



BUILDING SERVICES ENGINEERING SENIOR TECHNICIAN

Key information

Reference: ST0041

Version: 1.1

Level: 4

Typical duration to gateway: 36 months

Typical EPA period: 4 months

Maximum funding: £13000

Route: Construction and the built environment

Date updated: 03/04/2024

Lars code: 275

EQA provider: Ofqual

Example progression routes:

Building services design engineer (degree),

Building services engineering site management (degree),

Building control surveyor (integrated degree),

Senior and head of facilities management (integrated degree),

Design and construction management (degree)

End-point assessment plan

AP02

Introduction and overview

This document explains the requirements for end-point assessment (EPA) for the building services engineering senior technician apprentices. End-point assessment organisations (EPAOs) must follow this when designing and delivering their EPA.

Building services engineering senior technician apprentices, their employers and training providers should read this document.

An approved EPAO must conduct the EPA for this apprenticeship. Employers must select an approved EPAO from the Education and Skills Funding Agency's Register of end-point assessment organisations (RoEPAO).

A full-time apprentice typically spends 36 months on-programme (this means in training before the gateway) working towards competence as a building services engineering senior technician. All apprentices must spend at least 12 months on-programme. All apprentices must spend at least 20% of their on-programme time completing off-the-job training.

This EPA has 2 EPA methods.

The grades available for each EPA method are:

EPA method 1 - technical project report and presentation with questioning:

- fail
- pass
- distinction

EPA method 2 - professional discussion underpinned by a portfolio:

- fail
- pass
- distinction

The result from each EPA method is combined to decide the overall apprenticeship grade. The following grades are available for the apprenticeship:

- fail
- pass
- distinction

EPA summary table

<p>On-programme - typically 36 months</p>	<p>Training to develop the knowledge, skills and behaviours (KSBs) of the occupational standard.</p> <p>Training towards English and mathematics qualifications at Level 2, if required.</p> <p>Training towards any other qualifications listed in the occupational standard.</p> <p>The qualification(s) required are:</p> <p>A Level 4 qualification in Construction and Built Environment that meets the knowledge requirements of the standard and is approved by the Engineering Council as meeting the learning outcomes specified for EngTech at level 4</p> <p>Compiling a portfolio of evidence.</p>
<p>End-point assessment gateway</p>	<p>The employer must be content that the apprentice is working at or above the level of the occupational standard.</p> <p>The apprentice's employer must confirm that they think the apprentice:</p> <ul style="list-style-type: none"> • is working at or above the occupational standard as a building services engineering senior technician • has the evidence required to pass the gateway and is ready to take the EPA <p>An apprentice must have passed any other qualifications listed in the building services engineering senior technician occupational standard ST0041.</p> <p>The qualification(s) required are:</p> <p>A Level 4 qualification in Construction and Built Environment that meets the knowledge requirements of the standard and is approved by the Engineering Council as meeting the learning outcomes specified for EngTech at level 4</p> <p>Apprentices must have achieved English and mathematics at Level 2.</p> <p>An apprentice must submit all gateway evidence to the EPAO. The EPAO must review the evidence. When the EPAO confirms the gateway requirements have been met, the EPA period starts and typically takes 4 months to complete. The expectation is that the EPAO will confirm the gateway requirements have been met as quickly as possible.</p> <p>For the professional discussion underpinned by a portfolio, the apprentice will be required to submit a portfolio of evidence.</p> <p>Apprentices must submit any policies and procedures as requested by the EPAO.</p>
<p>End-point assessment - typically 4 months</p>	<p>Grades available for each method:</p> <p>Technical project report and presentation with questioning</p> <ul style="list-style-type: none"> • fail • pass • distinction <p>Professional discussion underpinned by a portfolio</p> <ul style="list-style-type: none"> • fail • pass • distinction <p>Overall EPA and apprenticeship can be graded:</p> <ul style="list-style-type: none"> • fail • pass • distinction
<p>Professional recognition</p>	<p>This apprenticeship standard aligns with Engineering Council (EngTech) for level 4. The experience gained and responsibility held by the apprentice on completion of the apprenticeship will either wholly</p>

	or partially satisfy the requirements for registration at this level.
Re-sits and re-takes	<ul style="list-style-type: none"> • Re-take and re-sit grade cap: pass • Re-sit timeframe: typically 4 month(s) • Re-take timeframe: typically 6 month(s)

Duration of end-point assessment period

The EPA will be taken within the EPA period. The EPA period begins when the EPAO confirms the gateway requirements are met and is typically 4 months.

The expectation is that the EPAO will confirm the gateway requirements are met and the EPA begins as quickly as possible.

EPA gateway

The apprentice's employer must confirm that they think the apprentice is working at or above the occupational standard as a building services engineering senior technician. They will then enter the gateway. The employer may take advice from the apprentice's training provider(s), but the employer must make the decision.

Apprentices must meet the following gateway requirements before starting their EPA.

These are:

- achieved English and mathematics at Level 2.
- achieved A Level 4 qualification in Construction and Built Environment that meets the knowledge requirements of the standard and is approved by the Engineering Council as meeting the learning outcomes specified for EngTech at level 4
- for the professional discussion underpinned by a portfolio apprentices must submit: portfolio of evidence

Portfolio of evidence requirements:

Apprentices must compile a portfolio of evidence during the on-programme period of the apprenticeship. It should contain evidence related to the KSBs that will be assessed by this assessment method. The portfolio of evidence will typically contain 12 discrete pieces of evidence. Evidence should be mapped against the KSBs.

Evidence may be used to demonstrate more than one KSB; a qualitative as opposed to quantitative approach is suggested.

