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Open Awards Level 4 End-point Assessment for

ST0629 BEMS (Building Energy Management Systems) Controls Engineer

End-point Assessment Handbook

Version History

Version	Date	Change(s) made	Section(s)	Publication source(s)
1	23/10/24	New document.	All	Development Team

This EPA Handbook is for apprentices, employers and providers. It provides an overview of the end-point assessment, the assessment methods, the grading criteria etc. It is a reference document which will guide you through each stage of the process.

For further information about apprenticeship standards and Trailblazers please contact **enquiries@openawards.org.uk**.

Contents

Occupational Overview

A BEMS (Building Energy Management Systems) Controls Engineer will engage in designing the energy management system for buildings, overseeing the control of various services such as heating, air conditioning, and renewable energy sources. They may also develop associated software and graphical interfaces, in addition to installing and commissioning these systems.

A significant aspect of the role involves integrating with other building systems like security to establish 'Smart Buildings'. Following occupancy, they may also handle servicing, maintenance, troubleshoot system faults, and conduct energy performance evaluations. Further details on the knowledge, skills and behaviours associated within the occupational standard are accessible on the IfATE website[1] and in the Assessment Specification section in this document.

Standard Information

Level: 4

Reference: ST0629

Version: 1.1 (for apprentices starting on or after 3rd April 2024)[2]

Approved for delivery: 3 February 2020 (updated 21 September 2022).

Route: construction and the built environment

Minimum duration to gateway: 12 months (this does not include the EPA period). Typically the duration is 36 months.

Employers involved in creating the standard: In Tandem Systems Ltd, Global Associates, Clarkson Controls, Imperium Building Systems, Detail Design Engineering, Kendra Energy Solutions, E.ON Control Solutions Ltd, Trend Control Systems, Mitie, Boss Controls Ltd, Schneider Electric, AIS BMS, Siemens Building Technologies, Crown House Technologies, Chartwell Controls, BMSI, Controlco, Priva UK, Comfort Controls, Eton Associates, Impact Controls, Integrated BMS, Next Energy, Management, SCS Group, Tridium Europe, Schneider Electric, ABB, Essential Controls, Beckhoff Automation, ebm-papst, BCIA Ltd, Sontay, Bath College, Capital City College Group, National Electrotechnical Training (NET), JTL, Building Controls Industry Association (BCIA), Keystone Communications, BuroHappold, the BESA

External Quality Assurance Provider: Ofqual

[1] **https://www.instituteforapprenticeships.org/apprenticeship-standards/**

[2] Please see Appendix 1 for details of the changes between version 1.0 and 1.1. Open Awards is able to assess apprentices against both versions of the assessment plan.

Entry Requirements

There are no formal entry requirements however apprentices must achieve English and mathematics in line with current apprenticeship funding rules.

EPA Documents Overview

An overview of the main documents and supporting materials you will encounter during this end-point assessment is in the table below.

Document Name	Brief Description	Who Should Read this Document	When To Use this Document	Additional Information
Skills Scan	This document is designed to support employers and providers to ensure that an apprentice's job role meets the requirements of the standard.	Employers Providers	Use this during the decision making process when considering whether the EPA is appropriate for the apprentice.	This allows employers and providers to ensure that the EPA is a good fit for the skills and aspirations of the apprentice.
Apprentice EPA Journey	A one page visual overview of the different milestones the apprentice will reach within their EPA journey.	Apprentices Employers Providers	Before committing to the course to make sure it is the right fit for you. Throughout the EPA journey.	This roadmap will help you to understand what has been achieved so far and what still needs to be completed.
EPA Handbook	This provides an overview of the end-point assessment, the assessment methods, the grading criteria etc. It is a reference document which will guide you through each stage of the process.	Apprentices Employers Providers	During the apprenticeship as a reminder of the expectations, assessment methods and grading.	This is a key document which will help you to navigate your way through each step of the end-point assessment. Refer back to this frequently.

