Highway Electrician / Service Operative Apprenticeship, Level 3:

End-point Assessment Plan

Introduction & Overview

This document sets out the requirements for end-point assessment (EPA) for the Highway Electrician / Service Operative apprenticeship standard. It is written for end-point assessment organisations who need to know how EPA for this apprenticeship must operate. It will also be of interest to apprentices, their employers and training providers.

Full time apprentices will typically spend 24 months on-programme working towards the apprenticeship standard, with a minimum of 20% off-the-job training.

The EPA should only start once the employer is satisfied that the apprentice is consistently working at or above the level set out in the standard, that the pre-requisite gateway requirements for EPA have been met and that they can be evidenced to an End-point assessment organisation (EPAO) organisation.

As a gateway requirement, apprentices must complete a Level 3 Certificate and a Level 3 NVQ Diploma prior to taking their EPA. Apprentices within English and mathematics at level 2 must achieve level 2 prior to taking their EPA.

The EPA must be completed within a maximum a three month period, after the apprentice has met the EPA gateway requirements.

EPA must be conducted by an organisation approved to offer services against this standard, as selected by the employer, from the Education & Skills Funding Agency's (ESFA) Register of End Point Assessment Organisations (RoEPAO).

The EPA consists of 3 distinct assessment methods:

- Presentation
- Professional discussion
- Practical assessment

Performance in the EPA will determine the apprenticeship grade of fail, pass, merit or distinction.

Diagram 1. Typical Highway Electrician / Service Operative Apprenticeship Summary

On-programme **(typically 24 months)**	**End Point Assessment Gateway**	**End Point Assessment** **(maximum 6 months)**	**Professional recognition**
Training to develop the Highway Electrician / Service Operative standard's knowledge, skills and behaviours Working towards English/maths Level 2 (if required)	Level 3 Certificate and a Level 3 NVQ Diploma within the sector specific area English/maths Level 2 Employer satisfied apprentice is consistently working at or above the level of the standard	Consists of: Presentation Professional discussion Practical assessment Graded fail, pass, merit or distinction	On successful completion of the apprenticeship: Technician Member of the Institution of Engineering and Technology (TMIET) Meet registration requirements of the Engineering Council for Engineering Technician (EngTech) Meets the requirements for full registration to the industry recognised Highway Electrical Registration Scheme (HERS)

End-point Assessment Gateway

The EPA should only start once the employer is satisfied that the apprentice is consistently working at or above the level set out in the standard, the pre-requisite gateway requirements for EPA have been met and that they can be evidenced to an EPAO organisation. Employers may wish to take advice from their apprentice's training provider(s).

Gateway requirements:

- English and mathematics at level 2
- Level 3 Certificate and a Level 3 NVQ Diploma within the sector specific area

End-point Assessment Methods, Timescales & Location

The end-point assessment consists of 3 distinct assessment methods:

- Presentation
- Professional discussion
- Practical assessment

The assessment methods must be completed in one assessment day, within a timescale of 3 months after the apprentice has met the EPA gateway requirements.

The assessment methods must be completed in the order listed above. It is not necessary for the apprentice to successfully complete one method of assessment before moving on to the next.

EPAOs must ensure that the assessments are conducted in a suitable controlled environment i.e. for the presentation and professional discussion a quiet room free from distraction and influence, with the necessary equipment for each assessment method e.g. computer, power-point facilities for the presentation (if required by the apprentice). Due to the safety critical nature of the role, the practical assessment must be conducted in a consistent and simulated work situation, at an EPAO approved centre. Employer's premises can be used for EPA venues, where possible.

Requirements for each assessment method are detailed below.

1. Presentation

- The presentation must assess the apprentice against the knowledge, skills and behaviours mapped against this assessment method, as set out in Annex A.

- EPAOs must give an apprentice a minimum of three weeks' notice of the time, date and venue for the presentation.

- The presentation must take place on a one-to-one basis between an independent assessor and an apprentice.

- The apprentice must give a presentation on three work projects covering three specific areas that have taken place after all assessed works during the Apprenticeship have been finalised:
    - Set teams to work
    - Reactive maintenance
    - Install of Equipment

- For each project the following information will need to be presented by the apprentice, this evidence is to be used to explain and or clarify the actions and outcomes of the works :

    - Overview of the job/project
    - Who the apprentice was working with and reporting to
    - The paperwork and preparation for the job
    - Equipment, plant and materials required and used
    - Both general and particular Health & Safety and environmental issues
    - Detailed description of the actual work carried out
    - Apprentices role and responsibilities
    - How the apprentice contributed to the team
    - What records were completed, by whom and what reporting was carried out
    - Areas that went well and those that could be improved

- The apprentice should bring supporting hard copy evidence for each of the areas above that they will be presenting on, this evidence is used to support the presentation annex B part 1 Presentation criteria outcomes, where supporting hard copy evidence is used this will be assessed in line with the EPA Annex B Part EPA Presentation assessment criteria. This will be based on the Apprentice organisational processes and procedures, and method of work, reporting and notification of project

- The presentation must take a maximum of 45 minutes (+/-10%) and there will be no follow up questions.

  Apprentices are to be allowed time between each presentation to prepare and set up as required, this should not exceed 5 minutes.

- It should be held in a designated space, in a quiet room free from distractions and influence. It is anticipated that EPAOs will use the apprentice's employer's premises wherever possible to minimise costs. This will be dependent on the employers' premises suitability and available space and practicality to set up the Practical Assessment Facility

- Apprentices can use presentation aides e.g. power-point, flip chart, notes. EPAOs must ensure any reasonable presentational requirements are in place e.g. power-point

facilities. Apprentices must make any requirement requests at least two weeks prior to the scheduled date for the presentation.

- The Presentation will be marked according to the grading criteria set out in Annex B and awarded a mark of Standard Not Achieved, or Pass. Merit or Distinction will be calculated from the level of achievement as identified within each Apprenticeship Grading section of this document . This would include any part for 'Safety Critical' not achieved and 'part' not achieved. The Presentation has an overall weighting factor of 20%

- Evidence of how the apprentice has demonstrated the KSBs must be documented by the independent assessor using documentation provided by the EPAO.