Evidence must cover the following areas:

- design, technology and modelling in building services engineering
- project management and safe systems of working
- roles, responsibilities and engagement with others
- personal and professional practice

Evidence sources may include evidence of work undertaken which may be supported by:

- building services engineering designs
- technical drawings
- CAD/BIM/Revit models
- technical briefs
- industry specifications
- industry standards
- technical reports
- project plans
- client or customer feedback
- witness statements
- employer/trainer feedback
- initial and continuous professional development and training records
- appraisal records
- training course completion

This is not a definitive list; other evidence sources can be included.

The portfolio should not include reflective accounts or any methods of self-assessment. Any employer contributions should focus on direct observation of performance (for example witness statements) rather than opinions. The evidence provided should be valid and attributable to the apprentice; the portfolio of evidence should contain a statement from the employer and apprentice confirming this.

The EPAO should not assess the portfolio of evidence directly as it underpins the discussion. Independent assessors should review the portfolio of evidence to prepare questions for the discussion assessment method. They are not required to provide feedback after this review.

Apprentices must submit any policies and procedures as requested by the EPAO.

The EPA period starts when the EPAO confirms all gateway requirements have been met. The expectation is they will do this as quickly as possible.

Order of assessment methods

The assessment methods can be delivered in any order.

The result of one assessment method does not need to be known before starting the next.

Technical project report and presentation with questioning

Overview

A project involves the apprentice completing a significant and defined piece of work that has a real business application and benefit. The project must start after the apprentice has gone through the gateway.

The technical project report and presentation with questioning must be structured to give the apprentice the opportunity to demonstrate the KSBs mapped to this EPA method to the highest available grade.

The project must meet the needs of the employer's business and be relevant to the apprentice's occupation and apprenticeship. The EPAO must confirm that it provides the apprentice with the opportunity to demonstrate the KSBs mapped to this EPA method to the highest available grade. The EPAO must refer to the grading descriptors to ensure that projects are pitched appropriately.

This EPA method includes 2 components:

- project with a project output
- presentation with questions and answers.

The project and any components must be assessed holistically by the independent assessor when they are deciding the grade for this EPA method.

Rationale

This EPA method is being used because the technical project reflects an employer's building services engineering challenges and is typical of the apprentice's everyday work, ensuring that they can demonstrate KSBs in practice. As part of a building services engineering senior technician's role, they will be expected to plan and carry out technical projects, using appropriate engineering principles, theories, processes, and advanced mathematical and data analysis skills, before evaluating and proposing appropriate building engineering solutions, with consideration for a range of factors, back to various audiences through reports, presentations and discussions. Therefore, this method of assessment is deemed as the most appropriate for this occupation as it accurately reflects the environments and current workplace tasks of the apprentice. The technical project report, presentation and questioning allow for effective assessment of the KSBs assigned to this assessment method.

Component 1: Project with a project output

Delivery

Apprentices must complete a project which may be based on any of the following:

- a specific problem
- a recurring issue
- an idea or opportunity.

The EPAO must provide detailed specifications with what must be included in the project to allow an apprentice to evidence the KSBs mapped to the EPA method to the highest available grade.

The project output must be in the form of a report.

The apprentice must start the project after the gateway. They must complete and submit the report to the EPAO after a maximum of 6 weeks. The employer should ensure the apprentice has the time and resources within this period, to plan and complete their project. The apprentice must complete their project and the production of all its components unaided.

The apprentice may work as part of a team which could include technical internal or external support. However, the project output must be the apprentice's own work and will be reflective of their own role and contribution. The apprentice and their employer must confirm that the project output(s) is the apprentice's own work when it is submitted.

The report must include at least:

Apprentices will undertake a technical project after they have passed the gateway and produce a report that appropriately covers all of the KSBs assigned to this method of assessment.

The EPAO will issue the technical project brief to the apprentice at gateway aligned to their engineering specialism.

The technical project brief will reflect a real work-based building services engineering challenge in a subject area, providing a focus on an area such as:

- mechanical engineering
- electrical engineering
- mechanical and electrical engineering (M&E)
- public health engineering
- energy and building management systems
- environment and sustainability in building services engineering
- facilities management
- building services engineering contracting
- building services engineering manufacturing

The technical project brief, designed and issued by the EPAO, will typically be 500 words in length. The EPAO will design and issue guidance with the technical brief.

Technical project reports must include:

- an introduction
- the scope of the project
- key performance indicators
- a project plan, methodology and timeline for key tasks
- research and findings:
 - data collection, analysis and evaluation appropriate to the technical project and level of apprenticeship
- reference to:
 - relevant scientific and engineering principles and theories
 - relevant techniques, procedures and methods used
 - relevant drawings and mathematical calculations at level 4
 - the use of appropriate and approved materials, components or parts
 - relevant industry policies, standards, regulations and legislations
 - environmental and sustainability concerns
 - cost, quality, safety, security, environmental impact and lifecycle of building services engineering solutions
- project outcomes and the rationale for the chosen project solution presented
- conclusions

The apprentice must prepare a technical project report with appendices of supporting evidence relating to the technical project. The technical project report and all appendices of supporting evidence directly demonstrating performance of KSBs must be attributable in full. Evidence must be accompanied by a witness statement outlining the apprentice's contribution, signed by the apprentice and their employer authenticating it.

Examples of appendices of supporting evidence may include:

- plans
- diagrams
- calculations
- designs
- feedback
- video clips

This is not a definitive list and other evidence sources apart from self-reflection are permissible..

To allow the apprentice to apply for professional registration on completion of the apprenticeship, two independent assessors must holistically assess all assessment methods, in line with the independent assessor requirements set out in this plan. They will have equal responsibility in grading the assessment. The use of two independent assessors will enable the provision of balance to assessment, to bring in greater breadth and depth of technical expertise to questioning and discussion with the apprentice, elucidating more accurate grading decisions.

In the event that the two independent assessors cannot agree on whether to grade the technical project and presentation with a pass, fail or distinction, the EPAO is required to moderate in accordance with their moderation procedures. The EPAO will then make the final decision on the grade to award based on the assessment evidence presented.

