INSTALLATION ELECTRICIAN / MAINTENANCE ELECTRICIAN APPRENTICESHIP – ASSESSMENT PLAN

Introduction and Overview

This assessment plan is to accompany the Installation Electrician / Maintenance Electrician level 3 apprenticeship standard.

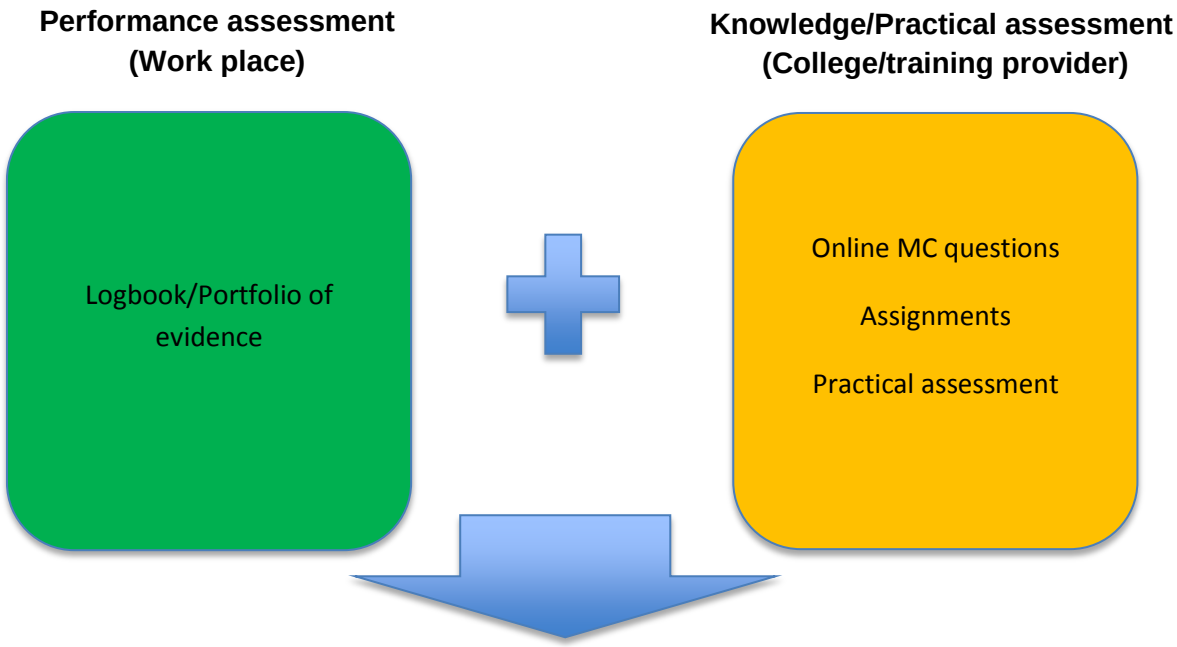
Apprentices must complete the Level 3 Electrotechnical Qualification, (Installation) or (Maintenance). Assessments that form this qualification meet agreed common assessment specifications to ensure consistency across awarding organisations. A certificate will be issued on satisfactory completion of this qualification however the wording of the certificate will make it clear that it does not indicate full competence.

Once all training that makes up the apprenticeship qualification has been completed apprentices are able to apply to take the synoptic end-point assessment - AM2. AM2 is an independent stand-alone assessment that is already well recognised in the industry. Satisfactory completion of the qualification and AM2 will demonstrate full competence and lead to the award of the apprenticeship certificate.

On successful completion, an apprentice is eligible for application for professional registration as EngTech however, actual registration is not a requirement of the apprenticeship.

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.

All assessments are mandatory for successful completion of the apprenticeship

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On-programme Assessment

Two awarding organisations have assisted in the production of a joint assessment strategy for a new qualification – Level 3 Electrotechnical Qualification, (Installation) or (Maintenance), which must be completed as part of this apprenticeship**.** This new qualification encompasses all the elements of the standard. The qualification's units and content are common and shared between all awarding organisations - any can offer the qualification via their approved centres. This will ensure that learners from different centres and employers are subject to the same level of assessment. It will also ensure centre personnel involved in the assessment process are working and subject to the same practices and quality assurance procedures, and will also have the same level of competence. All assessment is subject to external verification by the Awarding Organisations (AOs), which must be registered with Ofqual.

