

## **ASSESSMENT PLAN FOR BUILDING SERVICES ENGINEERING SITE MANAGEMENT NON-INTEGRATED DEGREE APPRENTICESHIP LEVEL 6**

### **Summary of Assessment**

The Level 6 Building Services Engineering Site Management Standard is designed to create highly skilled employees who can contribute to the success of complex construction projects by demonstrating skills, knowledge and behaviours in key aspects of the management of the installation of mechanical and electrical services in buildings, as well as contributing to wider project objectives.

Building Services Engineering Site Managers will be working on construction sites managing the installation of building services and are responsible for ensuring that sites are managed safely and in a way that leads to the construction being achieved on time, to budget and in line with the client's quality expectations. There will also be some liaison with third parties such as design teams, clients and statutory authorities.

Successful completion of the Apprenticeship Standard demonstrates that the apprentice has the skills, knowledge and behaviours to work competently as a Building Services Engineering Site Manager.

This assessment plan ensures that successful candidates will have satisfied the requirements for registration as an Incorporated Engineer with the relevant Professional Engineering Institution (PEI) as the first step in their career as an engineer. Incorporated Engineer (IEng) is an internationally recognised benchmark of competence.

The duration of the apprenticeship will typically be three to four years for new entrants. The End-point Assessment (EPA) will be in two stages and typically undertaken in the last three months of the apprenticeship:

The EPA consist of two distinct methods: A presentation and a structured interview. There are two stages to the EPA – a preparation stage and a face to face stage.

**Stage 1 – is the preparation for the presentation and structured interview.** It will consist of:

- **Research Assignment** which will test the apprentice's ability to integrate the knowledge, skills and behaviours acquired during the apprenticeship through a response to a research assignment set by the assessment organisation, which is approved by the relevant PEI.
- **Engineering Practice Report** of 4,500 – 5000 words which demonstrates how, in the course of their apprenticeship, the apprentice has integrated the knowledge, skills and behaviours set out in the standard, through references to the contribution they have made to the design, management and delivery of projects. The report is verified by a professionally qualified engineer and will be used to inform the structured interview. It

will be submitted electronically to the assessment organisation at least four weeks ahead of the date of the EPA.

**Stage 2 – is the face to face stage which will consist of:**

- A 15-20 minute **presentation** by the apprentice to the Assessor Panel showcasing the findings of their research assignment, which will be supported by ‘hard copy’ such as slides and information such as drawings, spreadsheets. This will be followed by 15-20 minutes of questions and discussion. The presentation and questions following this, together with the ‘hard copy’, will both be marked.
- A 40-50 minute **structured interview** based on the Engineering Practice Report submitted prior to the interview, the purpose being to determine the apprentice’s ability to integrate the knowledge, skills and behaviours acquired during the apprenticeship. The Engineering Practice Report will not be marked.

To be successful the apprentice must pass the Presentation and Structured Interview. The presentation is supported by a research assignment which will be graded as part of this assessment method. The structured interview is informed by an Engineering Practice Report, which will not be marked as part of this assessment method. The assessment will satisfy the requirements for registration as an Incorporated Engineer by the Engineering Council. The Assessor Panel will consist of two experienced, qualified and trained Building Services Engineers nominated by the relevant End point assessment (EPA) organisation. Benchmarking the EPA against the Engineering Council UK-SPEC requirements for IEng means that the assessment outcomes will be consistent and reliable, allowing a fair and proper comparison between apprentices employed across the UK in different types and sizes of organisations.

The standard not only prepares apprentices for key job roles but also provides them with the foundation to be able to move on to the further academic learning and experience required to become a Chartered Engineer (CEng).