2. Professional discussion

- The Professional Discussion must assess the apprentice against the knowledge, skills and behaviours mapped against this assessment method, as set out in Annex A.

- The Professional Discussion must take place on a one-to-one basis between an independent assessor and an apprentice.

- The Professional Discussion will take up to 120 minutes in total (+/-10%) and will be broken into three sections. Each section will have up to 40 minutes allocated (+/-10%).

- For each section the apprentice will be given a scenario, which must include a photograph with text. The assessor will read out the text, which will be a brief description of the scenario to set the scene and the apprentice will have 5 minutes consolidation time, when notes can be written, or the apprentice can ask for any of the text to be repeated.

- The apprentice will then explain what action they would take to address the situation in the scenario, including what documentation they would use. The independent assessor can ask up to a maximum of 10 follow up questions, if required. The aim of the follow up questions is for clarification, so the independent assessor can determine if the apprentice has met the KSB's being assessed by the Professional Discussion.

- The independent assessor will then provide additional information, (from the bank of change in circumstance produced by the EPAO) to introduce a change in circumstances (context) for the scenario (see Annex B part 2 EPA Professional Discussion), which the apprentice will respond to, to meet Annex B part 2 EPA Professional Discussion context 1. The independent assessor can ask up to a maximum of 4 follow up questions, if required. This process is repeated, with a further change in circumstances to meet Annex B part 2 EPA Professional Discussion context 2 and the independent assessor asking up to a maximum of 4 follow up questions, if required.

- The EPAO is required to create a bank of three scenarios for each of the areas listed below, each with two sets of 3 possible situation circumstance change criteria (context), ensuring consistency for all apprentices. The EPAO must ensure that the scenarios are relevant to the associated sector the Apprentice is working within. The EPAO must put in place measures to ensure specification security and to maintain a specification bank of sufficient size to mitigate predictability and review them regularly to ensure they are fit for purpose.
- It is recommended that EPAOs develop assessment tools in consultation with representative employers, where they do this they must put measures in place to ensure security of the assessment tools.

- The 3 areas the scenarios will cover are:

  - Initial Verification and Periodic Inspection and Testing
  - Reactive Maintenance
  - Emergency Attendance

- The EPAO must ensure for each of the 3 areas listed for the professional discussion scenarios that there will be 3 possible options available to the assessor to choose from, plus the first and second change in circumstances (context) criteria. For each of the 3 areas, only one option is required to be assessed with only one first and second circumstance change question asked. The 3 possible area options must cover the base scenarios listed below, which must reflect and accommodate the specific sector of approval for the EPAO, ie Traffic Control, Public Lighting, Communications.

  - Initial Verification and periodic Inspection and Testing, the 3 options must include;
    1. A full inspection and test before system is set to work.
    2. Questionable safety/integrity of an electrical installation and compliance within current IET BS7671 regulations.
    3. The system has been upgraded to a new specification before final energisation and approving
  - Reactive Maintenance, the 3 options must include;
    1. Site fault attendance with limited supporting information.
    2. Site attendance where it appears that the system is not working to specification.
    3. Site attendance with an intermittent fault condition
  - Emergency Attendance, the 3 options must include;
    1. Equipment/system that has been reported as not secure.
    2. Road Traffic Collision situation which involves Highway Electrical equipment/system.
    3. Vandalised equipment/system with potential for exposed electrical conductors

- The Professional Discussion should be held in a designated space, in a quiet room free from distractions and influence with any the necessary equipment set up in advance.

- The Professional Discussion must be recorded on documentation provided by the EPA organisation.

- The Professional Discussion will be marked according to the grading criteria set out in Annex B and awarded a mark of Standard Not Achieved, or Pass. Merit or Distinction will be calculated from the level of achievement as identified within each Apprenticeship Grading section of this document . This would include any part for 'Safety Critical' not achieved and 'part' not achieved. The Professional Discussion has an overall weighting factor of 40%

3. Practical assessment

- Apprentices must complete a practical assessment, consisting of an Initial Verification and Testing electrical inspection, fault testing and, functional testing with direct observation and questioning. This will be on a one-to-one basis with an independent assessor.

Apprentices must be observed by an independent assessor completing the tasks providing the opportunity to assess the KSBs mapped against this assessment method, as set out in Annex A, and mapped in Annex B Part 3 EPA Practical Assessment

- Apprentices must be provided with verbal instructions on the tasks they must complete, including timescales.

- The apprentice will be given a specification of electrical installation relating to their sector of work and will have 10 minutes to read it. They will then be asked to complete the following tasks in the order outlined below :

    1) Undertake the initial approach i.e. risk assessment
    2) Carry out a safe isolation, while talking through what they are doing and why
    3) Undertake a full electrical inspection and test as per industry standard.
    4) Fault diagnosis covering 3 set faults which are switched in by the EPAO. After the first fault the apprentice will undertake tests and checks to diagnose the problem, talking through what they are doing and why. This process will then be repeated for a second and third fault.
    5) Functional testing, talking through what they are doing and why
    6) Complete risk assessment, electrical inspection and Electrical Installation Certificate documentation.

- Where the Commissioning option has been chosen, which is a sector part specific criteria, incorporated within the Traffic Signals and Motorway Communications sectors, and forms part of the overall pathway outcomes, a recorded discussion is required to determine that the Apprentice has the required underpinning knowledge and the

additional competencies required for this task. The successful outcome is recorded within the assessment outcome that forms part of the Electrical Inspection and Testing section of the end assessment as specified within Annex B Part 3 EPA Practical Assessment - Commissioning

- The assessor may ask clarification questions where required, up to a maximum of 10 questions. Questions will be determined by the independent assessor taking account of what has been observed and what the apprentice has told them as they completed the tasks. Questioning must be completed within the total time allowed for the practical assessment and the questions and answers recorded on documentation provided by the EPAO.