Knowledge learning outcomes will be assessed via on-screen assessments, externally set and marked by the awarding organisations and a range of assignments, projects and written assessments (one or more tasks) covering theory and practical skills, externally set by the awarding organisation and internally marked by the centre.

Performance learning outcomes – skills, will require auditable evidence of competent performance from the workplace which demonstrate the apprentice's ability against set assessment criteria. The apprentice will complete a portfolio of evidence to show this.

Assessment of behaviours will require the apprentice to provide auditable evidence from the workplace which will clearly demonstrate that they have met these criteria.

All centre assessment will be carried out by a qualified assessor who is also required to be a competent electrician, qualified to at least the level of the qualification being assessed. All centre and occupational based assessment will be subject to internal and external verification. Internal quality assurance of assessment will be carried out by a member of staff who has a building services related occupation, and the necessary qualification in internal quality assurance/internal verification. All assessment and quality assurance must comply with the information given by the awarding organisations in their joint assessment strategy.

The majority of assessments will be graded pass/fail. The exception is the theory assessments (on-screen and written) which forms part of '6k Electrical scientific principles and technologies' unit. This unit allows apprentices to demonstrate a greater breadth and level of understanding with sufficient marks available to differentiate between pass, merit and distinction. The assessments though graded pass/merit/distinction will **not** contribute to the overall apprenticeship grade. This provides transparency of candidate's knowledge but retains the importance of practical skills. It will allow employers to identify apprentices who are good in this area for further development into, for example, design.

All qualification units must be passed for candidates to achieve the qualification and consequently the apprenticeship.

The assessment methods facilitate reliable results which are fair and objective between apprentices, centres and awarding organisations. The range of assessments ensures that an apprentice cannot pass this standard without undertaking independent rigorous un-biased assessment.

The range of assessment methods are balanced and weighted to afford a sufficient challenge to the apprentice and measure their ability to an industry-recognised level of competence.

End-point Assessment

The synoptic end-point assessment will be provided by the AM2. 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 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 AM2 will assess the apprentice's skills, knowledge and confirm behaviours against the theory and performance criteria within the standard.

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The AM2 is a robust, timed (16.5 hours typically over 2 and a half days) practical and theory (40 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 AM2 (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 four sections:
Section A – Composite Installation
Section B – Inspection and Testing of the completed composite installation
Section C – Fault Diagnosis and Correction
Section D – Assessment of Applied Knowledge

<u>Section A: Composite Installation</u>

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:

- Risk assessment and safe-isolation.
- 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.

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- 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: Fault Diagnosis

To demonstrate occupational competence candidates will be expected to:

- Undertake an assessment of risk.
- Correctly identify and use tools, equipment and instruments that are fit for purpose.
- Carry out checks and preparations that must be completed prior to undertaking fault diagnosis.
- Carry out safe isolation in the correct sequence.
- Identify 7 faults from 'fault symptom' information given by the examiner.
- State and record how the identified faults can be rectified.

Section D: 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 40 questions.

Behaviours

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

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Process

All elements of the AM2 will be marked. The AM2 will be graded pass/merit/distinction. Candidates will require 70% to pass, a level set and agreed by employers, with merit at 80% and distinction at 90%. It is possible to retake AM2 if necessary but any subsequent successful attempt will be graded Pass. Only on the first attempt can a candidate achieve Merit or Distinction.

The AM2 can only be taken at an approved AM2 test centre where there are specific test booths and test rigs which are used only for AM2 assessment, not training. Assessors must not have been involved in any way in the training and/or work based assessment of the apprentice. Assessors are required to be fully qualified industry installation electricians. He/she is also required to be a fully qualified NVQ assessor in the relevant discipline they will assess. They then receive further training as part of their qualification to become an assessor. This must be carried out at a centre other than their own, to ensure independence and quality. Once licensed, their credentials are tied to the centre that employs them. They cannot move to another centre without receiving approval from the Assessment Organisation and undergoing various checks and further training, as required.