Suggested Structure

Timescale	Knowledge	Skills	Behaviours	Notes
Months 0-41	<b>On-programme assessment</b>			Supervised and assessed by training provider and employer
	<p style="text-align: center;">Apprentice follows appropriate, BEng (Hons) or BSc (Hons) Building Services Engineering Degree approved by PEI</p> <p style="text-align: center;">Works towards industry certificates in Site Safety Plus Site Managers’ Safety Training Scheme and Site Environmental Awareness Training Scheme</p>			

	Apprentice gains experience in workplace and records achievement on line or in paper form	
Month 42	<p style="text-align: center;"><b>Employer-led Gateway</b></p> <p>Satisfactory completion of BEng (Hons) or BSc (Hons) Building Services Engineering Degree</p> <p>Satisfactory completion of industry certificates in Site Safety Plus Site Managers' Safety Training Scheme and Site Environmental Awareness Training Scheme</p> <p>Satisfactory evidence of knowledge, skills and behaviours</p> <p>Achieved Level 2 standard in Maths and English</p> <p>Progression to EPA decided by employer with the support of training provider</p>	
Months 43-45	<p style="text-align: center;"><b>End-point Assessment</b></p> <p>Presentation based on response to research assignment. Pass/Fail</p> <p>Structured interview informed by an Engineering Practice Report. Pass/Fail</p> <p>Pass or Fail – Pass satisfies the requirements for registration as an Incorporated Engineer</p>	Assessed by qualified engineers appointed by the assessment organisation

### Assessment Overview (EPA)

Assessment Method	Area Assessed	Assessed by	Grading
Presentation based on response to research assignment	Knowledge, skills and behaviours from across the Standard. Details for each method can be found in Annex A.	Assessor Panel appointed by the relevant assessment organisation	Pass/Fail
Structured interview informed by an Engineering Practice Report			Pass/Fail

## Process Summary

Gateway	<p>Satisfactory completion of knowledge, skills and behaviours as set out in the apprenticeship standard</p> <p>Achieved a level 2 qualification in Maths and English</p> <p>Achieved the BEng (Hons) or BSc (Hons) Building Services Engineering Degree as specified in the standard</p> <p>Satisfactory completion of industry certificates in Site Safety Plus Site Managers' Safety Training Scheme and Site Environmental Awareness Training Scheme</p> <p>Employer confirmation and request for EPA</p>
Research assignment (to support the Presentation assessment method)	<p>End point assessment organisation issues the research assignment</p> <p>Apprentice responds to the research assignment and prepares to deliver a presentation on this. The presentation is the first assessment method.</p>
Engineering Practice Report (to support the Structured Interview assessment method)	<p>Apprentice completes an Engineering Practice Report of 4500-5000 words which demonstrates how, in the course of their apprenticeship, they integrated the knowledge, skills and behaviours needed to be a competent Building Services Site Manager. This report is verified by a professionally qualified engineer, submitted by the apprentice and will be used to inform the areas to be explored in the structured interview. The Structured Interview is the second assessment method.</p>
Review of Engineering Practice report	<p>Two trained and qualified assessors review the Engineering Practice Report and assess it against all of the knowledge, skills and behaviours listed in the apprenticeship standard and agree areas that need to be explored further as part of the interview. The interview questions will focus on 4 main areas in the context of the occupational specialism demonstrated in the Engineering Practice Report. The Engineering Practice Report is not marked. This is in line with Engineering Council requirements.</p>
Presentation (informed by the research assignment).	<p>Apprentice makes a 15-20 minute presentation to the Assessor Panel on their response to the research assignment, followed by 15-20 minutes of questions and discussion about the presentation.. The presentation and questions following this, together with the 'hard copy', will be marked.</p>
Structured Interview (informed by the	<p>This is followed by a 40-50 minute interview informed by the Engineering Practice Report. The purpose of the interview is for the Assessor Panel to be confident that the apprentice has acquired and can use all the knowledge,</p>

Engineering Practice Report).	skills and behaviours needed to be a competent Building Services Engineering Site Manager.
Decision	The Assessor Panel submits the completed documentation provided by the End-point Assessment organisation, along with a recommendation as to whether or not the apprentice has successfully passed the EPA and satisfied the requirements for registration as an Incorporated Engineer to the relevant PEI.

### **On-programme Assessment**

The apprentice will demonstrate their progress through achievement of a BEng (Hons) or BSc (Hons) Building Services Engineering Degree and industry certificates in Site Safety Plus Site Managers' Safety Training Scheme and Site Environmental Awareness Training Scheme as specified in the Standard. The maintenance of an online or paper-based portfolio of evidence which demonstrates how the apprentice has met each of the Knowledge, Skills and Behaviours statements in the Standard is recommended. It is recommended that these should be supervised by in-company mentors and training providers and tested by external assessors and verifiers.