- The apprentice will need to complete the HEA standard Initial and Periodic inspection and Testing and Electrical Installation Certificate documentation during the assessment. The EPAO will provide the apprentice with copies of the documentation, which will also be issued to the apprentice with their joining instructions to allow time for familiarisation, two weeks in advance of the notified/agreed date of the practical assessment.
- The apprentice must bring their own, fully functional test equipment that they are familiar with or compliant equipment will be provided by the EPAO, where the EPAO provides equipment, the Apprentice must be allowed sufficient time to familiarise themselves with the equipment and use. Time for familiarisation is not to be included as part of the of the overall assessment time. They must also bring their own Personal Protective Equipment: Insulated electrical gloves and high protections and/or face shield or this will be provided by the assessment centre.

- The practical assessment must be carried out over a maximum total assessment time period of 3.5 hours, including a 30 minute lunch break and comfort breaks as required.
- Evidence of how the apprentice has demonstrated the KSBs must be documented by the independent assessor.
- Due to the safety critical nature of the role, the practical assessment equipment must be conducted in a consistent and simulated manner as would be expected in normal working conditions/work situation, at an EPAO approved centre, or where specific equipment size and transportability allows, at the employer's premises. The simulated environment must be a 'real' representation of the optional system/equipment that is being tested, which is capable of simulating real type faults and enable a full functional test.
- The EPAOs should develop a bank of practical assessment specifications and it is recommended this is undertaken in consultation with representative employers. The EPAO must put in place measures to ensure specification security and to maintain a

specification bank of sufficient size to mitigate predictability and review them regularly to ensure they are fit for purpose.

- The practical assessment will be marked according to the grading criteria set out in Annex B and awarded a mark of Standard Not Achieved, or Pass. Merit or Distinction will be calculated from the level of achievement as identified within each Apprenticeship Grading section of this document . This would include any part for 'Safety Critical' not achieved and 'part' not achieved. The practical assessment has an overall weighting factor of 40%

Apprenticeship Grading

Performance in the EPA will determine the apprenticeship grade of Not Achieved, Pass, Merit or Distinction grades, determination of grade is calculated by the level of overall achievement outcomes.

Each assessment method must be graded according to the requirements set out in this plan. Restrictions on grading apply where apprentices re-sit/re-take an assessment method – see re-sit/re-take section below.

EPAOs must combine the weighted percentages achieved from the 3 assessment methods to determine the EPA overall grade.

To achieve an EPA pass, apprentices must achieve an overall weighted percentage of greater than or equal to 45% and up to and including 75%

To achieve a merit, apprentices must achieve greater than or equal to 76% and less than 86%

To achieve a distinction, apprentices must achieve greater than 85%.

A part Not Achieved, Not Achieved or safety critical Not Achieved, in either the presentation, professional discussion or practical will result in the EPA outcome as not achieved.

Independent assessors' decisions must be subject to moderation by the EPAO – see internal quality assurance section below. Decisions must not be confirmed until after moderation.

EPA Component	Sub part	Maximum Marks	% mark	Weighting Factor %
Presentation				
	Set Teams to Work	10		
	Reactive Maintenance	10		
	Install of Equipment	10		
		T= Total	T * 3.333333333333	% mark * 0.2

Each element in the sub part (see the grading criteria in Annex B) is worth 1 mark.

If any one sub part meets the 'Not Achieved' criteria of **6** Not Achievements out of the possible 10, then the EPA Presentation has resulted in a **'Part** Not Achieved**'** for that sub part

Critical Not Achieved if any Critical element has not been met, this overrides all possible grading and results in a – **Presentation Assessment** Not Achieved

Not Achieved if the total score for **all 3 sub parts** is less than or equal to 45 % of the total

Pass if total score for all **3 sub parts** is greater than 45% and less than 76 %

Merit if total score for all **3 sub parts** is greater than or equal to 76% and less than 86%

Distinction if total score for all **3 sub parts** is equal to or greater than 86%

Worked example;

A total score of 15, (with no critical failures or part failures) is 15 * 3.33333333 = (49.9999999) **50%** This equates to a 'Pass' mark ***for the Presentation***.

This has a total weighting factor of 20% for the overall EPA which is 50 * 0.2 = **10%**

EPA Component	Sub part	Maximum Marks	% mark	Weighting Factor %
Professional Discussion				
	Initial and Inspection and Testing	16		
	Reactive Maintenance	16		
	Emergency Attendance	16		
		T= Total	T * 2.0833333333333	%mark * 0.4

Each element in the sub part (see the grading criteria in Annex B) is worth 1 mark.

If any one sub part meets the **'**Not Achieved**'** criteria of **10** Not Achievements out of the possible 16, then the EPA professional discussion has resulted in a **'Part** Not Achieved for that professional discussion sub part.

Critical Not Achieved if any Critical element has not been met, this overrides all possible grading and results in a – **Professional Discussion** Not Achieved

Not Achieved if the total score for all 3 sub parts is less than or equal to 45 % of the total

Pass if total score for all 3 sub parts is greater than 45% and less than 76 %

Merit if total score for all 3 sub parts is greater than or equal to 76% and less than 86%

Distinction if total score for all 3 sub parts is equal to or greater than 86%

Worked example;

A total score of 39, (with no critical failures or part failures) is 39 * 2.0833333333333 = (81.2499999) **81.25%** This equates to a 'Merit' mark ***for the Professional Discussion***.

This has a Total weighting factor of 40% for the overall EPA is 81.25 * 0.4 = **32.5%**

EPA Component	Sub part	Maximum Marks	% mark	Weighting Factor %
Practical Assessment				
	Initial Approach	5		
	Safe Isolation	25		
	Electrical Inspection and Testing*	59		
	Fault Diagnosis	11		
	Functional Testing	1		
		T= Total	T * 0.990099	%mark * 0.4

Each element in the sub part (see the grading criteria in Annex B) is worth 1 mark.