The project report has a maximum word count of 3500 words. A tolerance of 10% above or below the word count is allowed at the apprentice's discretion. Appendices, references and diagrams are not included in this total. The project report must map, in an appendix, how it evidences the relevant KSs mapped to this EPA method.

Component 2: Presentation with questioning

Delivery

This is a formal presentation where an apprentice will present to an independent assessor on a set subject. The independent assessor must ask questions. Apprentices must prepare, submit and deliver a presentation. The presentation is restricted to the KSs allocated to this EPA method as shown in the mapping section of this document.

The presentation and questioning must last 30 minutes. This will typically include a presentation of 10 minutes and questioning lasting 20 minutes.

The independent assessor must ask at least 5 questions. They must use the questions from the EPAO's question bank or create their own questions in-line with the EPAO's training. Follow up questions are allowed where clarification is required.

The presentation will provide an overview of the apprentice's project and the presentation with questions and answers. Independent assessors will ask questions after the presentation. All presentations must include at least:

- an overview of the project
- the project scope (including key performance indicators)
- summary of actions undertaken by the apprentice
- project outcomes and how these were achieved.

The apprentice must prepare and submit their presentation to the EPAO at the same time as the report which is a maximum of 6 weeks after the gateway.

The apprentice must notify the EPAO, at the submission of the presentation, of any technical requirements for the presentation.

The independent assessor must have at least 3 weeks to review the project output(s) and presentation before the presentation to allow them to prepare appropriate questions.

Apprentices must be given at least 1 week(s) notice of the date and time of the presentation or question and answer session.

Assessment location

The presentation with questioning must take place in a suitable venue selected by the EPAO for example the EPAO's or employer's premises. The presentation with questioning should take place in a quiet room, free from distractions and influence.

Question and resource development

EPAOs must write an assessment specification and question bank. The specification must be relevant to the occupation and demonstrate how to assess the KSs shown in the mapping. It is recommended this is done in consultation with employers of this occupation. EPAOs should maintain the security and confidentiality of EPA materials when consulting employers. The questions must be unpredictable. A question bank of sufficient size will support this. The assessment specification and questions must be reviewed at least once a year to ensure they remain fit-for-purpose.

EPAOs will develop purpose-built question banks and ensure that appropriate quality assurance procedures are in place, for example, considering standardisation, training and moderation. EPAOs will ensure that questions are refined and developed to a high standard.

EPAOs must ensure that apprentices have a different set of questions in the case of re-sits or re-takes.

- independent assessor EPA materials which include:
 - training materials
 - administration materials
 - moderation and standardisation materials
 - guidance materials
 - grading guidance
 - question bank
- EPA guidance for the apprentice and employer

Professional discussion underpinned by a portfolio

Overview

In the professional discussion, an independent assessor and apprentice have a formal two-way conversation. It gives the apprentice the opportunity to demonstrate their competency across the KSs as shown in the mapping.

Rationale

This EPA method is being used to assess those KSBs that are not likely to occur in the technical project report. Building services engineering senior technicians will be expected to be able to discuss their portfolio, where evidence and results of work-based tasks or projects carried out as part of their apprenticeship, can be used to underpin assessment in a formal setting and where apprentices' will be able to explain their work in detail.

Delivery

The professional discussion must be structured to give the apprentice the opportunity to demonstrate the KSBs mapped to this EPA method to the highest available grade.

The purpose of the independent assessor's questions will be to:

- clarify any questions the independent assessors have from their review of the portfolio
- explore aspects of the work, including how it was carried out, in more detail
- require the apprentice to draw on their portfolio evidence to demonstrate the KSBs

The EPAO must give an apprentice 3 weeks notice of the professional discussion. The independent assessor must have at least 3 week(s) to review the supporting documentation.

Apprentices must have access to their portfolio of evidence during the professional discussion.

Apprentices can refer to and illustrate their answers with evidence from their portfolio of evidence, however the portfolio of evidence is not directly assessed.

The professional discussion must last for 40 minutes. The independent assessor can increase the time of the professional discussion by up to 10%. This time is to allow the apprentice to respond to a question if necessary.

For the professional discussion, the independent assessor must ask at least 6 questions. Follow-up questions are allowed. The independent assessor must use the questions from the EPAO's question bank or create their own questions in-line with the EPAO's training. The professional discussion must allow the apprentice the opportunity to demonstrate the KSBs mapped to this EPA method at the highest possible grade.

The independent assessor conducts and assesses the professional discussion.

The independent assessor must keep accurate records of the assessment. The records must include the KSBs met, the grade achieved and answers to questions.

To allow the apprentice to apply for professional registration on completion of the apprenticeship, two independent assessors must holistically assess all assessment methods, in line with the independent assessor requirements set out in this plan. They will have equal responsibility in grading the assessment. The use of two independent assessors will enable the provision of balance to assessment, to bring in greater breadth and depth of technical expertise to questioning and discussion with the apprentice, elucidating more accurate grading decisions.

In the event that the two independent assessors cannot agree on whether to grade the technical project and presentation with a pass, fail or distinction, the EPAO is required to moderate in accordance with their moderation procedures. The EPAO will then make the final decision on the grade to award based on the assessment evidence presented.

Assessment location

The professional discussion must take place in a suitable venue selected by the EPAO (for example the EPAO's or employer's premises).

The professional discussion can be conducted by video conferencing. The EPAO must have processes in place to verify the identity of the apprentice and ensure the apprentice is not being aided.

The professional discussion should take place in a quiet room, free from distractions and influence.

Question and resource development

EPAOs must write an assessment specification and question bank. The specification must be relevant to the occupation and demonstrate how to assess the KSBs shown in the mapping. It is recommended this is done in consultation with employers of this occupation. EPAOs should maintain the security and confidentiality of EPA materials when consulting employers. The questions must be unpredictable. A question bank of sufficient size will support this. The assessment specification and questions must be reviewed at least once a year to ensure they remain fit-for-purpose.