AM2 test centres must operate to quality assurance requirements stipulated by the assessment organisation, and are licensed to operate, reviewed annually. Each centre receives a minimum of an annual visit prior to re-licensing. Real-time monitoring is carried out via the on-line marking system, which is capable of analysing trends and throwing up anomalous results for closer scrutiny - this sometimes triggers an additional quality assurance visit, intervention by another centre or suspension of the centre's licence until issues are resolved. Standardisation is continuously addressed. The licence is granted only if a range of criteria can be satisfied. The requirements are wide, including qualified assessors, correct technical facilities including test booths, effective business planning, satisfactory physical layout and security of the centre.

English and Maths

Apprentices are required to have achieved level 2 English or Maths (GCSE or Functional Skills) by the end of the programme.

Apprenticeship Certification and Grading

To obtain the Electrotechnical apprenticeship certificate, apprentices must achieve the following:

- Level 3 Electrotechnical Qualification (Installation) or Level 3 Electrotechnical Qualification (Maintenance)
- AM2
- Maths level 2
- English level 2

The overall apprenticeship grade will be derived only from the AM2 grade (pass, merit or distinction).

Implementation

The standard builds on the good aspects of historic and embedded apprenticeship frameworks, so the implementation in the delivery network should not be onerous. The on-programme qualification to meet the standard's requirements has been developed and approved by Ofqual, it is available for all assessment organisations offer through their approved centres. The external synoptic end test (AM2) is already in place and established. There are over 40 centres delivering AM2. Provision could be flexed to meet increased demand.

It is anticipated that the cost of the end-point assessment – AM2 will be approximately £700 representing approximately 4% of the external apprenticeship costs.

Annual electrotechnical apprenticeship starts have remained fairly constant over the last few years at around 5000; it is anticipated that all starts will quickly move from the framework to the standard.

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Professional Recognition

On successful completion of the apprenticeship, the apprentice can apply to be recognised by the Institute of Engineering and Technology (IET) against the Engineering Council's UK Spec as an Engineering Technician. This will enable them to have professional recognition and adopt (EngTech) in their title.

The apprentice will be issued with the appropriate Electrotechnical Certification Scheme (ECS) card by the Joint Industry Board for the Electrical Contracting Industry (JIB), and will also be able to apply for 'Electrician' status from the JIB (Joint Industry Board for the Electrical Contracting Industry).

Level 3 Electrotechnical Qualification, (Installation) or (Maintenance)

Shared Assessment Specifications

The Level 3 Electrotechnical qualification knowledge units have shared assessment specifications to include question number allocation, coverage of unit, pass-mark and grading standards as applicable. We expect this to accommodate employers' desire for consistency across AOs, whilst allowing efficient, quick working and responsibility for individual AOs.

Pass marks for all tests will be set in advance in consultation with technical experts and employers. Performance of the online assessments will be monitored closely at initial stages and any adjustments made to the content as necessary. Regular reviews will be planned in throughout the lifetime of the apprenticeship.

Behaviours

Behaviours are mapped to UK spec for EngTech.

Behaviours will be fully incorporated into the performance outcomes in a site-based logbook, where candidates provide evidence of demonstrating these behaviours. Candidates can provide for instance reflective accounts of meeting these criteria. Also, can be supported by employer's /supervisor's witness testimony:

- Behaviour 1 (B1): Work reliably and effectively without close supervision
- Behaviour 2 (B2): Accept responsibility for the work of themselves and others
- Behaviour 3(B3): Accept allocate and supervise technical and other tasks
- Behaviour 4(B4): Use oral, written and electronic methods for the communication of technical and other information
- Behaviour 5(B5): Work effectively with colleagues, other trades, clients, suppliers and the public
- Behaviour 6 (B6): Undertake work in a way that contributes to sustainable development
- Behaviour 7(B7): Maintain and enhance competence in own area
- Behaviour 8 (B8): Exercise responsibilities in an ethical manner.

Example: In the performance unit: **Apply the principles and practices for overseeing and organising the work environment.** The learner will be assessed on learning outcomes such as:

1. Providing relevant people with technical and functional information for work on electrical systems and equipment.
2. Overseeing health and safety during work on electrical systems and equipment.
3. Co-ordinating liaison with other relevant persons during work activities.
4. Organising and oversee work activities and operations.
5. Organising a programme for working on electrical systems and equipment.
6. Organising the resource requirements for work on electrical systems and equipment.