Due to the nature of the practical safety critical criteria there is no 'part Not Achieved' criteria

Critical Not Achieved if any Critical element has not been met, this overrides all possible grading and results in a – **Practical Assessment** Not Achieved

Not Achieved if the total score for all 5 sub parts is less than or equal to 45 % of the total

Pass if total score for all 5 sub parts is greater than 45% and less than 76 %

Merit if total score for all 5 sub parts is greater than or equal to 76% and less than 86%

Distinction if total score for all 5 sub parts is equal to or greater than 86%

* **Road Loop Inductance** *(Mandatory for Traffic Control Systems, Motorway Comms, VMS activated systems).* This test forms part of the 59 parts for *Electrical Inspection and Testing.* Where this test is not a requirement i.e. Public Lighting systems, documented explanation is required. One mark should be applied to account for the test, to ensure that the EPA grade calculation (marking and weighting factor) as detailed above, is not affected.

* Where the **'Commissioning'** option has been chosen, a recorded discussion is required to determine that the Apprentice understands the additional elements required for this task. This is to be part of the Electrical *Inspection and Testing* sub part

Worked example;

A total score of 101, (with no critical failures or part failures) is; 101 * 0.990099 = (100) **100%** This equates to a 'Distinction' mark ***for the Practical Assessment.***

This has a weighting factor of 40% for the overall EPA is 100 * 0.4 = **40%**

Total EPA Assessment Achieved Grade – worked examples			
EPA Part	Weighting Factor Section Score in %	Total EPA Score %	Final Grade
Presentation	10		
Professional Discussion	32.5		
Practical Assessment	40		
		82%	Merit

Re-sit and re-take information

Apprentices who fail one or more assessment method will be offered the opportunity to take a re-sit/retake. A re-sit does not require further learning, whereas a re-take does. Re-sits/re-takes must not be offered to apprentices wishing to move from pass to merit or distinction or from merit to distinction.

The apprentice's employer will need to agree that a re-sit/re-take is an appropriate course of action. Apprentices should have a supportive action plan to prepare for the re-sit/re-take.

All 3 assessment methods must be successfully passed within a 3 month period of each of other, otherwise the entire EPA must be retaken.

The maximum grade awarded to a re-sit/re-take will be pass, unless the EPAO identifies exceptional circumstances accounting for the original fail.

Where a resit/retake is required for the presentation, new project examples will need to be prepared.

If the apprentice does not pass an assessment method, feedback should be provided to the apprentice. The feedback can advise an apprentice on the area(s) failed in the EPA, but not advise what they need to do to overcome it in a resit/retake

EPAOs must ensure that apprentices complete a different Practical Assessment specification and Professional Interview scenarios (with different faults applied) when taking a re-sit/re-take.

Professional Body Recognition

This apprenticeship is designed to prepare successful apprentices to meet:

- the requirements for registration as Technician Member of the Institution of Engineering and Technology (TMIET)
- the registration requirements of the Engineering Council for Engineering Technician (EngTech)
- requirements for full registration to the industry recognised Highway Electrical Registration Scheme (HERS)

End-point Assessment Organisations

Employers must choose an independent EPAO approved to deliver the EPA for this apprenticeship from the Education & Skills Funding Agency's (ESFA's) Register of End Point Assessment Organisations (RoEPAO).

Requirements for Independent Assessors, Invigilators and Markers

EPAOs must appoint:

- independent occupationally competent assessors with the specified sub-sector to assess and grade the presentation, professional discussion and practical assessment.
- quality assurance staff to undertake moderation of EPA

Independent assessors must meet the following requirements:

- be independent of the apprentice, their employer and training provider(s) i.e. there must be no conflict of interest
- be registered with the Highway Electrical Registration Scheme
- hold Assessing Competence within the Workplace Environment Level 3
- had training from their EPAO in terms of good assessment practice, operating the assessment tools and grading and operate according to their guidance

- hold an appropriate level qualification for Inspection and Testing, Initial Verification and Periodic Testing
- experience of selecting, installing, commissioning, servicing and maintaining the range of systems and work activities demonstrated within the Highways Electrician/Service Operative Apprenticeship Standard for the scope of assessment
- be able to demonstrate a clear understanding of the Highway Electrical qualifications and current best practice and training specifications.
- have completed a minimum of 30 hours continuing professional development (CPD) relevant to Highways Electrical in the last year; they do not necessarily still need to be employed in a Highways Electrical occupation
- undertake a minimum of 1-days' EPAO standardisation training per year

Quality assurance staff must meet the following requirements:

- be independent of the apprentice, their employer and training provider i.e. there must be no conflict of interest
- hold quality assurance qualifications e.g. TACA (Training, Assessment, Quality and Assurance)

Internal quality assurance

Internal quality assurance refers to the requirements that EPAOs must have in place to ensure consistent, reliable, accurate and valid assessment decisions. EPAOs for this EPA must undertake the following:

- appoint independent assessors that meet the requirements as detailed in this plan – see above
- provide training for independent assessors in terms of good assessment practice, operating the assessment tools and grading
- have evidenced quality assurance systems and procedures that support fair, reliable and consistent assessment across the organisation and over time
- operate regular standardisation events to allow independent assessors to attend a minimum of 1 events per year
- operate moderation of assessment activity and decisions, through examination of documentation and observation of activity, with a minimum of 10% of each independent assessors' assessments moderated

Assessment tools and materials

EPAOs must produce assessment tools and supporting materials for the EPA that follow best assessment practice, as follows:

- Scenarios for the professional discussion and specifications for the practical assessment
- It is recommended that EPAOs develop assessment tools in consultation with representative employers, where they do this they must put measures in place to ensure security of the assessment tools

- Documentation for recording assessment evidence and decisions. The assessment documentation must follow the Annex B criteria for each assessment method. A fully workable electronic marking spreadsheet for the EPA has been developed by the Highway Electrical Sector employer group to assist EPAOs, if they wish to use it. This can be accessed free of charge from the Highway Electrical Association, at www.thehea.org.uk and request a copy

- Guidance for independent assessors on conducting the EPA
- Guidance for apprentices, their employers and training providers on the EPA

External Quality Assurance

External quality assurance arrangements will ensure that EPAOs delivering EPA for this apprenticeship operate consistently and in line with this plan.