### **Assessment Gateway**

Readiness for the End-point Assessment will be decided by the employer in consultation with the training provider.

The apprentice will need to demonstrate satisfactory completion of all aspects of their apprenticeship before they are able to undertake the EPA, including having achieved Level 2 Maths and English. Specifically, they must have:

1. Achieved the BEng (Hons) or BSc (Hons) Building Services Engineering Degree and industry certificates in Site Safety Plus Site Managers' Safety Training Scheme and Site Environmental Awareness Training Scheme, as specified in the standard. The precise requirements for this are outlined in the Employer Occupational Brief (which will be published at [www.goconstruct.org](http://www.goconstruct.org)). Proof of achievement of the appropriate qualification may be evidenced by a certificate.
2. Gained the experience required to be recommended for the EPA by demonstrating all the knowledge, skills and behaviours in the Standard to the employer's satisfaction.
3. Passed English and Maths at Level 2.

This will enable the apprentice to be recommended for the End-point Assessment by their employer. It is recommended that the employer recommendation is a senior manager responsible for apprentices or a Director, depending on the size of the company and its structure.

## **End-point Assessment**

### **What will be assessed?**

The apprentice will be expected to demonstrate through a presentation setting out the findings of their research assignment and a structured interview informed by an Engineering Practice Report, that they have acquired the knowledge, skills and behaviours as described by the statements in the Standard and can, through their integration, competently undertake the role of a Building Services Engineering Site Manager. See Annex A for a mapping of the Standard against the assessment methods.

### **How will it be assessed?**

The assessment organisation will ensure their assessment process is aligned to the Engineering Council Incorporated Engineer review process.

Throughout the End Point Assessment the apprentice will need to include how they have, or would, use Building Information Modelling (BIM) to access and work with data.

The assessment will be in two stages:

**STAGE 1 – is the pre-work necessary to prepare for the presentation and interview.** Completing the research assignment and Engineering Practice Report will take 8 weeks in total.

### **Research Assignment**

The assessment organisation will provide the apprentice with a research assignment which will be assessed as part of the presentation. The apprentice will make a 15-20 minute presentation to the Assessor Panel on their response to the research assignment, which will be supported by 'hard copy' such as slides and information such as drawings, spreadsheets. The presentation and questions following this, together with the 'hard copy', will be marked.

The purpose of the brief is to set the apprentice a task which will assess their ability to integrate a range of knowledge, skills and understanding they have acquired during their apprenticeship. For detail on areas covered see Annex A.

A bank of research assignments will be developed and maintained securely by the assessment organisation (using the expertise of the members of the assessment organisation's register of assessors). The bank will be reviewed and refreshed every two years to ensure alignment with technical and legislative updates. Each research assignment will comply with the knowledge, skills and behaviours in the standard and meet the demand for consistent content, depth and breadth.

## Criteria for the Research Assignment

The bank of research assignments will need to cover the range of building services engineering specialisms and employment sectors that apprentices may be employed in. Each research assignment brief will be a maximum of 500 words and designed to take 30-40 hours to complete.

Generically the research assignment will involve research and analysis associated with improving the design, performance and/or delivery of building services systems and components and the preparation of material for the presentation.

The research assignment will ask the apprentice to

- Research and report on an improvement or innovation that will impact on the design and/or delivery of building services systems or components.
- Discuss the advantages and disadvantages of the chosen improvement or innovation paying particular attention to its impact on sustainability (e.g. energy usage, waste management, whole-life costing)
- Consider what changes need to occur to make the chosen improvement or innovation a reality. This will include critically examining the role of the design authority, asset owner, asset manager and supply chain in encouraging or impeding the deployment of the improvement or innovation.
- Make an informed prediction as to what will happen justifying their prediction with evidence from the market.

**Engineering Practice Report (4500-5000 words)** – the apprentice will submit a reflective account which should clearly demonstrate the achievement of knowledge, skills and behaviours as set out in the standard at a level of responsibility commensurate with that of an Incorporated Engineer. The apprentice will have 8 weeks to complete the report.