Progression Tracker	This allows the employer to compile and record an evidence base to prove that the apprentice has demonstrated competence against each KSB specified in the assessment plan.	Apprentices Employers Providers	Throughout the EPA prior to gateway.	This document could be a valuable basis for discussions around progress that the employer may have with the apprentice.
Preparation for the Practical Observation with Questioning	This gives you a brief reminder of how to prepare for the Practical Observation with Questioning and the KSBs that will be assessed through this assessment method.	Apprentices Employers Providers	When preparing for your Practical Observation with Questioning.	The grading descriptors will help apprentices to identify areas you may need to work on.
Preparation for the Project Report and Presentation with Questioning	This gives you a brief reminder of how to prepare for the Project Report and Presentation with Questioning and the knowledge and behaviours that will be assessed.	Apprentices Employers Providers	When preparing for your Project Report and Presentation with Questioning.	The grading descriptors will help apprentices to identify areas you may need to work on.
Gateway Authenticity and Declaration form	This form declares that the apprentice is ready for gateway, the gateway conditions have been met and the evidence submitted has been produced by the apprentice.	Apprentices Employers Providers	At gateway.	This form needs to be signed by employers, providers and the apprentice. The apprentice is unable to enter gateway until this form has been completed and submitted.

Project Brief submission form	This allows the apprentice to detail their Project Brief for submission at gateway. This is typically no more than 500 words (+/- 10% tolerance).	Apprentices Employers Providers	At gateway.	This form needs to be submitted at gateway. The apprentice is unable to enter gateway until this form has been completed and submitted.

Gateway Requirements

The training provider must provide Open Awards with the following evidence to enable us to approve the gateway.

- Apprentices must have completed the minimum apprenticeship on-programme duration (12 months from the start date; typically 18 months).
- Apprentices must achieve English and mathematics in line with current apprenticeship funding rules.
- Project Brief (typically no more than 500 words +/- 10% tolerance).
- Fully completed and signed Gateway Authenticity Declaration form.

For more information on acceptable qualifications for English and mathematics, please visit **here.**

Assessment

The ST0629 EPA consists of the following two (2) assessment methods. Method 1 has two (2) components:

Method 1 – Component 1 Project Report

Method 1 – Component 2 Project Presentation with Questioning

Method 2 – Practical Observation with Questioning

Assessment Preparation

Support materials are available on the Open Awards portal to help prepare apprentices for their assessments. These materials will also support training providers and employers post-gateway to ensure apprentices are well prepared for their EPA experience. They are not intended to be used to measure proficiency pre-gateway or to support gateway decisions. Training providers can access these materials through the Secure Portal.

Order of Assessments

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.

Assessment Window

The EPA period will typically last for six (6) months.

Where a resit or retake is required, the overall EPA window can be extended. A resit is typically within three (3) months of the EPA outcome notification; a retake is typically within four (4) months of the EPA outcome notification.

Therefore, the maximum time for the EPA window (including resits/retakes) is 10 months.

Assessment Method 1, Component 1 - Project Report

The apprentice must complete a project report after they have gone through gateway. This involves the apprentice submitting a project brief at gateway.

The employer **must** ensure it has a real business application and Open Awards will ensure it meets the requirements of the EPA (including suitable coverage of the KSBs assigned to this assessment method).

An Open Awards' Independent End-point Assessor will sign-off the project subject, title and scope to confirm its suitability in agreement with the apprentice and employer at the gateway. The Project brief must include:

- 500-word synopsis, completed by the apprentice, including details of the apprentice's role and the relevance of the project to the KSBs assigned to the assessment method
- The timeline for the project (within three (3) months)
- The date of the proposed submission of the written project

The brief will be reviewed within five (5) working days of being submitted as part of the gateway checks. This is not assessed and should typically be no more than 500 words (+/- 10% tolerance).

Once the brief is approved, the apprentice will conduct their project and submit their report and presentation (at the same time) to the EPAO within (but no longer than) four (4) months of the EPA start date. The typical duration of the project is three (3) months. The independent assessor must review the Presentation and Project Report prior to the Presentation with Questioning taking place. The employer will ensure the apprentice has sufficient time and the necessary resources, within this period, to plan and undertake the project.

Report Content

The project report must include the following, as a minimum:

- Background
- Project brief and objectives detailing targets
- Project research
- Project plan
- Implementation – how targets were achieved
- The role the apprentice played, the contribution made and the technical skills used
- Project outcomes
- Challenges faced and or lessons learnt by the apprentice

The project report has a word limit of 4,500. A tolerance of +/- 10% is allowed (appendices, references, diagrams etc. are not included in this total). In addition, an appendix must be included that evidences how the project report maps to the relevant KSBs for this assessment method.

