

M.I.T. >>>

Skills Centre

Installation Electrician and Maintenance Electrician

Apprenticeship standard (ST0152)

Employer Handbook



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Purpose of the Standard

Generic job titles recognised across the industry

- Electrician
- Installation Electrician
- Maintenance Electrician

Electricians install, maintain and repair electrical systems in industrial, commercial and domestic environments. Electricians might work in both indoor and outdoor settings. Electrical equipment and systems may include switchboards, motors, cables, fuses, thermal relays, fault current protection switches, heating, lighting, air conditioning and metering equipment as well as crime and fire alarm systems and renewable energy technologies. They are able to work on their own proficiently and work without immediate supervision in the most efficient and economical manner.

They may contribute to the design of electrical systems. They are able to set out jobs from drawings and specifications and requisition the necessary installation materials.

Electrical safety is an important area of Electricians' work. On completion of their work the electrical systems must be safe to use. They must adhere to safe working practices without endangering themselves or others.

Installation Electricians work on the installation, testing, commissioning and maintenance of low voltage (less than 1000v) electrical and electronic devices and appliances.

Maintenance Electricians work on the maintenance of electrical and electronic installations including automated production systems. Duties include the supervision of the equipment, its maintenance and necessary repairs.

Typical Duration: 42 months **not** including the end point assessment (EPA)

Core Occupation Duties

Below are the core occupational duties your apprentice must be competent in. These have 3 elements which are: Skills, Knowledge and Behaviours which are detailed on the following pages.

- Legislation, codes of practice, relevant regulations, safe working practices, risk assessment, COSHH and method statements, safe working environments and situations (working at heights, excavations etc.), fire protection and emergency procedures.
- Scientific principles, units of measurement, mechanical principles, magnetism, circuit design, component/item use and operating principles.
- Environmental principles - Compliance to environmental legislation and the impact of processes and technologies associated with fire, emergency and security systems. Questions to assess the apprentice on the culture of re-use and recycle, WEEE Regulations (Waste electrical electronic equipment).
- Managing time, resource and job planning for economy, business and client convenience and sound business principles. Principles of high quality customer service and the needs of others. Building and maintaining relationships. Communicating in a clear, articulate, and appropriate manner.
- Size, select, plan, install, test, commission, decommission, service, maintain, fault find and repair electrical systems, including; domestic, commercial and industrial environmental technologies, lighting and power systems.

Knowledge and Skills

Electricians will use engineering knowledge and understanding to apply their technical and practical skills. They will contribute to the design, development, manufacture, construction, commissioning, operation or maintenance of products, equipment, processes, systems or services. Electricians must:

- Understand and apply the principles, practices and legislation for the termination and connection of conductors, cables and cords in electrical systems
- Understand and apply the practices and procedures for the preparation and installation of wiring systems and electrotechnical equipment in buildings, structures and the environment
- Understand and apply the principles, practices and legislation for the inspection, testing, commissioning and certification of electrotechnical systems and equipment in buildings, structures and the environment
- Understand and apply the principles practices and legislation for diagnosing and correcting electrical faults in electrotechnical systems and equipment in buildings, structures and the environment
- Understand and apply the electrical principles associated with the design, building, installation and maintenance of electrical equipment and systems
- Oversee and organise the work environment.

In addition,

Installation Electricians must:

- Understand and apply the principles of planning and selection for the installation of electrotechnical equipment and systems in buildings, structures and the environment.

Maintenance Electricians must:

- Understand and apply the practices and procedures for planning and preparing to maintain electrotechnical systems and equipment.

In all of these activities, Electricians must understand and apply health and safety and environmental regulations, guidance notes and relevant codes of practice; and the requirements of the current edition of the Wiring Regulations.

Behaviours

Behaviours will be assessed throughout the apprenticeship and as part of the Level 3 Electrotechnical Qualification.

Electricians will be expected to:

- Work reliably and effectively without close supervision
- Accept responsibility for the work of themselves and others
- Accept allocate and supervise technical and other tasks
- Use oral, written and electronic methods for the communication of technical and other information
- Work effectively with colleagues, other trades, clients, suppliers and the public
- Undertake work in a way that contributes to sustainable development
- Maintain and enhance competence in own area
- Exercise responsibilities in an ethical manner.