EPAOs will develop purpose-built question banks and ensure that appropriate quality assurance procedures are in place, for example, considering standardisation, training and moderation. EPAOs will ensure that questions are refined and developed to a high standard.

EPAOs must ensure that apprentices have a different set of questions in the case of re-sits or re-takes.

EPAOs must produce the following materials to support the professional discussion underpinned by a portfolio:

- independent assessor assessment materials which include:
 - training materials
 - administration materials
 - moderation and standardisation materials

- guidance materials
- grading guidance
- question bank
- EPA guidance for the apprentice and employer

Grading

Technical project report and presentation with questioning

Fail - does not meet pass criteria

THEME KSBS	PASS APPRENTICES MUST DEMONSTRATE ALL OF THE PASS DESCRIPTORS	DISTINCTION APPRENTICES MUST DEMONSTRATE ALL OF THE PASS DESCRIPTORS AND ALL OF THE DISTINCTION DESCRIPTORS
Building services engineering technical knowledge and techniques K1 K2 S1 S2	Applies and interprets appropriate engineering principles, scientific, theoretical and technical knowledge and techniques, procedures and methods to the building services engineering problem outlined in the technical project brief and assesses the outcomes (K1, K2, S1, S2)	Evaluates the effectiveness and relevance of the methods and techniques used, justifying those adopted to solve this building services engineering problem (K2, S2)
Data collection, analysis and evaluation K3 K5 S3 S5 B4	<p>Uses mathematical, statistical and analytical techniques to interpret and solve building services engineering problems outlined in the technical project brief (K3, S3)</p> <p>Collects, analyses and evaluates data and technical information accurately using appropriate techniques and methods, explaining the different types and uses of information in relation to the building services engineering problem outlined in the technical project brief (K5, S5, B4)</p>	<p>Justifies the techniques adopted to solve the problem presented (S3)</p> <p>Justifies the use of specific types of information in support of the building services engineering solution proposed (S5)</p>
Use of resources and materials K4 K14 S4 S13 B2	<p>Explains the choice of materials, components or parts used to solve the building services engineering problem outlined in the technical project brief based on their properties, performance and approved use (K4, S4)</p> <p>Formulates and applies project planning techniques and tools in relation to the building services engineering project, identifying appropriate specifications, and the resources, costs and timescales for delivery. Discusses the potential effects that cost, quality, safety, security and environmental impact and the lifecycle of this building services engineering solution (K14, S13)</p> <p>Explains how they made independent decisions during the project, and how they determined they were within their own limitations, and where beyond the, how they sought support (B2)</p>	<p>Discusses their approach to materials, components or parts in terms of building safety and sustainable practice, and how this can improve the performance of the building services engineering solution proposed (K4, S4)</p> <p>Explains how the choices of materials, components, parts promote sustainable practice and safety (K4, S4)</p> <p>Appraises own performance when managing this project by comparing the outcomes of initial planned resources, timescales and costs against actual outcomes, and making recommendations that would further improve own performance (S13, B2)</p>
Industry standards, policies and regulatory requirements K9 K12 S7 S10	<p>Interprets and applies relevant statutory and regulatory requirements, industry policies, standards, regulations, and legislation and codes of practice to the technical project solution presented (K9, S7)</p> <p>Apply principles of sustainable development, environmental policies and legislation in building services engineering projects, recognising the need to reduce carbon use, lower emissions, and plan for wider sustainability (K12, S10)</p>	<p>Evaluates the impact of industry standards, regulations or guidance related to their project solution (K9, S7)</p> <p>Evaluates how the building services engineering solution proposed could be improved for increased sustainability or reducing the impact on the environment (S10)</p>
Communication K15 S15	Uses appropriate communication techniques and methods for all project outcomes, incorporating relevant and appropriate terminology, and appropriate forms of referencing and citation in the written report and presentation (K15, S15)	N/A

Professional discussion underpinned by a portfolio

Fail - does not meet pass criteria

THEME KSBS	PASS APPRENTICES MUST DEMONSTRATE ALL OF THE PASS DESCRIPTORS	DISTINCTION APPRENTICES MUST DEMONSTRATE ALL OF THE PASS DESCRIPTORS AND ALL OF THE DISTINCTION DESCRIPTORS
Design, technology and models in building services engineering information K6 K7 K8 S6	<p>Explains the principles and control processes used, and the common constraints faced, in the production of designs for building services engineering. (K6)</p> <p>Explains how they effectively use analytical and computer-based software packages to produce and interpret building services engineering solutions. (K7, S6)</p> <p>Explains the use and importance of digital modelling techniques, such as Building Information Modelling (BIM), and their limitations, within building services engineering (K8)</p>	<p>Evaluate the impacts of the functional characteristics on the design solution (K6)</p> <p>Explains how digital modelling techniques are used to improve building services engineering solutions (K7, K8, S6)</p>
Project management and safe systems of work K10 K11 K13 S8 S9 S11 S12 B1	<p>Explains project management techniques used in building services engineering, explaining the techniques for recording and reporting progress, the relationship between project quality requirements and the need for continuous improvement (K13, S11, S12)</p> <p>Describes how they apply health & safety regulations and legislation, and discusses the importance of, and how, safe working practices are implemented (using Construction Design and Management) and fostered in building services engineering (K10, S8, B1)</p> <p>Identifies, evaluates and mitigates the hazards and risks within building services engineering, using appropriate risk assessment methods (K11, S9)</p>	<p>Evaluates different management techniques used for various types of projects (K13, S11)</p> <p>Evaluates the impact of health and safety legislation, how it has benefitted through changes in legislation within building services engineering (K10, S8, B1)</p>
Roles, responsibilities and engagement with others K16 K17 K18 S14 B3 B5	<p>Describes the roles and responsibilities commonly found in a building services engineering organisation, and the methods for performance evaluation (K16)</p> <p>Explains how they monitor and manage their own performance at work, and how this impacts others in their team.</p> <p>Describes the importance of equality, diversity and inclusion, how it supports fairness at work, and impacts building services engineering solutions (K18, S14, B3)</p> <p>Describes the key stakeholders in building services engineering, the importance of communication, collaboration and decision-making processes to achieve contractual requirements and project success (K17, B5)</p>	<p>Evaluates the success of teams by considering individual and group working practices (K16, S14, B3)</p>
Personal and professional practice K19 K20 S16 S17 B6	<p>Describes the methods for developing (IPD) and maintaining (CPD) professional competence and technical knowledge, and explains how they plan, undertake, review and improve their own professional competence, and supports others when requested (K20, S17, B6)</p> <p>Explains how they apply ethical principles to building services engineering projects, including the secure use of data and information (K19, S16)</p>	<p>Discusses how they use their own performance to inform and improve their own or others' practices (K19, S17, B6)</p>