Assessment Method 1, Component 2 - Project Presentation with Questioning

Apprentices will prepare and deliver a presentation that appropriately covers the KSBs assigned to this method of assessment. The presentation will be based on the project carried out in the first component and will cover a summary of the project and report:

- Description as to the scope of the presentation – which engineering project/s or activities are being presented
- Description of the role of the apprentice in these activities
- Summary of actions undertaken by the apprentice and outcomes of these activities
- Achievements, difficulties faced and lessons learned

The presentation with questioning will take place at a date, time and location agreed with the employer no earlier than (at least) two (2) weeks after submission. This is to allow sufficient time for the EPAO to review the documentation and for the apprentice to prepare.

The Presentation with Questioning will last for 60 minutes. This will typically be 30 minutes for the presentation and a further 30 minutes for questioning. The IEPA will ask a minimum of 4 questions.

The independent assessor has the discretion to increase the time of the questioning by up to 10% to allow the apprentice to complete their last point or answer their last question.

If the apprentice chooses to end their assessment early, they **must** understand the implications and be confident that they have provided all their evidence against the grading descriptors.

Assessment Method 1 - Project Report and Presentation with Questioning Grading Descriptors

Pass Grading Descriptors		Distinction Grading Descriptors	
P1	Explains building control technologies, theory and the principles of control logic including the fundamentals of proportional and integral control including: • The primary role and function of the control system • The merits of automated control over manual control methods • The development of interface protocols so data can be shared and exchanged between the BEMS and 3rd party systems e.g. access systems and lighting systems. (K1, K19)	D1	Gives an example of how the application of appropriate controls theory has improved the control and energy efficiency of a building. (K1, K2, K13)
P2	Explains the fundamentals of controlling HVAC (heating, ventilation and air conditioning) and building technology. (K2)	D2	Identifies incorrect control Panel wiring, construction and relay logic and provides an example rectification of the issue. (K7)
P3	Explains hydrodynamics and hydronic systems in buildings (such as the transfer of energy using water) and its use in cooling systems, heat generation and renewable technology and provides an example of incorporating these into the design process. (K3, K5, S2, S4)	D3	Describes how the varying needs of building stakeholders were incorporated into the BEMS design. (S9)
P4	Explains thermodynamic relationships in air conditioning systems. (K4)	D4	Describes how design documentation is updated following direct feedback from client and or building stakeholder. (S1)
P5	Explains the principles and practices of measurement technology by explaining the operation and application of BEMS field devices and their effects on energy efficiency and comfort control of the building.	D5	Evaluates and explains the requirements for electrical protection measures applied to a BEMS installation. (K17, S8, S10)

Pass Grading Descriptors		Distinction Grading Descriptors	
	(K6, K13, K15)		
P6	Explains examples of Control Panel wiring, construction and relay logic and provides an example of incorporating these into the design process. (K7, S5)	D6	Evaluates and explains the process of value engineering in the requirements of BEMS element of electrical engineering (e.g. use of multicore cabling). (S11)
P7	Explains the control principles associated with the design, function, facilities management and use of the building and applies the principles to create points lists, description of operation and cable schedules to meet the needs of a variety of building stakeholders. (K8, S1, S9)	D7	Evaluates and explains how the process of commissioning a BEMS installation interacts with or is affected by other site trades or activities (e.g. Water Balancing). (K11, S12)
P8	Explains the use of communications technology protocols and media. (K9)	D8	Identifies an alternative solution to correct a fault in a BEMS network or system to prevent future occurrence. (K12)
P9	Explains and applies the practices and procedures for the installation of BEMS wiring systems and explains the general characteristics of electrical installations and how to assess them whilst Identifying the requirements for protection of the electrical installation. (K10, K17, S8, S10)		
P10	Describes the requirements for the BEMS element of electrical installations. (S11)		
P11	Explains and applies the principles and practices for the commissioning of BEMS and associated equipment in buildings and explains the requirements of inspection and testing of BEMS element of electrical installations and the testing, inspection and certification of BEMS related controls equipment. (K11, K14, K18, S12)		
P12	Describes the requirements of inspection and testing of BEMS		

Pass Grading Descriptors		Distinction Grading Descriptors	
	element of electrical installations within relevant legislative requirements, specifications, codes of practice and industry recognised practices. (S16)		
P13	Describes the principles for diagnosing and correcting faults in BEMS network systems and BEMS equipment in buildings. (K12)		
P14	Explains the relevant health & safety legislation and safe working practices applying to themselves and others with particular reference to the requirements for protection and safe working with electrical installation and the BEMS impact on wellbeing. (K16)		
P15	Explains the principles for completing conditional site surveys, along with associated recommendations. (S14)		
P16	Explains the application of energy efficiency measures to optimise comfort in buildings whilst minimising energy usage. (S15)		
P17	Explains the needs and concerns of others, especially in relation to diversity and equality. (B1)		
P18	Explains how to maintain, and enhance productive working relationships by accepting, prioritising, delegating and undertaking technical and other tasks effectively. (B2, B8)		
P19	Explains how to work independently and solve problems within their own scope of responsibility, by applying technical and behavioural skills and knowledge to define the problem, identify, evaluate and select alternatives and implement solutions and complete the work to		