The Report should review the apprentice's career and experiences to date including

- A general overview of the type of work and training undertaken
- A table setting out the different projects described later in the body of the Report. The number of projects referred to is dependent on the requirement to demonstrate achievement of the full range of knowledge, skills and behaviours as set out in the Standard. It could be one long-term project or a number of shorter term projects.
- A summary of key features of each project chosen – client, scope, value and dates
- A demonstration as to how the experience gained in each project is linked to the achievement of the knowledge, skills and behaviours listed in the standard; the apprentices role and insight into the important decisions they were responsible for or made a significant contribution to. The examples must demonstrate where they have exercised independent judgment – as an engineer and a practicing professional

A registered member of a Professional Engineering Institution (IEng or CEng) who works with the apprentice will sign to verify that the work described in the Engineering Practice Report has been carried out by the apprentice.

The Engineering Practice Report will be submitted electronically to the assessment organisation who will pass it on to the Assessor Panel at least four weeks ahead of the date of the interview.

Two trained and qualified assessors will review the Engineering Practice Report against the knowledge, skills and behaviours listed in the apprenticeship standard, record their findings against the relevant knowledge, skills and behaviours and agree areas that need to be explored further as part of the interview. The Engineering Practice Report will not be marked.

**STAGE 2 – is the Presentation and Structured Interview.** It is anticipated that the time from submission of the written report to interview will be at least 4 weeks.

The Assessor Panel of two qualified and trained and independent assessors will assess both elements of the End Point Assessment.

**Presentation** - The apprentice will give a 15-20 minute slide presentation showcasing the findings of their research assignment. The Assessor Panel will be made aware of the subject of the research assignment three weeks in advance of the presentation. The presentation will be supported by 'hard copy' which should include a copy of the slides and information such as drawings, spreadsheets. There should be a maximum of 20 slides and 20 pieces of information. The apprentice will have prepared the 'hard copy' beforehand and it will be made available at the start of the presentation. The presentation will be followed by 15-20 minutes of questions and discussion. The presentation and discussion, together with the 'hard copy' will be marked on the documentation provided by the End-point Assessment organisation, according to the grading criteria set out in this Assessment Plan and awarded a mark of Pass or Fail.

**Structured Interview** This is then followed by a 40-50 minute structured interview with members of the Assessor Panel. The purpose of the discussion is so that the Assessor Panel members can assure themselves that the apprentice has the competence to work as a Building Services Design Engineer.

The questions should focus on 4 main areas in the context of the occupational specialism demonstrated in the Engineering practice report. At least two questions must be asked for each of the 4 areas.

- Technology and problem solving – questions about the range of factors affecting choice of engineering solutions, the implementation and evaluation of design solutions, choices of systems and components, health and safety, environmental impact and sustainability, whole life costing, the use of software tools in design and data collection.

- Management – questions about planning for effective project implementation, planning, budgeting and organisation, managing teams and developing staff, continuous improvement
- Communication – questions exploring examples of technical and non-technical presentations and reports, working as part of a team, presenting and discussing proposals.
- Commitment and ethics – questions about client confidentiality, the importance of safe systems of work, the need for sustainable solutions, professional development

The structured interview will be marked according to the grading criteria set out in this Assessment Plan and awarded a mark of Pass or Fail.

To achieve an overall pass for the End Point Assessment the apprentice must gain a pass grade for both the presentation and the structured interview.

The presentation and interview can be either face-to-face or remotely via a video link. It will be the same process whichever meeting style is used. The EPAO must ensure that the apprentice is not disadvantaged or advantaged if the video link option is chosen. The presentation and interview will both take place on the same day. These will be recorded for training and quality assurance purposes.

### **What will the Apprentice have to do?**

Prepare and present the findings of a research assignment including any handouts and/or slides

Submit an Engineering Practice Report on the knowledge, skills and behaviours acquired during the apprenticeship

Attend an interview

- Make a 15-20 minute presentation showcasing their findings of their research assignment, answer questions and take part in a discussion based on the presentation
- Take part in a 40-50 minute structured interview informed by their Engineering Practice Report

### **Where will the assessment take place?**

The interview and presentation will be set up by the assessment organisation in a suitable venue to minimise travel wherever possible by the Apprentice and the assessors. In exceptional circumstances, for example if the Apprentice is working in a remote location, the option of an interview by the use of video conference facilities may be used.

