Unit 205E: Understand how to install and connect electrical cables, conductors, wiring systems and equipment

# Delivery guide

Unit information

This unit covers the knowledge and understanding for the selection, installation and connection of electrical cables, conductors, wiring systems, equipment, accessories and components for electrical systems.

The learner will be able to comply with the procedures and methods for installing and connecting electrical cables, conductors, wiring systems, equipment, accessories and components in accordance with current versions of the appropriate industry standards and regulations, the specification, industry recognised working practices, the working environment and the natural environment.

Their skills will cover the different types of cables, conductors, wiring systems, equipment, accessories and components, their limitations, applications and the techniques for their positioning, fitting, fixing and connection.

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

* What types of cables are used?
* How are cables installed?
* Why is designing a circuit important?

Learning outcomes

1. Understand the applications, advantages and limitations of types of electrical cables, conductors, wiring systems, associated equipment, accessories and components
2. Understand the industry recognised methods for determining the type, size and rating of electrical cables, conductors, wiring systems, associated equipment, accessories and components in relation to the electrical system's design
3. Understand how to install and connect types of electrical cables, conductors, wiring systems, associated equipment, accessories and components

Suggested resources

British Standards

* BS 7671:2018/A1:2020. Requirements for Electrical Installations. IET Wiring Regulations.

Website

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

Textbooks

* *IET On-Site Guide (BS 7671:2018) (Electrical Regulations)*. 7th edition. London: Institution of Engineering and Technology.

ISBN 978-1-78561-442-2

* 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. Understand the applications, advantages and limitations of types of electrical cables, conductors, wiring systems, associated equipment, accessories and components | * 1. The applications, advantages, and limitations of electrical cables | * Learners to know the different types of cable used in electrical installations, including: * PVC/PVC twin and 3-core flat profile cable * single insulated PVC cables * Steel Wire Armour (SWA) cables * Mineral-Insulated Copper-Clad Cables (MICC) * Fire Performance (FP) type cables * Category 5 (CAT 5) cable * flexible cable * braided cable * coax cable * fibre optic cable * cable glands. * Learners to be able to state reasons for selection of one type over another. * See *The City & Guilds Textbook: Book 1 Electrical Installations for the Level 3 Apprenticeship (5357), Level 2 Technical Certificate (8202) & Level 2 Diploma (2365)*, Ch4. |
| * 1. The requirements of industrial plugs, sockets, and couplers | * Learners to be shown industrial plugs and sockets to BS EN 60309-1:1999+A2:2012, BS EN 60309-2:1992+A2:2012 and BS EN 60309-5:2007+A1:2012. * Learners to understand the ranges available, e.g. voltages, current ranges, etc. * Learners to know the standard colour system for each range. * Learners to be able to match the colour code to the voltage range. * Learners to know the leads and adaptors used. * Learners to be shown examples from suppliers’ catalogues. |
| 1. Understand the industry recognised methods for determining the type, size and rating of electrical cables, conductors, wiring systems, associated equipment, accessories and components in relation to the electrical system's design | 2.1 How to determine the size and rating of electrical cables (basic single-phase circuits to non-reactive loads) | * Learners to be able to do simple AC cable calculations in resistive loads only. (See worked example in *The City & Guilds Textbook: Book 1 Electrical Installations for the Level 3 Apprenticeship (5357), Level 2 Technical Certificate (8202) & Level 2 Diploma (2365)*, Ch3, pp192–198.) * Learners to understand the term diversity. * Learners to be able to calculate the design current from knowing the power rating of the equipment. * Learners to understand that a suitably rated protective device can be selected from the calculated design current. * Learners to be able to look up tabulated currents for cable sizes without compensating factors from BS 7671:2018/A1:2020, Appendix 4 or *IET On-Site Guide*, Appendix F. * Learners to understand how the current carrying capacity of cables is reduced when rating factors are introduced. * See *The City & Guilds Textbook: Book 1 Electrical Installations for the Level 3 Apprenticeship (5357), Level 2 Technical Certificate (8202) & Level 2 Diploma (2365)*, Ch3. |
| 1. Understand how to install and connect types of electrical cables, conductors, wiring systems, associated equipment, accessories and components | 1. The methods and techniques for installing and fixing electrical cables, conductors, wiring systems, associated equipment, accessories and components in accordance with:  * the electrical system's design * manufacturers' instructions | * Learners to understand the methods of cable installation. * Learners to know how a PVC/PVC twin profile cable is installed. * Learners to know how to install and fix: * single PVC insulated circuit cables and containment methods * support systems for cables * metallic and plastic conduit and trunking * tray and ladder. * Learners to be familiar with fixing accessories to different surfaces, e.g. brick, plasterboard, etc. * Learners to understand the importance of following the electrical system’s design and manufacturers’ instructions. * See *The City & Guilds Textbook: Book 1 Electrical Installations for the Level 3 Apprenticeship (5357), Level 2 Technical Certificate (8202) & Level 2 Diploma (2365)*, Ch4. * Learners to know to refer to the *IET On-Site Guide* for spacings of fixings for all containment systems and cables. |
| 1. The different types and methods of terminating and connecting electrical cables and conductors | * Learners to be able to describe methods of terminating electrical cables, including: * crimping * screw terminals * soldered * non-screw compression * cable glands * MICC cables * SWA cables. * See *The City & Guilds Textbook: Book 1 Electrical Installations for the Level 3 Apprenticeship (5357), Level 2 Technical Certificate (8202) & Level 2 Diploma (2365)*, Ch4. |