Pass Grading Descriptors		Distinction Grading Descriptors	
	the appropriate specifications and codes of practice. (B5, B6)		
P20	Demonstrates the ability to work with colleagues, clients, the public and other stakeholders in a collaborative, non-confrontational and ethical way, in line with professional competence and conduct. (B9, B11)		
P21	Explains how they have taken responsibility for personal development, demonstrating commitment to learning and self-improvement. (B10)		
P22	Explains how to work in a way that contributes to sustainable development. (B12)		
P23	Applies the principles and practices for the design and commissioning of standard network architectures e.g. Ethernet TCP, IP, MSTP and RS485. (S18)		
P24	Demonstrates how the candidate has accepted responsibility for their own work and actions and that of others in their team. (B7)		

Assessment Method 1 - Project Report and Presentation with Questioning

Knowledge, Skills and Behaviours

Ref	Criteria
Knowledge	
K1	Understanding building control technologies and theory including: •The primary role and function of the control system •The merits of automated control over manual control methods •The development of interface protocols so data can be shared and exchanged between the BEMS and 3rd party systems e.g. access systems and lighting systems
K2	Understand the fundamentals of controlling HVAC (heating, ventilation and air conditioning) and building technology
K3	Understand hydrodynamics and hydronic systems in buildings e.g. the transfer of heat energy and cooling energy through a building using water
K4	Understand thermodynamic relationships in air conditioning systems
K5	Understand cooling systems, heat generation and renewable technology
K6	Understand the principles and practices of measurement technology
K7	Understand Control Panel wiring, construction and relay logic
K8	Understand the control principles associated with the design, function, facilities management and use of the building
K9	Understand communications technology protocols and media
K10	Understand the practices and procedures for the installation of BEMS wiring systems
K11	Understand the principles and practices for the commissioning of BEMS and associated equipment in buildings
K12	Understand the principles for diagnosing and correcting faults in BEMS network systems and BEMS equipment in buildings
K13	Understand the energy efficiency and comfort control requirement within buildings
K14	Understand the testing, inspection and certification of BEMS related controls equipment
K15	Understand the operation and application of BEMS field devices e.g. sensors
K16	Understand relevant health & safety legislation and safe working practices applying to themselves and others. Give particular reference to understanding the requirements for protection of and safe working with electrical installations and BEMS impact on 'wellbeing'
K17	Understand the general characteristics of electrical installations and how to assess them
K18	Understand the requirements of inspection and testing of BEMS element of electrical installations

K19	Understand the principles of control logic including the fundamentals of proportional and integral control
Skills	
S1	Applying the control principles associated with the design, function and use of buildings e.g. to create points lists, description of operation, cable schedules
S2	Incorporating hydrodynamics and orhydronic systems into designs
S4	Incorporating cooling systems, heat generation and renewable technology into designs as applicable
S5	Incorporating Control Panel wiring, construction and relay logic into the design process
S8	Identifying requirements for protection of electrical installations
S9	Incorporating the needs of a variety of building stakeholders (e.g. owners and or operators) within the design of the BEMS system
S10	Applying the practices and procedures for the installation of BEMS wiring systems
S11	Interpreting the requirements for the BEMS element of electrical installations
S12	Applying the principles and practices for the commissioning of BEMS systems and equipment in a variety of building types and environments
S14	Applying the principles for completing conditional site surveys, along with associated recommendations
S15	Applying knowledge of energy efficiency to optimise comfort in buildings whilst minimising energy usage
S16	Identifying the requirements of inspection and testing of BEMS element of electrical installations within relevant legislative requirements, specifications, codes of practice and industry recognised practices
S18	Applying the principles and practices for the design and commissioning of standard network architectures. E.g. Ethernet TCP,IP, MSTP and RS485
Behaviours	
B1	Be aware of the needs and concerns of others, especially in relation to diversity and equality
B2	Create maintain, and enhance productive working relationships
B5	Take responsibility for working independently and completing work to the appropriate specifications and codes of practice
B6	Solving problems within their own scope of responsibility, by applying technical and behavioural skills and knowledge to define the problem, identify, evaluate and select alternatives and implement solutions.
B7	Accepting responsibility for their own work and actions and that of others in their team
B8	Accepting, prioritizing, delegating and undertaking technical and other tasks effectively
B9	Committed to working effectively with colleagues, the public, clients and other stakeholders
B10	Take responsibility for personal development, demonstrating commitment to learning and self-improvement
B11	Exercise responsibilities in an ethical manner

B12	Undertake work in a way that contributes to sustainable development.