Behaviours can be mapped and incorporated into this unit and throughout other units. The learner will be told in the unit information they will be assessed on these behaviours throughout the unit and qualification. This will not make behaviours onerous, but facilitate natural generation of evidence. An example is shown on the next pages.

Also indicative mapping to performance based evidence for the workplace:

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Behaviour 1	All units
Behaviour 2	All units and in particular oversee and organise
Behaviour 3	Oversee and organise unit
Behaviour 4	All units e.g. planning design commissioning, materials, dealing with customers, wholesalers etc
Behaviour 5	All units
Behaviour 6	All units, eg material wastage, use of environmentally friendly materials
Behaviour 7	This will be evidenced by the CPD 17th Edition unit. As it is now a mandatory unit, but also by accessing trade journals, CPD events, and other training courses. Can be evidenced by reflective accounts etc
Behaviour 8	All units can be evidenced by reflective accounts etc.

Employer/manager could also sign off as a witness testimony to attest to the above.

Assessment Strategy

The qualification will use a shared assessment strategy which will provide a standardised approach for AOs and their centres in qualification administration, delivery and quality assurance. AOs will continue to work together to maintain consistency in all of these aspects.

The common assessment strategy will include aspects such as: competence of verifiers, assessors and delivery staff (i.e. technical ability). It shall include measures of these aspects to be checked by the awarding organisation. It also will stipulate assessment method types across all knowledge units and rules relating to vocational evidence for performance aspects. Its aim will be to ensure evidence is to the same standard between learners, centres and AOs.

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Annex 1

Detailed Qualification Assessment Plan

The following is the detailed qualification assessment plan that has been agreed by the Employer group for the Electrotechnical standard.

Mandatory Standards – All must be completed:

Unit No	Titles	Assessment	Notes
1k	Understand Health, Safety and Environmental Considerations	Common rules on knowledge assessment as given on the assessment strategy.	Covers EU, and UK legislation - statutory Instruments etc. and enables issue of the ECS Apprentice card by the JIB.
1p	Apply Health, Safety and Environmental Considerations	On site portfolio of evidence	
2k	Understand How to Organise and Oversee Electrical Work Activities	Common rules on knowledge assessment as given on the assessment strategy.	
2p	Organise and Oversee the Electrical Work Environment	On site portfolio of evidence	
3k	Understand Terminations and Connections of Conductors	Common rules on knowledge assessment as given on the assessment strategy.	Also utilises the BS 7671, OSG, GNs, manufacturers info
3p	Terminate and Connect Conductors	On site portfolio of evidence	
4k	Understand Inspection, Testing and Commissioning	Common rules on knowledge assessment as given on the assessment strategy.	Also utilises the BS 7671, OSG, GNs, manufacturers info Writing up test reports in legible professional format.
4p	Inspect, Test and Commission Electrical Systems	On site portfolio of evidence	

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5k	Understand Fault Diagnosis and Rectification	Common rules on knowledge assessment as given on the assessment strategy	Also utilises the BS 7671, OSG, GNs, manufacturers info
5p	Apply Fault Diagnosis and Rectification	On site portfolio of evidence	
6k	Electrical Scientific Principles and Technologies	Common rules on knowledge assessment as given on the assessment strategy	Also utilises the BS 7671, OSG, GNs, and manufacturers' info. (Does not have comparable performance unit as will be indicative in other units).
7k	Understand the Requirements for Electrical Installations BS 7671: 2008 (2015)	Common rules on knowledge assessment as given on the assessment strategy.	Covers BS 7671. Note that BS 7671 also covered in other units also in design inspection testing etc and the AM2.
8k	Understand Design, Installation and Maintenance Practices and Procedures	Common rules on knowledge assessment as given on the assessment strategy.	Also utilises the BS 7671, OSG, GNs, manufacturers info.

Installation pathway

8p	Apply Design and Installation Practices and Procedures	On site portfolio of evidence	

OR

Maintenance pathway

9p	Apply Maintenance Practices and Procedures	On site portfolio of evidence	

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