As part of the end-point assessment the following behaviours will be confirmed:

- Work reliably and effectively without close supervision – will be confirmed in full
- Accept responsibility for the work of themselves and others – will be confirmed in terms of themselves, not others
- Accept allocate and supervise technical and other tasks – will be confirmed in terms of accepting tasks, not allocating and supervising
- Use oral, written and electronic methods for the communication of technical and other information – will be confirmed in full
- Exercise responsibilities in an ethical manner – will be confirmed as far as is possible.

Behaviours are envisaged as a pass/fail element and therefore do not impact on the grade of the apprenticeship. All successful apprentices at whatever grade will have confirmed correct behaviour.

End Point Assessment Gateway

Submission for the EPA (AM2S) will only start once you are satisfied that the employee is consistently working at or above the level set out in the occupational standard and are deemed to have achieved occupational competence.

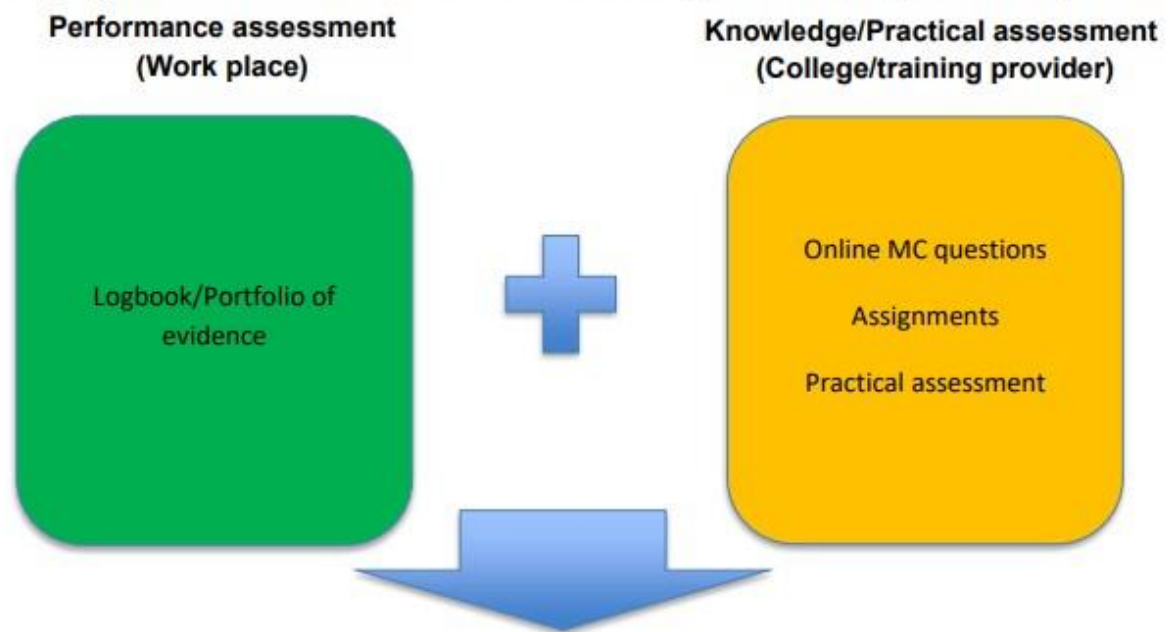
In making this decision, you may take advice from MITSkills, but the decision must ultimately be made solely by the employer.

Criteria for gateway

- All technical and performance units of the mandated qualification completed and certificate issued
- English and mathematics at level 2 achieved
- Employer is satisfied the apprentice is consistently working at, or above, the level of the occupational standard.

Assessment Overview

On-programme: Level 3 Electrotechnical Qualification, (Installation) or (Maintenance)



End-point assessment:

AM2 test

A synoptic practical/knowledge assessment. This single common assessment is externally set and marked by an independent body within an independent assessment structure.