### **Who will carry out the assessment and who will be on the Register?**

The EPA will be carried out by an Assessor Panel of two assessors appointed by the relevant assessment organisation which has the ability to assess applicants as Building Services Engineering Site Managers and award the status of IEng.

Following receipt of the application for EPA the assessment organisation will check that all is in order and then select two assessors at least one of whom is matched to the Apprentice's area of specialism.

The assessment organisation will be on the Register of End Point Assessment Organisations (RoEPAO).

### **Minimum requirements for assessors**

The members of the Assessor Panel are required to be professionally qualified members of a PEI and must have been trained to carry out their role as assessors. Applicants must either be working in the industry or, if not currently working in the industry or recently retired (up to two years), will need to demonstrate that they have maintained links with the industry and current practices. Each application to become an assessor will be evaluated on its own merits. The evaluation process will consider all relevant factors such as a minimum of three years' industry experience, professionally qualified to at least IEng and having post-professional qualification experience. Once appointed, the assessor will undertake training as required by the assessment organisation and be subject to the assessment organisation's quality assurance process including maintaining and submitting CPD records on request. This training includes how to undertake assessments, marking standardisation, questioning techniques and observing interview and is a tried and tested process within the PEIs which are licensed by the Engineering Council, the UK regulatory body for the engineering profession.

### **How will the panel work and who will have the casting vote?**

The Assessor Panel will be appointed by the assessment organisation.

The Engineering Practice Report and evidence from the Gateway submitted by the Apprentice will be checked by the assessment organisation's staff to ensure that all is in order before they are passed on to the Assessor Panel members for them to study ahead of the interview. The Assessor Panel members will consider the documents, record their findings on the Assessment Form which lists the knowledge, skills and behaviours from the Standard, along with the grading criteria and agree between themselves on the areas to be covered in the interview. See Annex A for a mapping of the Standard against the assessment methods. The assessors will record their findings for both the presentation and the structured interview on the documentation provided by the End-point Assessment organisation. The assessors will mark each component as pass or fail, backing their decision from the evidence from the various elements of the EPA. To be successful the Apprentice must demonstrate that they have met all of the knowledge, skills and behaviours in the Standard and have obtained a pass grade for both the presentation and structured interview elements of the EPA.

The completed form with the Panel's recommendation will then be submitted to the assessment organisation for audit and approval.

If, after discussion, one or more of the assessors are of the opinion that the required standard has not been achieved then the outcome is a Fail.

### **End-point Assessment – final judgement**

The two assessors will make the final judgement on whether the Apprentice has passed the End-point Assessment. This will be subject to moderation as part of the end-point assessment organisation's internal quality assurance and the Apprentice will be notified within 6 weeks of attending the End Point Assessment. To be successful the apprentice must pass the Presentation and Structured Interview. If they pass then they will be able to apply to register as EngTech with no further assessment process

The relevant assessment organisation will be registered and listed on the Register of End Point Assessment Organisations (RoEPAO).

If the apprentice has been unsuccessful they will have to apply to resit/retake the End Point Assessment taking into account assessor feedback on areas where they did not demonstrate competence as evidenced in the completed documentation. A resit does not require further learning, whereas a re-take does.

If the apprentice does not pass the presentation, subject to the feedback they receive, they may have to undertake further work on the research assignment. If the apprentice passes the presentation element they only have to resit/retake the structured interview, which will involve resubmitting the Engineering Practice Report. Subject to the feedback they receive, they may have to undertake further work on the Engineering Practice report. The resit/retake must include a structured interview even if it was passed first time round.

The assessor feedback will be provided in writing at the same time as the apprentice is informed that they have failed the End Point Assessment. The feedback should provide guidance on what the apprentice failed on but not how to address it.

The resit/retake must be taken within 12 months of the original End Point Assessment

### **Independence**

#### **Who is providing the independent EPA?**

The assessment organisation will co-ordinate the entire EPA process and not be involved in any aspect of the delivery of the on-programme assessment and be independent of the employer. The assessment organisation must have systems in place to ensure that if assessors know the apprentice, or has links to the training provider or employer, they would not be able to take part in the assessment process.