Overall EPA grading

The EPA methods contribute equally to the overall EPA grade.

Performance in the EPA will determine the apprenticeship grade of:

- fail
- pass
- distinction

Independent assessors must individually grade the: technical project report and presentation with questioning and professional discussion underpinned by a portfolio according to the requirements set out in this EPA plan.

EPAOs must combine the individual assessment method grades to determine the overall EPA grade.

Apprentices who fail one or more assessment method will be awarded an overall EPA fail.

Apprentices must achieve at least a pass in all the EPA methods to get an overall pass. In order to achieve an overall EPA 'distinction', apprentices must achieve a distinction in both assessment methods.

Grades from individual assessment methods should be combined in the following way to determine the grade of the EPA as a whole.

TECHNICAL PROJECT REPORT AND PRESENTATION WITH QUESTIONING	PROFESSIONAL DISCUSSION UNDERPINNED BY A PORTFOLIO	OVERALL GRADING
Fail	Any grade	Fail
Any grade	Fail	Fail
Pass	Pass	Pass
Pass	Distinction	Pass
Distinction	Pass	Pass
Distinction	Distinction	Distinction

Re-sits and re-takes

Apprentices who fail one or more EPA method(s) can take a re-sit or a re-take at the employer's discretion. The apprentice's employer needs to agree that a re-sit or re-take is appropriate. A re-sit does not need further learning, whereas a re-take does.

Apprentices should have a supportive action plan to prepare for a re-sit or a re-take.

The employer and EPAO agree the timescale for a re-sit or re-take. A re-sit is typically taken within 4 months of the EPA outcome notification. The timescale for a re-take is dependent on how much re-training is required and is typically taken within 6 months of the EPA outcome notification.

Failed EPA methods must be re-sat or re-taken within a 6-month period from the EPA outcome notification, otherwise the entire EPA will need to be re-sat or re-taken in full.

Re-sits and re-takes are not offered to apprentices wishing to move from pass to a higher grade.

An apprentice will get a maximum EPA grade of pass for a re-sit or re-take, unless the EPAO determines there are exceptional circumstances.

Roles and responsibilities

ROLES	RESPONSIBILITIES
Apprentice	<p>As a minimum, apprentices should:</p> <ul style="list-style-type: none"> • participate in and complete on-programme training to meet the KSBs as outlined in the occupational standard for a minimum of 12 months • undertake 20% off-the-job training as arranged by the employer and training provider • understand the purpose and importance of EPA • undertake the EPA including meeting all gateway requirements
Employer	<p>As a minimum, employers must:</p> <ul style="list-style-type: none"> • select the EPAO and training provider • work with the training provider (where applicable) to support the apprentice in the workplace and to provide the opportunities for the apprentice to develop the KSBs • arrange and support a minimum of 20% off-the-job training to be undertaken by the apprentice • decide when the apprentice is working at or above the level required by the occupational standard and so is ready for EPA • ensure that all supporting evidence required at the gateway is submitted in accordance with this EPA plan • remain independent from the delivery of the EPA • confirm arrangements with the EPAO for the EPA (who, when, where) in a timely manner (including providing access to any employer-specific documentation as required, for example company policies) • ensure that the EPA is scheduled with the EPAO for a date and time which allows appropriate opportunity for the apprentice to meet the KSBs • ensure the apprentice is well prepared for the EPA • require the training provider and EPAO to ensure the EPA is booked in a timely manner <p>Post-gateway, employers must:</p> <ul style="list-style-type: none"> • confirm arrangements with the EPAO for the EPA (who, when, where) in a timely manner (including providing access to any employer-specific documentation as required, for example company policies) • ensure that the EPA is scheduled with the EPAO for a date and time which allows appropriate opportunity for the KSBs to be met • remain independent from the delivery of the EPA • ensure the apprentice is given sufficient time away from regular duties to prepare for, and complete all post-gateway elements of the EPA, and that any required supervision during this time (as stated within this EPA plan) is in place • where the apprentice is assessed in the workplace, ensure that the apprentice has access to the resources used on a daily basis • pass the certificate to the apprentice upon receipt from the EPAO
EPAO	<p>As a minimum, EPAOs must:</p> <ul style="list-style-type: none"> • conform to the requirements of this EPA plan and deliver its requirements in a timely manner • conform to the requirements of the Register of End-Point Assessment Organisations (RoEPAO) • conform to the requirements of the external quality assurance provider (EQAP) for this apprenticeship standard • understand the occupational standard • make all necessary contractual arrangements, including agreeing the price of the EPA • develop and produce assessment materials including specifications and marking materials (for example mark schemes, practice materials, training material) • appoint suitably qualified and competent independent assessors and oversee their working • appoint administrators (and invigilators where required) to administer the EPA as appropriate • provide training for independent assessors in terms of good assessment practice, operating the assessment tools and grading • provide adequate information, advice and guidance documentation to enable apprentices, employers and training providers to prepare for the EPA

