpret the result of each test<br>4.8 Explain how test results are verified for compliance<br>• Functional testing | **Activities:**<br>Tutor to explain what course of action has to be taken if functional tests fail, including:<br>• temporary measures<br>• rectification process<br>• retesting of effected circuit(s)<br><br>Tutor to explain how the cost of any delay needs to be considered<br>**Resources:**<br>• **PowerPoint presentation 20**<br>• BS 7671<br>• Guidance Note 3 | **Worksheet 26** |
| 26 | 5. Perform inspection and testing of electrical installations<br><br>5.6 Verify test results for compliance | **Activities:**<br>Candidates to check that operation of circuit meets customer expectations and to confirm compliance.<br>**Resources:**<br>• BS 7671<br>• Guidance Note 3<br>• customer specification | **Observation and demonstration** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 27 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.4 Explain the purpose of each test<br>• Voltage drop (using measured conductor resistance method**).** | **Activities:**<br>Tutor to outline why we establish voltage drop when doing initial verification, including:<br>• to confirm new additions to existing circuits will operate correctly<br>• to confirm the design<br><br>Tutor to outline the effects of a voltage drop in excess of the permitted values.<br>**Resources:**<br>• **PowerPoint presentation 21**<br>• BS 7671<br>• Guidance Note 3 | **Group Q & A** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 27 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.5 Describe how each test is carried out<br>• Voltage drop (using measured conductor resistance method). | **Activities:**<br>Tutor to identify the correct procedure to be followed in accordance with Guidance Note 3 including:<br>• evaluation using Ohm's law after measuring the resistance of line and neutral<br>• evaluation using Ohm's law after measuring line and CPC resistance<br><br>Tutor to explain that pure calculation methods are typically only used during the design process.<br>**Resources:**<br>• **PowerPoint presentation 21**<br>• BS 7671<br>• Guidance Note 3 | **Worksheet 27** |
| 27 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.6 Identify factors that affect the result of each test<br>• Voltage drop (using measured conductor resistance method). | **Activities:**<br>Tutor to explain what factors could affect the results including:<br>• conductive material<br>• conductor temperature<br>• accuracy of measured resistance<br>• amount of current that is expected to flow<br>**Resources:**<br>• **PowerPoint presentation 21**<br>• BS 7671<br>• Guidance Note 3 | **Group Q & A** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 28 | 5. Perform inspection and testing of electrical installations<br><br>5.5 Carry out tests in accordance with BS 7671 and IET Guidance Note 3<br>• Voltage drop (using measured conductor resistance method**).** | **Activities:**<br>Candidates to perform tests in accordance with agreed procedure including:<br>• using measured values of line and neutral resistance<br>• using measured values of line and CPC resistance<br>**Resources:**<br>• **PowerPoint presentation 21**<br>• BS 7671<br>• Guidance Note 3 | **Observation and demonstration** |
| 28 | 4. Understand the requirements for testing electrical installations at initial verification<br><br>4.7 Interpret the result of each test<br>4.8 Explain how test results are verified for compliance<br>• Voltage drop (using measured conductor resistance method). | **Activities:**<br>Tutor to explain, with the use of Appendix 4 of BS 7671, what the maximum permitted value of voltage drop is for final circuits.<br>**Resources:**<br>• **PowerPoint presentation 21**<br>• BS 7671<br>• Guidance Note 3 | **Group Q & A** |

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| Session | Objectives/learning outcomes<br>**The learner will:** | Activities and resources | Assessment |
|---|---|---|---|
| 28 | 5. Perform inspection and testing of electrical installations<br><br>5.6 Verify test results for compliance | **Activities:**<br>Candidates to verify that voltage drops established comply with maximum permitted values.<br>**Resources:**<br>• BS 7671<br>• Guidance Note 3 | **Observation and demonstration** |
| 28 | 5. Perform inspection and testing of electrical installations<br><br>5.7 Complete documentation in accordance with BS 7671 and IET Guidance Note 3 | **Activities:**<br>Candidates to confirm Electrical installation certificate and all Schedules of inspection and Schedules of test results are complete and signed.<br>**Resources:**<br>• BS 7671<br>• Guidance Note 3<br>• Electrical installation certificate<br>• Schedule of inspections<br>• Schedule of test results | **Observation and demonstration** |

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