#### **How is this deliverable for all employers?**

The interview will be set up by the assessment organisation in a suitable venue to minimise travel wherever possible by the Apprentice and the assessors. In exceptional circumstances, for example if the Apprentice is working in a remote location, the option of an interview by the use of video conference facilities may be used.

**End-point – Grading**

The table below outlines the scoring criteria that will be applied to each assessment method.

EPA method	Pass criteria	Fail criteria
<p>Presentation (based on findings of research assignment. The presentation and questions following this, together with the 'hard copy', will be marked)</p>	<p>Using Annex A provides evidence of knowledge, skills and behaviours required to:</p> <ul style="list-style-type: none"> <li>- Maintain and extend a sound theoretical approach to the application of technology in engineering practice (K1, K2, K3, S1, S2)</li> <li>- Use a sound evidence-based approach to problem-solving and contribute to continuous improvement (K2, K6, K10, S2, B2)</li> <li>- Identify, review and select techniques, procedures and methods to undertake engineering tasks (K1, K2, K12, S1, S2, S8, B2)</li> <li>- Contribute to the design and development of engineering solutions (K1, K2, K3, K11, S1, S2, B2)</li> <li>- Implement design solutions and contribute to their evaluation (K1, K3, K10, K12, S1, S2, S5, S8, B1, B2))</li> <li>- Plan for effective project implementation (K4, K5, K6, K8, K9, S3, S7, B1, B2)</li> <li>- Manage tasks, people and resources to plan and budget (K4, K5, K7, K8, K9, S3, S4, S7, B1)</li> <li>- Manage teams and develop staff to meet changing technical and managerial needs (K5, K8, K9, S3, S7, B1, B4)</li> <li>- Manage continuous quality improvement (K6, K12, S3, S8, B2)</li> <li>- Communicate in English with others at all levels (K8, S7, B1)</li> </ul>	<p>Fails to provide evidence to meet knowledge, skills and behaviours as required in Annex A for this assessment method</p>

	<ul style="list-style-type: none"> <li>- Present and discuss proposals (K8, S7)</li> <li>- Demonstrate personal and social skills (K8, S7)</li> <li>- Comply with relevant codes of conduct (K1, B3)</li> <li>- Manage and apply safe systems of work (K10, S5, B3)</li> <li>- Undertake engineering activities in a way that contributes to sustainable development (K11, S6)</li> <li>- Carry out and record Continuing Professional Development (CPD) necessary to maintain and enhance competence in one's area of practice (B4)</li> <li>- Exercise responsibilities in an ethical manner (B3)</li> <li>- Show how they have, or would, use Building Information Modelling (BIM) to access and work with data (K2, K6, K12, S1, S2)</li> </ul> <p>To pass the Apprentice must demonstrate achievement of all these grading criteria.</p>	
<p>Structured interview (informed by an Engineering Practice Report. The Engineering Practice Report will not be marked)</p>	<p>Using Annex A provides evidence of knowledge, skills and behaviours required to:</p> <ul style="list-style-type: none"> <li>- Maintain and extend a sound theoretical approach to the application of technology in engineering practice (K1, K2, K3, S1, S2)</li> <li>- Use a sound evidence-based approach to problem-solving and contribute to continuous improvement (K2, K6, K10, S2, B2)</li> <li>- Identify, review and select techniques, procedures and methods to undertake engineering tasks (K1, K2, K12, S1, S2, S8, B2)</li> <li>- Contribute to the design and development of engineering</li> </ul>	<p>Fails to provide evidence to meet knowledge, skills and behaviours as required in Annex A for this assessment method</p>