	<ul style="list-style-type: none"> • arrange for the EPA to take place, in consultation with the employer • where the apprentice is not assessed in the workplace, ensure that the apprentice has access to the required resources and liaise with the employer to agree this if necessary • develop and provide appropriate assessment recording documentation to ensure a clear and auditable process is in place for providing assessment decisions and feedback to all relevant stakeholders • have no direct connection with the apprentice, their employer or training provider. In all instances, including when the EPAO is the training provider (i.e. HEI), there must be no conflict of interest • have policies and procedures for internal quality assurance (IQA), and maintain records of regular and robust IQA activity and moderation for external quality assurance (EQA) purposes • deliver induction training for independent assessors, and for invigilators and/or markers (where used) • undertake standardisation activity on this apprenticeship standard for all independent assessors before they conduct an EPA for the first time, if the EPA is updated and periodically as appropriate (a minimum of annually) • manage invigilation of apprentices in order to maintain security of the assessment in line with the EPAO's malpractice policy • verify the identity of the apprentice being assessed • use language in the development and delivery of the EPA that is appropriate to the level of the occupational standard <p>Pre-gateway, EPAOs must:</p> <ul style="list-style-type: none"> • make all necessary contractual arrangements, including agreeing the price of the EPA • provide adequate information, advice and guidance documentation to enable apprentices, employers and training providers to prepare for the EPA • arrange for the EPA to take place, in consultation with the employer. <p>At the Gateway, EPAOs must:</p> <ul style="list-style-type: none"> • confirm all gateway requirements have been met as quickly as possible. <p>Post-gateway, EPAOs must:</p> <ul style="list-style-type: none"> • where the apprentice is not assessed in the workplace, ensure that the apprentice has access to the required resources and liaise with the employer to agree this if necessary
Independent assessor	<p>As a minimum, independent assessors must:</p> <ul style="list-style-type: none"> • have the competence to assess the apprentice at this level and hold any required qualifications and experience in line with the requirements of the independent assessor as detailed in the IQA section of this EPA plan • understand the occupational standard and the requirements of this EPA • have, maintain and be able to evidence, up-to-date knowledge and expertise of the subject matter • deliver the end-point assessment in-line with the EPA plan • comply with the IQA requirements of the EPAO • have no direct connection or conflict of interest with the apprentice, their employer or training provider; in all instances, including when the EPAO is the training provider (i.e. HEI) • attend induction training • attend standardisation events when they begin working for the EPAO, before they conduct an EPA for the first time and a minimum of annually on this apprenticeship standard • assess each assessment method, as determined by the EPA plan, and without extending the EPA unnecessarily • assess against the KSBs assigned to each assessment method, as shown in the mapping of assessment methods and as determined by the EPAO, and without extending the EPA unnecessarily • make all grading decisions • record and report all assessment outcome decisions, for each apprentice, following instructions and using assessment recording documentation provided by the EPAO, in a timely manner • use language in the development and delivery of the EPA that is appropriate to the level of the occupational standard • mark open (constructed) test answers accurately according to the EPAO's mark scheme and procedures
Training provider	<p>As a minimum, training providers should:</p> <ul style="list-style-type: none"> • work with the employer and support the apprentice during the off-the-job training to provide the opportunities to develop the knowledge, skills and behaviours as listed in the occupational standard

- conduct training covering any knowledge, skill or behaviour requirement agreed as part of the Commitment Statement (often known as the Individual Learning Plan)
- monitor the apprentice's progress during any training provider led on-programme learning
- advise the employer, upon request, on the apprentice's readiness for EPA
- remain independent from the delivery of the EPA. Where the training provider is the EPAO (i.e. a HEI), there must be procures in place to mitigate against any conflict of interest.

Reasonable adjustments

The EPAO must have reasonable adjustments arrangements for the EPA.

This should include:

- how an apprentice qualifies for reasonable adjustment
- what reasonable adjustments may be made

Adjustments must maintain the validity, reliability and integrity of the EPA as outlined in this EPA plan.

Internal quality assurance

Internal quality assurance refers to how EPAOs ensure valid, consistent and reliable EPA decisions. EPAOs must adhere to the requirements within the roles and responsibilities section and:

- have effective and rigorous quality assurance systems and procedures that ensure fair, reliable and consistent EPA regardless of employer, place, time or independent assessor
- appoint independent assessors who are competent to deliver the EPA and who:
 - have recent relevant experience of the occupation or sector to at least occupational level 4 gained in the last 2 years or significant experience of the occupation or sector
 - hold, or are working towards, an assessor qualification
 - have professional body membership with:

The Engineering Council, and registered with a relevant professional engineering institution (PEI)

- meet the following minimum requirements:
 - be professionally active and maintain their cpd record annually
 - complete an epao induction to demonstrate working knowledge of the apprenticeship standard and assessment methodology
- operate induction training for anyone involved in the delivery and/or assessment of the EPA
- provide training for independent assessors in good assessment practice, operating the assessment tools and making grading decisions
- provide ongoing training for markers and invigilators
- provide standardisation activity for this apprenticeship standard for all independent assessors:
 - before they conduct an EPA for the first time
 - if the EPA is updated
 - periodically as appropriate (a minimum of annually)
- conduct effective moderation of EPA decisions and grades
- conduct appeals where required, according to the EPAO's appeals procedure, reviewing and making final decisions on EPA decisions and grades
- have no direct connection with the apprentice, their employer or training provider. In all instances, including when the EPAO is the training provider (for example a higher education institution)

Value for money

Affordability of the EPA will be aided by using at least some of the following:

- utilising digital remote platforms to conduct applicable assessment methods
- using the employer's premises
- conducting assessment methods on the same day

Professional recognition

This apprenticeship standard is designed to prepare successful apprentices to meet the requirements for registration as a:

Engineering Council (EngTech) for level 4

KSB mapping table

KNOWLEDGE	ASSESSMENT METHODS
K1 Engineering principles, underpinned by relevant scientific, theoretical and technical knowledge and understanding to solve well-defined building services engineering problems	Technical project report and presentation with questioning
K2 Building services engineering techniques, procedures and methods used for building services engineering systems, to either measure and test, design, install, commission, maintain or operate	Technical project report and presentation with questioning
K3 Advanced mathematical, statistical and analytical problem-solving tools	Technical project report and presentation with questioning
K4 Properties of, and selection criteria for materials, components or parts used in building services solutions	Technical project report and presentation with questioning
K5 Techniques and methods to collect data and technical information for analysis and evaluation	Technical project report and presentation with questioning
K6 Design principles and control processes used in the building services engineering consultancy, construction or manufacturing process, and the common constraints faced	Professional discussion underpinned by a portfolio
K7 Technical drawings, designs, and models, using analytical and computer-based software packages	Professional discussion underpinned by a portfolio
K8 Uses and limitations of computational and digital models, including Building Information Modelling (BIM)	Professional discussion underpinned by a portfolio
K9 Industry policies, standards, regulations and legislation, and codes of practice, including Building Safety legislation or BSI Flex 8670	Technical project report and presentation with questioning
K10 Statutory health, safety and welfare policies, procedures, and regulations including Construction (Design and Management) (CDM)	Professional discussion underpinned by a portfolio
K11 Risk assessment and mitigation processes, and their importance in the building services environment	Professional discussion underpinned by a portfolio
K12 Principles of sustainable development and their impact on the lifecycle of building services engineering solutions, including United Nations Sustainable Development Goals (UNSDG), net-zero carbon emissions, environmental policies and legislations, and the climate change act	Technical project report and presentation with questioning
K13 Project management techniques, including quality and information management and assurance systems and continuous improvement processes	Professional discussion underpinned by a portfolio
K14 Methods for planning and resourcing building services engineering tasks, and the impact on cost, quality, safety, security, and environment	Technical project report and presentation with questioning
K15 Methods of communication and when to use them, using appropriate engineering terminology and conventions	Technical project report and presentation with questioning
K16 Roles and responsibilities within the organisation, team dynamics and their own boundaries of authority	Professional discussion underpinned by a portfolio

K17 Relationships between key organisations in the building services engineering sector (for example organisations, customers, partners and suppliers)	Professional discussion underpinned by a portfolio
K18 Equality, diversity and inclusion, its importance and impact on building services engineering solutions	Professional discussion underpinned by a portfolio
K19 Ethical principles as applied to building services engineering including the need for security of data and information	Professional discussion underpinned by a portfolio
K20 Methods to maintain professional competence and technical knowledge including initial professional development (IPD) and continuing professional development (CPD)	Professional discussion underpinned by a portfolio

SKILL	ASSESSMENT METHODS
S1 Apply engineering principles, using relevant scientific, theoretical and technical know-how to solve well-defined building services engineering problems	Technical project report and presentation with questioning
S2 Apply building services engineering techniques, procedures and methods, and review the results, when measuring and testing, designing, installing, commissioning, maintaining or operating building services engineering systems	Technical project report and presentation with questioning
S3 Employ a range of advanced mathematical, statistical and data interpretation tools, using analytical and computational methods to interpret and solve well-defined building services engineering problems	Technical project report and presentation with questioning
S4 Interpret and compare performance information to choose compliant materials, components or parts	Technical project report and presentation with questioning
S5 Select and use technical literature and other sources of information and data to address well-defined building services engineering problems	Technical project report and presentation with questioning
S6 Produce and interpret building services engineering technical drawings, designs, and models, using analytical and computer-based software packages, recognising the limitations of the software used	Professional discussion underpinned by a portfolio
S7 Produce building services engineering technical solutions in accordance with relevant industry standards, procedures, codes of practice, regulations, and legislation	Technical project report and presentation with questioning
S8 Comply with, and encourage others to demonstrate, statutory health, safety and welfare policies, procedures and regulation	Professional discussion underpinned by a portfolio
S9 Complete risk assessments to identify, evaluate and mitigate risks	Professional discussion underpinned by a portfolio
S10 Apply principles of sustainable development, and assess the impact of these in their work	Technical project report and presentation with questioning
S11 Employ project management techniques, measuring and recording progress against building services engineering project plans	Professional discussion underpinned by a portfolio
S12 Assess and report on quality using appropriate management and assurance systems and continuous improvement processes	Professional discussion underpinned by a portfolio
S13 Identify and use resources, equipment and technology to meet project requirements, including specifications, budget and timescales	Technical project report and presentation with questioning
S14 Monitor and manage individual performance, and supervise others, recognising the need to comply with appropriate codes of practice and equality, diversity & inclusion (EDI) requirements	Professional discussion underpinned by a portfolio
S15 Communicate using appropriate methods for the audience, using appropriate engineering terminology and conventions	Technical project report and presentation with questioning

S16 Apply ethical principles to building services engineering projects, including the secure use of data and information	Professional discussion underpinned by a portfolio
S17 Plan, undertake and review their own professional competence, updating and reviewing their CPD to improve performance	Professional discussion underpinned by a portfolio
BEHAVIOUR	ASSESSMENT METHODS
B1 Works to health, safety and welfare requirements, industry standards, statutory regulation and legislation, policies, and codes of practice, and ensuring others do likewise	Professional discussion underpinned by a portfolio
B2 Makes independent decisions when delivering building services engineering projects, whilst knowing their own limitations and when to ask for help or to escalate	Technical project report and presentation with questioning
B3 Works individually and as part of a team, being aware of their actions and the impact they may have on others, and demonstrating awareness of diversity and inclusion issues so as to meet the requirement of fairness at work	Professional discussion underpinned by a portfolio
B4 Solves problems with attention to detail, accuracy, and diligence, and seeks to continually improve	Technical project report and presentation with questioning
B5 Maintains professional and ethical working relationships with internal, external, and other stakeholders	Professional discussion underpinned by a portfolio
B6 Takes responsibility for their own professional development, seeking opportunities to enhance their knowledge, skills, and experience, and support others when requested	Professional discussion underpinned by a portfolio

