Unit 208E: Performing electrical installation

# Delivery guide

Unit information

This unit covers the skills required to carry out electrical work. It will enable the learner to practice and be assessed on a range of electrical systems and equipment safely at the centre. The content reflects industry recognised performance statements which facilitate the learner’s progression into an apprenticeship.

Learners may be introduced to this unit by asking themselves questions such as:

* What is the sequence of activities required to carry out typical tasks in my chosen trade?
* What PPE will I need to carry out typical tasks?
* How can I continually improve my skills in my chosen trade?

Learning outcomes

1. Assess and apply appropriate procedures.
2. Use sources of information to enable the installation of wiring systems, enclosures, and associated equipment to be carried out
3. Use appropriate measuring and marking out techniques which are appropriate to the wiring system, wiring enclosure and/or associated equipment that is being installed.
4. Install cables in accordance with BS 7671, the installation specification and programme of work
5. Install the wiring systems in accordance with BS 7671, the installation specification and agreed planned programme of work
6. Terminate and connect cables and conductors in accordance with manufacturer’s instructions, BS 7671, and any relevant drawing or specification.
7. Install electrical equipment and accessories, in accordance with BS 7671, the installation specification, manufacturers’ instructions and the programme of work
8. Connect to electrical equipment in accordance with manufacturer’s instructions, BS 7671, and any relevant drawing or specification
9. Terminate and connect conductors, using appropriate methods
10. Ensure that terminations and connections are electrically and mechanically sound.
11. Ensure cables have appropriate identification in accordance with BS 7671
12. Carry out a visual inspection.
13. Select the correct test instruments and their accessories for tests.
14. Carry out tests in accordance with the installation specification.
15. Verify test results.
16. Dispose of waste materials in accordance with site procedures.

Suggested resources

Regulations guidance

* *BS 7671:2018* *Requirements for Electrical Installations, IET Wiring Regulations*,18th edition (2018) London: Institution of Engineering and Technology.

ISBN 978-1-78561-170-4

* GS 38 *Electrical test equipment for use on low voltage electrical systems* (2015). 4th edition. The Health and Safety Executive.
* *Guidance Note 3:* *Inspection and Testing (Electrical Regulations)*, 8th edition (2018). London: Institution of Engineering and Technology.

ISBN 978-1-78561-452-1

Website

[YouTube | GSH Electrical Channel](https://www.youtube.com/channel/UCgtbE9w_d-u2AvPp3WBlPfQ)

Textbook

Tanner, P. (2018) *The City & Guilds Textbook: Book 1 Electrical Installations for the Level 3 Apprenticeship (5357), Level 2 Technical Certificate (8202) & Level 2 Diploma (2365)* London: Hodder Education.