	<p>solutions (KK1, K2, K3, K11, S1, S2, B2)</p> <ul style="list-style-type: none"> <li>- Implement design solutions and contribute to their evaluation (K1, K3, K10, K12, S1, S2, S5, S8, B1, B2))</li> <li>- Plan for effective project implementation (K4, K5, K6, K8, K9, S3, S7, B1, B2)</li> <li>- Manage tasks, people and resources to plan and budget (K4, K5, K7, K8, K9, S3, S4, S7, B1)</li> <li>- Manage teams and develop staff to meet changing technical and managerial needs (K5, K8, K9, S3, S7, B1, B4)</li> <li>- Manage continuous quality improvement (K6, K12, S3, S8, B2)</li> <li>- Communicate in English with others at all levels (K8, S7, B1)</li> <li>- Present and discuss proposals (K8, S7)</li> <li>- Demonstrate personal and social skills (K8, S7)</li> <li>- Comply with relevant codes of conduct (K1, B3)</li> <li>- Manage and apply safe systems of work (K10, S5, B3)</li> <li>- Undertake engineering activities in a way that contributes to sustainable development (K11, S6)</li> <li>- Carry out and record Continuing Professional Development (CPD) necessary to maintain and enhance competence in one's area of practice (B4)</li> <li>- Exercise responsibilities in an ethical manner (B3)</li> <li>- Show how they have, or would, use Building Information Modelling (BIM) to access and work with data (K2, K6, K12, S1, S2)</li> </ul> <p>To pass the Apprentice must demonstrate achievement of all these grading criteria.</p>	
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**End-point – Summary of roles and responsibilities**

Assessor	Role
Employer	To ensure that the apprentice is given the correct experience in their job role and act as the final approver in the Gateway process for going forward to the EPA.
Assessment Organisation	Act as the independent Assessment Organisation for the EPA by: <ul style="list-style-type: none"> <li>Recruiting, training and monitoring assessors</li> <li>Administering the EPA</li> <li>Conducting the EPA</li> <li>Quality control of the assessment process</li> <li>Informing the Apprentice of the outcome of the EPA</li> <li>Arranging resits/retakes</li> <li>Dealing with any issues or appeals that arise</li> <li>Applying for the Apprenticeship Completion Certificate</li> </ul>

**Quality Assurance – internal**

The assessment organisation will have its own internal quality assurance procedures to ensure that the End-point Assessment is valid and reliable. Where the assessment organisation is a PEI, these procedures are in accordance with the Engineering Council requirements from whom it gets its license in the first place.

The EPA will be conducted by assessors who are trained, approved and reviewed by the relevant assessment organisation.

The assessment organisation will sample all failures and 10% of the passes of the EPA results for consistency and reliability i.e. moderation. Regular meetings with assessors will be held at least annually to provide standardisation as well as an update and feedback on the assessment process.

The assessment organisation will have an appeals process if an Apprentice wishes to challenge the outcome of the EPA.

**Quality Assurance – external**

The employer led approach has been chosen as the EQA model, with the employers working in partnership with the Construction Industry Training Board (CITB).

### **Affordability**

The cost of the End Point Assessment (EPA) will be no more than 20% of the overall apprenticeship. The funding band is awaiting confirmation. This ensures that the EPA is open to all sizes of employer anywhere in the UK.

The assessment organisation costs will include:

- Logging applications for the EPA and issuing the technical project brief
- Setting up the interview and appointment of assessors
- Venue costs
- Assessor travelling and subsistence expenses
- Internal quality assurance
- External quality assurance
- General administration of the process.

### **Professional body recognition**

A Pass grade means that the Apprentice should have met the standards required to achieve Incorporated status with the Chartered Institution of Building Services Engineers (IEng ACIBSE). On successful completion of the End-point assessment process for this Apprenticeship the apprentice is eligible to apply for the designatory letters IEng ACIBSE and the status of Incorporated Engineer.

If the employer has chosen a PEI as the assessment organisation, apprentices are recommended to keep a diary of further learning activities that they undertake outside their apprenticeship as they may be required to produce a portfolio of CPD to submit to the PEI to enable registration as EngTech MICE.

### **Consistency**

Benchmarking the EPA against the Engineering Council UK-SPEC requirements for IEng and the internal and external quality assurance processes mean that the assessment outcomes will be consistent and reliable, allowing a fair and proper comparison between Apprentices employed in different types and sizes of organisations and at different geographical locations.

### **Volumes**

It is anticipated that there will be the following volumes of Apprentices following this standard:

- 2017-18 Academic Year: 40
- 2018-19 Academic Year: 70

The colleges and universities in the provider consortium who have indicated interest in delivering this new standard already deliver part-time academic qualifications for the industry and so there are no issues with capacity and scalability. Similarly, the assessment organisations consulted already deliver their assessment processes and have infrastructure in place. In the longer term this new standard should lead to an increase in new starters and the providers are able to cope with the gradual increases expected.