External quality assurance for this apprenticeship standard will be undertaken by the Institute for Apprenticeships.

Implementation

Affordability:

The following factors should ensure the EPA is affordable:

- The EPA is completed in one day, minimising the apprentice's down time.

Volumes:

It is anticipated that there will be 20 starts in year one of this apprenticeship and 30 per year once established.

Annex A – Knowledge, Skills and Behaviours to be assessed by each assessment method

This chart provides an overview of the knowledge, skills and behaviours (KSB's) to be assessed by the assessment methods.

	Knowledge and Skills	Presentation	Professional discussion	Practical test
Health, Safety and Environmental (K&S1)	Understanding the requirements of their employer and industry as a whole to ensure the health and safety of employees and others affected by any work carried out and how to minimise harming the environment and to apply these before starting work and during the works both for themselves and those they are responsible for	x	X	x
Highway Electrical Equipment and Systems (K&S2)	Understanding and identifying the different types of equipment and systems used in the highway electrical sector, the principles of operation, and how they are installed and maintained; Understanding electrical principles and practices and applying these to highway electrical equipment and systems.	x	X	
Planning, preparing and organising works (K&S3)	Understanding the requirements of the employer and industry and applying these to safely and efficiently plan, prepare and organise works on site including obtaining the necessary plant, tools, materials and competent people; allocating resources; setting individual responsibilities and ensuring the scope of work is understood	x	X	
Installation Techniques (K&S4)	Understanding how to install, and actually installing and connecting a range of highway electrical equipment and components (e.g. cables, fuses, distribution boards); understanding and dealing with varying site conditions; Understanding and carrying out the relevant electrical and functional tests for installed equipment and completing records	x		

	(e.g. job sheets and electrical test certificates)			
Maintenance Techniques (K&S5)	Understanding the principles and practices of routine (e.g. cleaning and bulk relamping) and reactive (e.g. responding to lights or signals that are out or out of timing) maintenance including the safety and technical implications, the diagnosis and correction of faults and the tests for equipment being maintained; applying these in practice	x		x
Inspection and Testing principles and practices (K&S6)	Understanding the principles, practices and requirements of electrical and where applicable structural inspection and testing of highway electrical equipment and systems; Understanding how to verify and record the results; Carrying out electrical and where applicable visual structural inspection and testing on highway electrical equipment, recording the results and verifying whether the system complies with the industry standards and is safe, and the actions to take if this is not the case.		X	x
Emergency Attendance & Emergency Works (K&S7)	Understanding the requirements and procedures of the employer and industry and applying these to emergencies such as a road traffic incident where a vehicle impacts a street light or traffic signal, to assess the site, determine what action is required, call for appropriate additional technical back up and ensure the site is left safe and relevant reports are completed		x	
Effective communication (K&S8)	Understanding of how to communicate effectively and how to develop and maintain effective	x		

	working relationships and applying this understanding in practice so as to ensure productive working relationships; ensuring communication is clear, appropriate and understood; promoting a professional image			
Effective supervisory techniques (K&S9)	Understanding the responsibilities and requirements of supervisors; Understanding the principles of effective supervision; Allocating duties and responsibilities and coordinating activities to ensure work is carried out safely, cost-effectively and within the programme of work	x		
OPTION				
Commissioning principles and practices (C1)	Understanding the scope, purpose and procedures associated with commissioning inspection and tests, handover and recording of results; planning and carrying out the commissioning (e.g. for ensuring traffic signal installations are safe and the specification of equipment, the installation and the timings are in accordance with the customers' requirements)			x

	Behaviours			
Health, Safety & Environment (B1)	Promoting a positive Health, Safety and Environmental culture through situational awareness and by personal example; taking appropriate actions if others are acting unsafely			X
Accepting responsibility (B2)	Taking responsibility for own and others judgements, actions and standards of work.	x		

	Being aware of the limits of their own competence and taking the initiative for ensuring that their competence is maintained, developed and up to date			
Supervision (B3)	Allocation of work tasks and monitoring performance to ensure appropriate standards of safety, workmanship and commercial performance / business needs are met and maintained	x		

Annex B – Grading Criteria for the assessment methods

Part 1 EPA Presentation

Ref: Knowledge, Skills and Behaviours	Pass Criteria (A pass mark to be awarded if the specified criteria have been met or exceeded)	Fail (Where the pass criteria have not been met this will be noted as Not Achieved)	Safety Critical Overriding Not Achieved if noted
K&S3, K&S2, B2	Provides a clear and coherent overview of the job / project undertaken	Does not meet pass criteria.	No
K&S3, K&S9, K&S8, B3	Clearly explains working team and to whom the reporting line was for the designated job and/or project undertaken	Does not meet pass criteria.	No
K&S3, B2	Clearly explains the works associated paperwork and the required level of preparation for the job/project to ensure the correct level of safety and material to complete the task	Does not meet pass criteria.	No
K&S3, K&S2	Identifies the equipment, plant and materials required for the job/project and how it is ensured that these are fit for purpose	Does not meet pass criteria.	No

K & S1, K&S3, B2	Explains both general and to particular Health and Safety and environmental issues for task and where applicable, associated with the equipment, tools and plant.	Does not meet pass criteria.	Yes
K&S3, K&S2, K&S4, K&S5, B2	Identifies actual work carried out in detail, explaining why specific action where taken, and how it was assured that the appropriate use of tools, equipment and plant was used	Does not meet pass criteria.	No
K&S3, K&S9, K&S8, B3	Identifies own role and responsibilities for the task and as part of the team	Does not meet pass criteria.	No
K&S3, K&S8	Identifies how they contributed to the team	Does not meet pass criteria.	No
K&S3, K&S4, K&S5, B2	Identifies what records were completed, why and by whom and what reporting was carried out	Does not meet pass criteria.	No
K&S9, B2, B3	Reviews the job/project to identify areas that went well and those that could be improved for future works	Does not meet pass criteria.	No