ISBN 978-1-51043-224-6

| **Learning outcomes** | **Criteria** | **Delivery guidance** |
| --- | --- | --- |
| 1. Assess and apply appropriate procedures to include:  * adopting appropriate PPE * following a safe system of work (e.g. working in accordance with a risk assessment and method statement) * selecting appropriate tools/equipment for the installation work |  | * Learners to observe the centre’s Health and Safety Policy. * Learners to follow guidance on appropriate Personal Protective Equipment (PPE) to be worn when undertaking electrical work. * Learners to follow risk assessments made by the centre. * Learners to adhere to method statements. * Learners to understand the dangers of hand tools and power tools and follow safety instructions on their selection. * See *The City & Guilds Textbook: Book 1 Electrical Installations for the Level 3 Apprenticeship (5357), Level 2 Technical Certificate (8202) & Level 2 Diploma (2365)*, Ch1 and Ch4. |
| 1. Use sources of information to enable the installation of wiring systems, enclosures, and associated equipment to be carried out |  | * Learners to practice using sources of information to carry out electrical work. * Learners to be able to follow: * charts * diagrams * layouts. * Learners to understand accurate dimensions in standard units and tolerance. |
| 1. Use appropriate measuring and marking out techniques which are appropriate to the wiring system, wiring enclosure and/or associated equipment that is being installed |  | * Learners to gain experience by marking out. * Learners to use the ‘measure twice, cut once’ approach. * Learners to know how and when to use: * tape measures * plumb lines, chalk lines, etc. * spirit levels * set squares/combination squares * scribes. |
| 1. Install cables in accordance with BS 7671, the installation specification and programme of work |  | * Learners to adhere to BS 7671:2018 installation methods for cables in accordance with the specification. * Learners to pay special attention to installation methods within: * Table 4D1A for single PVC insulated cables or *IET On-Site Guide* TF4 * Table 4D5 for twin flat profile cable or *IET On-Site Guide* TF6 * Table 4D4A for multicore copper armoured cable. |
| 1. Install the wiring systems in accordance with BS 7671, the installation specification and agreed planned programme of work |  | * Learners to gain experience by installing: * plastic conduit to an agreed planned programme of work * plastic trunking to an installation specification * metallic conduit to an agreed programme of work * metallic trunking to an installation specification. |
| 1. Terminate and connect cables and conductors in accordance with manufacturer’s instructions, BS 7671, and any relevant drawing or specification | * 1. Cables: * single core cable (singles) * multicore insulated cable * PVC / PVC flat profile cable (twin and earth) * MICC cable * fire performance cable (such as FP 200 etc.) * SWA cable * GSWB galvanised steel wire braid * data cable | * Learners to gain experience by terminating different types of cables. * Learners to be able to follow drawings and specifications. * Learners to adhere to manufacturers’ instructions. * Learners to adhere to BS 7671:2018 regarding which type of terminations must be available for inspection (see Regulation 526.3). * Learners to compare the characteristics of GSWB galvanised steel wire braid (SY) and coaxial cable. |
| 1. Install electrical equipment and accessories, in accordance with BS 7671, the installation specification, manufacturers’ instructions and the programme of work |  | * Learners to gain experience by installing electrical accessories. * Learners to adhere to BS 7671:2018 when installing accessories in a special location or where high temperatures are expected, such as some types of luminaires. * Learners to pay particular attention to drawing dimensions and tolerances. * Learners to follow manufacturers’ instructions for mounting accessories. |
| 1. Connect to electrical equipment in accordance with manufacturer’s instructions, BS 7671, and any relevant drawing or specification. |  | * Learners to gain experience by connecting to electrical equipment. * Learners to make connections to: * a consumer unit with Residual-Current Device (RCD) or Residual Current Circuit Breakers (RCBOs) and circuit breakers * switches * socket outlets * switched and unswitched fused connection units. * Learners to follow Building Regulations regarding switch and socket outlet heights. |
| 1. Terminate and connect conductors, using appropriate methods |  | * Learners to gain experience by terminating and connecting cables using methods such as: * screw type compression * a crimping tool * non-screw compression terminations * cable glands for Mineral-Insulated Copper-Clad (MICC) cable, Fire Performance (FP) type cables, Steel Wire Armour (SWA) cables, Galvanised Steel Wire Braid (GSWB) * punch down connections. |
| 1. Ensure that terminations and connections are electrically and mechanically sound |  | * Learners to ensure terminations are mechanically sound by using: * manufacturers’ data to confirm torque settings * sight and touch to identify loose connections. * Learners to ensure terminations are electrically sound by using low-resistance ohmmeters. |
| 1. Ensure cables have appropriate identification in accordance with BS 7671 |  | * Learners to ensure that cables have appropriate identification with respect to BS 7671:2018, including: * Table 51 of BS 7671:2018 for alphanumeric and colours for cable functions. * A form of cable colour markings where non-standard colours are encountered for a function (black switched line conductor over-sleeved brown). * BS 951:2009 label for main protective bonding conductors. |
| 1. Carry out a visual inspection | * 1. Fundamental inspections on completed work | * Learners to gain experience of carrying out a visual inspection of non-energised new work. * Learners to carry out a visual inspection of completed work, using schedule of inspections for new work from BS 7671:2018 or *Guidance Note 3* for items specified by the centre (a full inspection is not expected). |
| 1. Select the correct test instruments and their accessories for tests |  | * Learners to gain experience of selecting correct instruments for carrying out dead testing only. * Learners to use dead tests as an opportunity to introduce GS 38 checklists for instrument probes and use correct terminology for the instruments. * Learners to know how to use a low-resistance ohmmeter for continuity testing and dead polarity. * Learners to know how to use an insulation resistance tester for insulation resistance testing. * Learners to understand that the insulation resistance tester can deliver 250, 500 and 1000V DC when operated and where and why each voltage would be applied. |
| 1. Carry out tests in accordance with the installation specification | * 1. Tests on single-phase circuits: * continuity of conductors * insulation resistance * polarity | * Learners to gain experience of dead testing single phase circuits by: * using *Guidance Note 3* for a step-by-step approach to carrying out the testing required * recording the results * confirming polarity by carrying out continuity of protective conductor using Test Method 1 in *Guidance Note 3* for radial power and lighting * confirm polarity for a ring final circuit when following the 3 stages for continuity in *Guidance Note 3*. |
| 1. Verify test results |  | * Learners to verify results for main protective bonding conductor by using Table B1 in *Guidance Note 3* and estimating the length of the conductor (temperature compensation is not expected). * Learners to use the above method for (R1+R2) for radial power circuits. * Learners to use the method outlined in *Guidance Note 3* to verify (R1+R2) for a ring final circuit. |
| 1. Dispose of waste materials in accordance with site procedures |  | * Learners to gain experience on how to deal with waste material. * Learners to be aware of the formal procedure for dealing with waste material used by sites and centres which must be followed and known by employees. * Learners to know that hazardous waste must be separated from non-hazardous waste. * Learners to know that recyclable and non-recyclable waste are separated. * Learners to know that copper wire off cuts and waste are collected separately and handled in accordance with site procedures. |