**Annex A****MAPPING OF EPA METHODOLOGY TO STANDARD**

<b>Knowledge reference</b>	<b>Knowledge category</b>	<b>Core knowledge to be assessed</b>	<b>Presentation Based on findings of research assignment</b>	<b>Structured interview Informed by an Engineering Practice Report</b>
K1	Building Services Engineering Knowledge	Understand engineering principles, codes and standards including, but not limited to: electrical, mechanical, plumbing and building management systems	Y	Y
K2	Building Services Engineering Solutions	Understand the client's needs and the practicality of using certain engineering solutions	Y	Y
K3	Building Services Engineering Techniques	Understand design principles, building surveys, costing, risk analysis, sustainability, Health and Safety, buildability, contract law	Y	Y
K4	Project Management	Understand the project management cycle including the planning, budgeting, project funding and payment processes	Y	Y
K5	People and Resources	Understand principles of team working, staff co-ordination, supply chain management, performance management and the development of people	Y	Y
K6	Quality Management	Understand the importance of maintaining quality standards, using records,	Y	Y

		systems, tools and techniques for quality improvement		
K7	Commercial and Legal Awareness	Understand budgets, costs, various forms of contract, procurement and record keeping and their impact on project success	Y	Y
K8	Communication	Understand different forms of communication (written, verbal, electronic) and evaluate the best solution for different circumstances	Y	Y
K9	Working with Others	Be aware of the importance of good working relationships, the needs of others and equality and diversity in the workplace	Y	Y
K10	Safe Systems of Work	Understand obligations for Health, Safety and Welfare issues on site, how to identify potential hazards and manage the risks	Y	Y
K11	Sustainability	Understand the environmental impact of building services engineering activities and how to minimise negative impacts during all stages of the project	Y	Y
K12	Commissioning	Understand the importance of the commissioning process and be able to describe typical commissioning activities to enable a building to function effectively	Y	Y

<b>Skills reference</b>	<b>Skills category</b>	<b>Core skills to be assessed</b>	<b>Presentation Based on findings of research assignment</b>	<b>Structured interview Informed by a Engineering Practice Report</b>
S1	Building Services Engineering Knowledge and Understanding	To develop and apply practical engineering solutions using established and emerging building services technologies	Y	Y
S2	Building Services Engineering Application	Be able to identify, review and select techniques, procedures and methods to undertake engineering tasks. Be able to contribute to the design, development and implementation of engineering solutions and evaluate their effectiveness	Y	Y
S3	Management and Leadership	Be able to plan for effective project management, plan and organise resources, tasks and people. Be able to manage teams and staff to meet project requirements and be able to manage quality processes.	Y	Y
S4	Commercial Ability	Be able to prepare and control budgets and apply statutory and commercial frameworks	Y	Y
S5	Health, Safety and Welfare	Be able to identify and manage risks of health, safety and welfare in line with legislation, hazards and safe systems of work so that people are kept safe on site	Y	Y

S6	Sustainable Development	Be able to manage engineering activities in a way that contributes to sustainable development and implements best practice	Y	Y
S7	Interpersonal Skills and Communications	Be able to communicate well with others at all levels and discuss plans and issues. Demonstrate personal and social skills and an ability to deal with colleagues and stakeholders in a way that enhances equality and diversity	Y	Y
S8	Commissioning	Be able to commission building services engineering products after installation to enable a building to function effectively	Y	Y

<b>Behaviours reference</b>	<b>Behaviours category</b>	<b>Core behaviours to be assessed</b>	<b>Presentation Based on findings of research assignment</b>	<b>Structured interview Informed by an Engineering Practice Report</b>
B1	Take Responsibility	Be responsible for your own work and that of others	Y	Y
B2	Independent Judgement and Responsibility	Exercise independent engineering judgement, take responsibility for actions and decisions and operate within the constraints of own skills and knowledge	Y	Y
B3	Complying with Codes of Conduct	Operate within the relevant PEI's Code of Conduct and implement	Y	Y

		work activities within the context of industry issues. Promote ethical behaviour in others and promote the building services industry		
B4	Maintaining Continuing Professional Development (CPD)	Identify own development needs and take appropriate action to meet those needs. Use own knowledge and expertise for the benefit of others		Y