Part 2 EPA Professional discussion

Ref: Knowledge, Skills and Behaviours	Pass Criteria (A pass mark to be awarded if the specified criteria have been met or exceeded)	Fail (Where the pass criteria have not been met this will be noted as Not Achieved)	Safety Critical Overriding Not Achieved if noted
K&S3, , K&S6, K&S7, K&S9, B1	Explains how they would plan and prepare for the work	Does not meet pass criteria.	No
K&S9	Explains who they would be working with and reporting to	Does not meet pass criteria.	No
K&S3, K&S6	Apprentice identifies equipment, plant and materials required	Does not meet pass criteria.	No
K & S1, K&S6, B1	Explains both general and particular Health and Safety and environmental issues	Does not meet pass criteria.	Yes
K&S2	Identifies the actual work to be carried out and how this would be done	Does not meet pass criteria.	No
B1	Identifies own role and responsibilities	Does not meet pass criteria.	No

K&S9	Identifies how they would contribute to the team	Does not meet pass criteria.	No
K&S2, K&S6	Identifies what records would be completed, by whom and what reporting would be carried out	Does not meet pass criteria.	No
First Context			
K&S2, K&S3, K&S7, K&S9, B1	Explains how this would affect the plan for the work	Does not meet pass criteria.	No
K & S1, K&S6, K&S7, B1	Explains how this would affect the Health and Safety and environmental issues	Does not meet pass criteria.	Yes
K & S1, K&S6, K&S7	Explains what practical steps would be taken	Does not meet pass criteria.	Yes
K&S6, K&S7	Explains what records and reporting would be completed and by whom	Does not meet pass criteria.	No
Second Context			
K&S2, K&S3, K&S7, K&S9, B1	Explains how this would affect the plan for the work	Does not meet pass criteria.	No

K & S1, K&S6, K&S7, B1	Explains how this would affect the Health and Safety and environmental issues	Does not meet pass criteria.	Yes
K & S1, K&S6, K&S7	Explains what practical steps would be taken	Does not meet pass criteria.	Yes
K&S6, K&S7	Explains what records and reporting would be completed and by whom	Does not meet pass criteria.	No

Part 3 EPA Practical Assessment

Ref: Knowledge, Skills and Behaviours	Pass Criteria (A pass mark to be awarded if the specified criteria have been met or exceeded)	Fail (Where the pass criteria have not been met this will be noted as Not Achieved)	Safety Critical Overriding Not Achieved if noted
Initial Approach			
K & S1, B1	Carries out Visual assessment of test set-up	Does not meet pass criteria.	No
K & S1, B1	Completes and records Risk Assessment	Does not meet pass criteria.	Yes
K & S1	Explains electrical system for EPA	Does not meet pass criteria.	Yes
K & S1, B1	Identifies Isolation point	Does not meet pass criteria.	Yes
K & S1, B1	Identifies appropriate P.P.E. to be worn during the EPA practical assessment	Does not meet pass criteria.	Yes
Safe Isolation - Individual item			
K & S1, K&S6	Correct instrument chosen to verify isolation	Does not meet pass criteria.	Yes

K & S1, K&S6	Instrument assessed for insulated probes / fused leads	Does not meet pass criteria.	Yes
K & S1, K&S6	If instrument is other than lamp-type (Go / No Go) mains test lead, verified in calibration	Does not meet pass criteria.	Yes
K & S1, K&S6	Identified correct means of isolation	Does not meet pass criteria.	Yes
K & S1	Individual item of equipment (e.g. public lighting luminaire or traffic signal post) isolated	Does not meet pass criteria.	Yes
K & S1, K&S6	Test instrument used in correct manner (e.g. fingers behind shields throughout test)	Does not meet pass criteria.	Yes
K & S1, B1 K&S6	Test instrument proved on known live source before testing whether isolation effective	Does not meet pass criteria.	Yes
K & S1, B1 K & S1, B1 K&S6	Isolation verified as effective at isolation point outgoing circuit (between all live conductors and all live conductors and earth)	Does not meet pass criteria.	Yes
K & S1, B1 K&S6	Test instrument proved on known live source after verifying isolation effective	Does not meet pass criteria.	Yes

K & S1, B1	Warning Notice posted at the point of isolation	Does not meet pass criteria.	Yes
K & S1	Isolation point locked off (retains key) / cut-out fuse carrier replaced (retains fuse)	Does not meet pass criteria.	Yes
K & S1, B1	Isolation point left safe for public whilst test is carried out (e.g. fuse carrier replaced, door closed)	Does not meet pass criteria.	Yes
K & S1, B1 K&S6	Test instrument proved on known live source before testing isolation effective	Does not meet pass criteria.	Yes
K & S1, B1 K&S6	Isolation verified as effective (between all live conductors and all live conductors and earth)	Does not meet pass criteria.	Yes
K & S1, B1 K&S6	Test instrument proved on known live source after verifying isolation effective	Does not meet pass criteria.	Yes
K & S1, B1	Learner explains / carries out Work at height safely	Does not meet pass criteria.	Yes
Safe Isolation – Circuit			

Circuit - Assessor Requests Circuit to a specific piece of equipment, defined by the assessor, to be isolated at the feeder pillar and tested at the feeder pillar and at the piece of equipment			
K & S1, B1 K&S6	Test instrument proved on known live source before testing isolation effective	Does not meet pass criteria.	Yes
K & S1, B1 K&S6	Isolation verified as effective at isolation point outgoing circuit (between all live conductors and all live conductors and earth)	Does not meet pass criteria.	Yes
K & S1, B1 K&S6	Test instrument proved on known live source after verifying isolation effective	Does not meet pass criteria.	Yes
K & S1, B1 K&S6	Warning Notice posted at the point of isolation	Does not meet pass criteria.	Yes
K & S1	Isolation point locked off (retains key) / cut-out fuse carrier replaced (retains fuse)	Does not meet pass criteria.	Yes
K & S1, B1	Isolation point left safe for public whilst check carried out (e.g. fuse carrier replaced, door closed)	Does not meet pass criteria.	Yes
K & S1, B1 K&S6	Test instrument proved on known live source before verifying isolation effective	Does not meet pass criteria.	Yes