End Point Assessment Details (AM2S)

The synoptic end-point assessment will be provided by the AM2S. This single common assessment is externally set and marked by an independent body within an independent assessment structure. For the last 30 years, the AM2(S) has been recognised within the electrotechnical industry as the benchmark of an individual's occupational competence, providing verification of competence for tens of thousands of electricians. The AM2S will assess the apprentice's skills, knowledge and confirm behaviours against the theory and performance criteria within the standard.

The AM2S is a robust, timed (18 hours typically over 2 and a half days) practical and theory (30 multiple-choice questions) assessment in sections, requiring candidates to perform a set of common tasks and procedures that a full scope electrical operative might face when working in commercial or industrial premises as well as dwellings. It assesses candidates on installation, inspection and testing and fault-finding; their work must comply with BS 7671, be in line with relevant health and safety legislation and conform to current industry practices and procedures.

Achievement of the AM2S (Electrotechnical Assessment of Occupational Competence) demonstrates apprentices have the level of competence expected by the Electrotechnical industry in the following key occupational areas:

- The interpretation of specifications, drawings and diagrams.
- Risk assessments and health and safety.
- Safe isolation
- Planning and preparing to install, terminate and connect wiring systems.
- Installing, terminating and connecting wiring systems.
- Inspection, testing and certification.
- Fault diagnosis and correction of electrical faults.
- The understanding and application of industry recognised procedures, working practices and the requirements of statutory and non-statutory regulations.

In accordance with an installation specification and the relevant statutory and non statutory regulations candidates will be expected to install, terminate, connect, inspect, test and commission:

- Lighting and power circuits
- A three-phase distribution board and sub-circuit
- A central heating/sustainable energy system
- A safety services circuit and device
- A data-cabling system.

The assessment is in five sections:

Section A –

- Risk assessment and safe isolation
- Composite Installation

Section B – Inspection and Testing of the completed composite installation

Section C – Safe Isolation

Section D – Fault Diagnosis and Correction

Section E – Assessment of Applied Knowledge

Section A: Risk Assessment and Safe Isolation

The candidate will be required complete a risk assessment of the AM2 facility and their working area prior to starting to recognise hazards, who may be harmed and how they will minimise the risk. Following this, they will complete safe-isolation in their work area before starting the installation.

Composite Installation

This section has areas where candidates will need to demonstrate occupational competence in accordance with statutory and non-statutory regulations and approved industry working practices.

The areas are:

- Interpretation of specifications and technical data.
- Selection of protective devices.
- Install protective equipotential bonding.
- Installing and terminating pvc singles cable.
- Installing and terminating pvc/pvc multi-core & cpc cable.
- Installing and terminating SY multi-flex cable.
- Installing and terminating heat-resistant flex.
- Installing and terminating XLPE SWA cable.
- Installing and terminating data-cable.
- Installing and terminating FP200 type cable.

Candidates will be expected to install the following

- Protective devices in a TP&N distribution board.
- A two-way and intermediate lighting circuit in PVC/PVC multi-core cable.
- A BS 1363 13A socket outlet ring circuit in PVC singles cable
- A carbon monoxide detector safety service circuit in FP200 type cable.
- Data outlets circuit in Cat. 5 cable.
- A BS EN 60309 16A socket outlet in XLPE SWA cable.
- Protective equipotential bonding to gas and water services.
- A 3-phase direct on line motor/starter circuit in SY cable.

- An S Plan central heating and hot water system with a solar thermal sustainable energy element utilising heat resistant flexible cable and PVC singles cable.

Section B: Inspection and Testing of the Composite Installation

- To demonstrate occupational competence candidates will be expected to:
- Undertake an assessment of risk and work according to best practise as required by Health and Safety legislation.
- Ensure the installation is correctly isolated before commencing the inspection and test activity.
- Carry out a visual inspection of the installation in accordance with BS 7671 and IEE Guidance Note 3.
- Complete the following tests on the installation in accordance with BS 7671 and IEE Guidance Note 3:
 - Continuity of protective conductors
 - Continuity of ring final circuit conductors
 - Insulation resistance
 - Polarity
 - Earth fault-loop impedance (EFLI)
 - Prospective fault current (PFC)
 - Functional testing
- Complete an electrical installation certificate, schedule of inspections and schedule of test results using the model forms as illustrated in Appendix 6 of BS 7671.