Mapping of KSBs to grade themes

Technical project report and presentation with questioning

KSBS GROUPED BY THEME	KNOWLEDGE	SKILLS	BEHAVIOUR
Building services engineering technical knowledge and techniques K1 K2 S1 S2	Engineering principles, underpinned by relevant scientific, theoretical and technical knowledge and understanding to solve well-defined building services engineering problems (K1) Building services engineering techniques, procedures and methods used for building services engineering systems, to either measure and test, design, install, commission, maintain or operate (K2)	Apply engineering principles, using relevant scientific, theoretical and technical know-how to solve well-defined building services engineering problems (S1) Apply building services engineering techniques, procedures and methods, and review the results, when measuring and testing, designing, installing, commissioning, maintaining or operating building services engineering systems (S2)	None
Data collection, analysis and evaluation K3 K5 S3 S5 B4	Advanced mathematical, statistical and analytical problem-solving tools (K3) Techniques and methods to collect data and technical information for analysis and evaluation (K5)	Employ a range of advanced mathematical, statistical and data interpretation tools, using analytical and computational methods to interpret and solve well-defined building services engineering problems (S3) Select and use technical literature and other sources of information and data to address well-defined building services engineering problems (S5)	Solves problems with attention to detail, accuracy, and diligence, and seeks to continually improve (B4)
Use of resources and materials K4 K14 S4 S13 B2	Properties of, and selection criteria for materials, components or parts used in building services solutions (K4) Methods for planning and resourcing building services engineering tasks, and the impact on cost, quality, safety, security, and environment (K14)	Interpret and compare performance information to choose compliant materials, components or parts (S4) Identify and use resources, equipment and technology to meet project requirements, including specifications, budget and timescales (S13)	Makes independent decisions when delivering building services engineering projects, whilst knowing their own limitations and when to ask for help or to escalate (B2)
Industry standards, policies and regulatory requirements K9 K12 S7 S10	Industry policies, standards, regulations and legislation, and codes of practice, including Building Safety legislation or BSI Flex 8670 (K9) Principles of sustainable development and their impact on the lifecycle of building services engineering solutions, including United Nations Sustainable Development Goals (UNSDG), net-zero carbon emissions, environmental policies and legislations, and the climate change act (K12)	Produce building services engineering technical solutions in accordance with relevant industry standards, procedures, codes of practice, regulations, and legislation (S7) Apply principles of sustainable development, and assess the impact of these in their work (S10)	None
Communication K15 S15	Methods of communication and when to use them, using appropriate engineering terminology and conventions (K15)	Communicate using appropriate methods for the audience, using appropriate engineering terminology and conventions (S15)	None

Professional discussion underpinned by a portfolio

KSBS GROUPED BY THEME	KNOWLEDGE	SKILLS	BEHAVIOUR
Design, technology and models in building services engineering information K6 K7 K8 S6	Design principles and control processes used in the building services engineering consultancy, construction or manufacturing process, and the common constraints faced (K6) Technical drawings, designs, and models, using analytical and computer-based software packages (K7) Uses and limitations of computational and digital models, including Building Information Modelling (BIM) (K8)	Produce and interpret building services engineering technical drawings, designs, and models, using analytical and computer-based software packages, recognising the limitations of the software used (S6)	None
Project management and safe systems of work K10 K11 K13 S8 S9 S11 S12 B1	Statutory health, safety and welfare policies, procedures, and regulations including Construction (Design and Management) (CDM) (K10) Risk assessment and mitigation processes, and their importance in the building services environment (K11) Project management techniques, including quality and information management and assurance systems and continuous improvement processes (K13)	Comply with, and encourage others to demonstrate, statutory health, safety and welfare policies, procedures and regulation (S8) Complete risk assessments to identify, evaluate and mitigate risks (S9) Employ project management techniques, measuring and recording progress against building services engineering project plans (S11) Assess and report on quality using appropriate management and assurance systems and continuous improvement processes (S12)	Works to health, safety and welfare requirements, industry standards, statutory regulation and legislation, policies, and codes of practice, and ensuring others do likewise (B1)
Roles, responsibilities and engagement with others K16 K17 K18 S14 B3 B5	Roles and responsibilities within the organisation, team dynamics and their own boundaries of authority (K16) Relationships between key organisations in the building services engineering sector (for example organisations, customers, partners and suppliers) (K17) Equality, diversity and inclusion, its importance and impact on building services engineering solutions (K18)	Monitor and manage individual performance, and supervise others, recognising the need to comply with appropriate codes of practice and equality, diversity & inclusion (EDI) requirements (S14)	Works individually and as part of a team, being aware of their actions and the impact they may have on others, and demonstrating awareness of diversity and inclusion issues so as to meet the requirement of fairness at work (B3) Maintains professional and ethical working relationships with internal, external, and other stakeholders (B5)
Personal and professional practice K19 K20 S16 S17 B6	Ethical principles as applied to building services engineering including the need for security of data and information (K19) Methods to maintain professional competence and technical knowledge including initial professional development (IPD) and continuing professional development (CPD) (K20)	Apply ethical principles to building services engineering projects, including the secure use of data and information (S16) Plan, undertake and review their own professional competence, updating and reviewing their CPD to improve performance (S17)	Takes responsibility for their own professional development, seeking opportunities to enhance their knowledge, skills, and experience, and support others when requested (B6)

Version log

Version	Change detail	Earliest start date	Latest start date	Latest end date
1.2	Occupational standard and end-point assessment plan revised.	03/04/2024	Not set	Not set
1.1	Standard, funding band and end-point assessment plan revised	01/07/2022	02/04/2024	Not set
1.0	Approved for delivery	08/05/2018	30/06/2022	Not set

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