K & S1, B1 K&S6	Isolation verified as effective (between all live conductors and all live conductors and earth)	Does not meet pass criteria.	Yes
K & S1, B1 K&S6	Test instrument proved on known live source after verifying isolation effective	Does not meet pass criteria.	Yes
Electrical Inspection & Tests **Visual Inspection** *Assessor selects equipment for the apprentice to undertake a visual inspection of the electrical installation for verification in accordance with BS7671 and to record the results*			
Assessment			
K & S1	Carries out General visual assessment of environment, equipment	Does not meet pass criteria.	Yes
K & S1	Completes Risk Assessment (or refers to Initial Approach Risk Assessment)	Does not meet pass criteria.	Yes
Learner identifies Presence of main & supplementary equipotential bonding conductors and any shortfalls			
K & S1, K&S6	Identifies Insulation of live parts, barriers and enclosures and any shortfalls	Does not meet pass criteria.	Yes
K & S1, K&S6	Identifies Presence of RCD(s) or not for supplementary protection against direct contact	Does not meet pass criteria.	Yes

	and/or protection against indirect contact and any shortfalls		
K & S1, K&S6	Identifies Presence of earthing conductors and any shortfalls	Does not meet pass criteria.	Yes
K & S1, K&S6	Identifies Presence of circuit protective conductors and any shortfalls	Does not meet pass criteria.	Yes
K & S1, K&S6	Identifies Presence of main & supplementary equipotential bonding conductors and any shortfalls	Does not meet pass criteria.	Yes
K & S1, K&S6	Identifies Class II fixed equipment present or not and any shortfalls	Does not meet pass criteria.	Yes
K & S1, K&S6	Identifies SELV/PELV present or not and any shortfalls	Does not meet pass criteria.	Yes
Identification			
K & S1, K&S6	Identifies Presence of diagrams, instructions, circuit charts and similar information and any shortfalls	Does not meet pass criteria.	Yes
K & S1, K&S6	Identifies Presence of danger notices and any shortfalls	Does not meet pass criteria.	Yes

K & S1, K&S6	Identifies Presence of other warning notices and any shortfalls	Does not meet pass criteria.	Yes
K & S1, K&S6	Identifies Labelling of protective devices, switches and terminals and any shortfalls	Does not meet pass criteria.	Yes
K & S1, K&S6	Identifies how conductors are identified and any shortfalls	Does not meet pass criteria.	Yes
K & S1, K&S6	Identifies Temporary supplies present or not and if any, suitably labelled and any shortfalls	Does not meet pass criteria.	Yes
K & S1, K&S6	Identifies what Ducting, marker tape or cable tiles would be suitable and any shortfalls	Does not meet pass criteria.	Yes
Prevention of mutual detrimental influence			
K & S1, K&S6	Identifies Proximity of non-electrical services and other external influences and any shortfalls	Does not meet pass criteria.	Yes
K & S1, K&S6	Identifies Segregation of Band I and Band II circuits or Band II insulation used or not and any shortfalls	Does not meet pass criteria.	Yes
K & S1, K&S6	Identifies Equipment housings are secure (IP33 for pillar / column) or not and any shortfalls	Does not meet pass criteria.	Yes
Cables & conductors			

K & S1, K&S6	Identifies Connections of conductors and equipment and any shortfalls	Does not meet pass criteria.	Yes
K & S1, K&S6	Identifies Selection of conductors for current carrying capacity and voltage drop and any shortfalls	Does not meet pass criteria.	Yes
General			
K & S1, K&S6	Identifies Presence and correct location of appropriate devices for isolation and switching and any shortfalls	Does not meet pass criteria.	Yes
K & S1, K&S6	Identifies adequacy of access to switchgear and other equipment and any shortfalls	Does not meet pass criteria.	Yes
K & S1, K&S6	Identifies Connection of single pole devices for protection or switching in phase conductors only and any shortfalls	Does not meet pass criteria.	Yes
K & S1, K&S6	Identifies Choice and setting of protective and monitoring devices (for fault protection and/or over current) and any shortfalls	Does not meet pass criteria.	Yes
K & S1, K&S6	Identifies Selection of equipment and protective measures appropriate to external influences and any shortfalls	Does not meet pass criteria.	Yes

K & S1, K&S6	Identifies Selection of appropriate functional switching devices	Does not meet pass criteria.	Yes
K & S1, K&S6	Identifies what could affect the Physical integrity of non-electrical equipment (e.g. corrosion)	Does not meet pass criteria.	Yes
Electrical Inspection & Tests **Electrical Tests** *Assessor selects equipment for the apprentice to undertake appropriate tests, record the results and verify the findings*			
Continuity of protective and bonding conductors			
K & S1, K&S6	Selects and confirms test instruments are fit for purpose	Does not meet pass criteria.	Yes
K & S1, K&S6	Bridges phase + CPC to include all of circuit or connects leads and measures total resistance	Does not meet pass criteria.	Yes
K & S1, K&S6	Tests at each identified outlet (between line & earth terminals)	Does not meet pass criteria.	Yes
K & S1, K&S6	Restores installation to original condition and deducts resistance of leads and records value on test results sheet	Does not meet pass criteria.	Yes