Section C: Safe Isolation

- Carry out safe isolation in the correct sequence on a combination of single phase circuits, three phase circuits and entire installations.

Section D: Fault Diagnosis

- Identify 7 faults from 'fault symptom' information given by the examiner.
- State and record how the identified faults can be rectified.

Section E: Assessment of Applied Knowledge

Candidates will be assessed on their application of knowledge associated with:

- Health and Safety
- BS 7671: Requirements for Electrical Installations
- Building Regulations

The assessment will be in the form of a computerised multiple-choice examination. Candidates will be expected to answer 30 questions.

Off-The-Job Training

Off-The-Job Training (OTJ) is a vital component of all apprenticeship training. The apprentice is required to spend at **least 20% of their time away from their regular working duties** developing knowledge, new skills and behaviours associated with their apprenticeship standard.

With support from the workplace mentor, they are expected to keep a continuous log evidencing their OTJ hours throughout the duration of their course. There are plenty of examples of what can be included. It doesn't necessarily always have to be completed in the workplace, as long as it actively contributes to the completion of the apprenticeship.

There are several ways Off-The-Job Training can be achieved and some of the activities which count towards the achievement of their 20% hours may surprise you. Below are some of the hundreds of examples of what can be classed as OTJ training and some of which cannot.

Examples of what **CAN** be classed as Off-The-Job Training

- Being mentored by a senior colleague who is in a role that they aspire to or delivering mentor sessions to other colleagues in the workplace
- 1-to-1 performance reviews in the workplace delivered by a more senior member of staff
- Shadowing another colleague's role, perhaps reflecting on their experiences before putting them to practice
- Teaching of theory or spending time at in a learning institution in tutor-led delivery sessions such as day release at college
- Completing portfolio work or undertaking e-learning and any practical training that supports this

Examples of what **CANNOT** be classed as Off-The-Job Training

- Additional learning outside of the apprentices paid hours such as voluntary work
- Progress reviews or on-programme assessment by an external assessor or coach
- Training to acquire knowledge or skills that are not relevant to the apprenticeship standard i.e., internal equality and diversity training

- English and Math’s study – Apprenticeships are designed to develop occupational competency and a minimum level 2 achievement in English and Maths is expected; therefore, training for English and maths must be in addition to the apprenticeship 20% off-the-job requirements

Calculating Off-The-Job hours

Off-The-Job Training hours are calculated as a total of the entire duration of the apprenticeship standard being undertaken. An example of these hours broken down could look like this:

1. 5 x 7.5 working hours in a day = 37.5 hours per week
2. 58 working weeks in a year x 37.5 working hours = 1950 total hours working in a year
3. 28 days annual leave: 28 x 7.5 = 210
4. Bank Holidays (usually 8): 8 x 7.5 = 60
5. Actual hours at work: 1950 – (210+60) = 1680
6. 20% OJT requirement of 1680 hours = **336 total OTJ hours**

Off-The-Job Training is also a key component of the new Ofsted Education inspection framework.

OJT Log Example



Apprentice Name: _____

Planned programme duration _____ Planned OTJ hours _____

| Date | Total hours | Description of Training | What did you learn? | Additional evidence or further learning required | Link to KSB criteria - e.g. K1, & S4 | OTJ running total |
|------------|-------------|---|--|--|--------------------------------------|-------------------|
| 13/09/2021 | 2.5 | Example- Read an article on earthing in Professional Electrician magazine | Importance of earthing systems and type of RCDs used | None | | |
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In Summary

To complete the standard, the apprentice must focus on evidencing their work throughout the course whilst gaining the required skills and knowledge to be able to confidently undertake all the assessments in the EPA. To attain this, it is:

- The responsibility of the learner and their employer to ensure all the skills and behaviours are undertaken at work during their time on the course.
- The responsibility of the training provider to provide guidance on requirements and remedial training when an employer raises concerns over an apprentice's skills abilities.
- The responsibility of the training provider to provide the underpinning knowledge to assist with the skills and behaviours as well as preparation for the knowledge test.

The qualification is **employer led** and time should be allocated by the employer to practice and hone the skills required to pass the EPA.