K & S1, K&S6	Indicates the order of magnitude of the expected result and compares this to actual result.	Does not meet pass criteria.	Yes
Insulation Resistance			
K & S1, K&S6	Selects instrument and records instrument details correctly	Does not meet pass criteria.	Yes
K & S1, K&S6	Confirms instrument is fit for purpose - Megaohm range open and closed circuit	Does not meet pass criteria.	Yes
K & S1, K&S6	Verifies all sensitive electronic equipment is isolated (or describes how test should be carried out with them present)	Does not meet pass criteria.	Yes
K & S1, K&S6	Verifies all current using equipment is isolated	Does not meet pass criteria.	Yes
K & S1, K&S6	Measures and records insulation resistance values with all MCBs and isolators closed off - either Core to Core: Line to Neutral ; Line to E ; Neutral to E (& describes bunched test where appropriate) or bunched Combined Line and Neutral to Earth	Does not meet pass criteria.	Yes
K & S1, K&S6	Verifies actual result to that expected by reference to the appropriate part of BS7671, IET GN3 or the IET On Site Guide	Does not meet pass criteria.	Yes

Earth Electrode Resistance			
K & S1, K&S6	Correctly determines and records the resistance of the Earth-Electrode	Does not meet pass criteria.	Yes
K & S1, K&S6	Verifies the result against that expected	Does not meet pass criteria.	Yes
Polarity			
K & S1, K&S6	Selects and confirms test Instrument is fit for purpose	Does not meet pass criteria.	Yes
K & S1, K&S6	Confirms polarity of supply and at other end component (e.g. in luminaire /signal head) is correct	Does not meet pass criteria.	Yes
Earth fault loop impedance			
K & S1, K&S6	Selects and confirms test Instrument is fit for purpose	Does not meet pass criteria.	Yes
K & S1, K&S6	Confirms polarity at identified outlet and that there are no RCDs in the circuit	Does not meet pass criteria.	Yes
K & S1, K&S6	Conducts test at the incoming supply	Does not meet pass criteria.	Yes
K & S1, K&S6	Measures & records ZnS value	Does not meet pass criteria.	Yes
K & S1, K&S6	Establishes maximum ZnS value permitted	Does not meet pass criteria.	Yes

K & S1, K&S6	Confirms results obtained comply with those in BS7671, IET GN3 or IET “On site Guide" adjusted as necessary	Does not meet pass criteria.	Yes
Functional Testing of RCD			
K & S1, K&S6	Selects and confirms test Instrument is fit for purpose	Does not meet pass criteria.	Yes
K & S1, K&S6	Tests the effectiveness of the operation of the protective device	Does not meet pass criteria.	Yes
K & S1, K&S6	Carries out test(s) and records results	Does not meet pass criteria.	Yes
K & S1, K&S6	Verifies results by reference to the appropriate documents	Does not meet pass criteria.	Yes
Volt Drop			
K & S1, K&S6	Determines the value of voltage / volt-drop in the circuit	Does not meet pass criteria.	Yes
Road Loop Inductance *(Mandatory for Traffic Control Systems, Motorway Comms, VMS activated systems only)*			
K & S1, K&S6	Road Loop Inductance Measurement taken and checked with system design parameters (Mandatory	Does not meet pass criteria.	Yes

	for Traffic Control Systems, Motorway Comms, VMS activated systems)		
Cables & conductors			
K & S1, K&S6	Connects conductors securely and leaves equipment in safe condition	Does not meet pass criteria.	Yes
K & S1, K&S6	Selection of conductors for current carrying capacity and voltage drop	Does not meet pass criteria.	Yes
Record Sheet			
K & S1, K&S6	Records instrument details correctly	Does not meet pass criteria.	Yes
K & S1, K&S6	Completes inspection and test sheet and any Observation / Defects sheet as far as practicable	Does not meet pass criteria.	Yes
Commissioning (Site Acceptance Testing) – Option A recorded discussion to determine the Apprentice understanding of equipment commissioning, as part of the Electrical Inspection and Testing sub part			
K & S1, C1	Understanding of the requirements for equipment commissioning, the tests required, the records to complete, and the final reporting before final acceptance and energising	Does not meet pass criteria.	Yes

Fault Diagnosis *A range of faults introduced to the system to enable the Apprentice to demonstrate their knowledge and skill at determining the cause of the fault condition*			
K & S1, K&S6	Correct instrument(s) chosen for fault diagnosis	Does not meet pass criteria.	Yes
K & S1, K&S6	Instrument(s) assessed for insulated probes / leads	Does not meet pass criteria.	Yes
K & S1, K&S6	Instrument(s) assessed for fused leads	Does not meet pass criteria.	Yes
K & S1, K&S6	If instrument is other than lamp-type (Go / No Go) mains test lead, verified in calibration	Does not meet pass criteria.	Yes
K & S1, K&S6	Risk Assessment completed and recorded	Does not meet pass criteria.	Yes
K & S1, K&S6	Test instrument proved on known live source before testing supply	Does not meet pass criteria.	Yes
K & S1, K&S6	Supply tested for polarity (between all live conductors and all live conductors and earth)	Does not meet pass criteria.	Yes
K & S1, K&S6	Test instrument proved on known live source after testing supply	Does not meet pass criteria.	Yes

Diagnose fault 1 in a logical manner & describe (incl. fault rectification) - **Supply**			
K & S1 **K&S5**	This fault can be in the form of a supply fault condition resulting in total or partial failure of the equipment or system, which can be switched for ease of setting fault	Does not meet pass criteria.	No
Diagnose fault 2 in a logical manner & describe (incl. fault rectification) - **Function**			
K & S1 **K&S5**	This fault can be in the form of a function failure condition resulting in end indication (i.e. luminaire, instruction indicator) of the equipment or system not working as per specification, which can be switched for ease of setting fault	Does not meet pass criteria.	No
Diagnose fault 3 in a logical manner & describe (incl. fault rectification) - **Component**			
K & S1 **K&S5**	This fault can be in the form of a component/ control gear and or PCB failure condition resulting in end indication (i.e. luminaire, instruction indicator) of the equipment or system not fully working as designed, or a fault condition identified within the system, which can be switched for ease of setting fault	Does not meet pass criteria.	No

Functional Test/s *A systems/product test to determine correct functionality*			
K & S1 **K&S5**	Item / system works in accordance with requirements	Does not meet pass criteria.	No