Assessment Method 2 – Practical Observation with Questioning

The observation involves an independent assessor observing the apprentice in their workplace. During the observation, the assessor will observe works that enables the apprentice to demonstrate the skills and behaviours required to fulfil the pass and distinction criteria and would normally occur during a typical working day.

The works selected will ensure that the assessor can observe the range of activities defined in the mapping of KSBs for this assessment method and will be based upon the activities detailed below so that the employers can ensure that such activities are available on the observation site for all apprentices.

In advance of the observation, apprentices must be provided with information on the format of the observation, including timescales.

The observation should typically take 4 hours and may be split into discrete sections held over a maximum of 1 working day (typically considered to be 7.5 hours).

The assessor has the discretion to increase the time of the observation by up to 10% to allow the apprentice to complete a task at the end of this component of the EPA.

If the apprentice chooses to end their assessment early, they **must** understand the implications and be confident that they have provided all their evidence against the grading descriptors.

Questions may be asked both during and after the observation is complete. The IEPA will ask a minimum of four (4) but can ask up to 12 open questions generated by themselves in order to allow the apprentice to demonstrate their underpinning knowledge, which may not have been observed. They may ask follow-up questions where clarification is required. This additional questioning must be included as part of the defined time limit.

The following activities **must** be observed during the observation:

Checklist of Core Activities	
All relevant Health & Safety documentation (e.g. Risk Assessments and Method Statements) associated with work activities to be located and reviewed prior to work commencement.	
Pre-works communication with Building stakeholder (due to the nature of the occupation there will always be some interaction with at least one stakeholder)	
All relevant local health & safety procedures are undertaken as required (e.g. Site inductions, permit to work documents)	
Establish communications with BEMS system using most relevant method	

Software versions to be verified	
BEMS software to be backed up	
BEMS software to be interrogated for operability	
Testing the operation and integration to the BEMS system of an analogue input signal (e.g. Temperature Sensor or Pressure sensor)	
Testing the operation and integration to the BEMS system of a digital input device (e.g. Air or water flow status or plant fault status).	
Testing the operation and integration to the BEMS system of an analogue output device (e.g. Speed, valve or damper actuator)	
Testing the operation and integration to the BEMS system of a digital output device (e.g. Fan or pump Enable)	
Identification of system faults or improvements (where applicable)	
Post works software backup	
Post works Communication with Building stakeholder	
Production of works completion documentation in line with company procedures	

Grading Criteria (Practical Observation with Questioning)

Pass Grading Descriptors		Distinction Grading Descriptors	
P25	Applies the principles and practices of measurement technology. (S3)	D9	Identifies and proposes a solution for a system improvement. (S3)
P26	Demonstrates the use of communications technology protocols and media e.g. MODBUS and BACNET. (S6)	D10	Evaluates and explains why a particular communication protocol was selected and implemented. (S6)
P27	Demonstrates adherence to relevant safety legislation, codes of practice and safe working practices to themselves and others. (S7, B3)		
P28	Demonstrates the principles, for diagnosing and correcting faults in BEMS network systems and BEMS equipment. (S13)	D11	Identifies an alternative method for fault finding on BEMS equipment. (S13)
P29	Undertakes the testing, inspection and certification of		

Pass Grading Descriptors		Distinction Grading Descriptors	
	BEMS related controls and equipment. (S17)		
P30	Carries out updates to BEMS system hardware to ensure compatibility with latest products. (S19)		
P31	Demonstrates effective communication with colleagues and clients to communicate technical and other information using oral, written and electronic methods. (B4)		

Knowledge, Skills and Behaviours - Practical Observation with Questioning

Ref	Criteria
Skills	
S3	Appling the principles and practices of measurement technology
S6	Applying communications technology protocols and media e.g. MODBUS and BACNET
S7	Applying relevant safety legislation, codes of practice and safe working practices to themselves and others
S13	Applying the principles, for diagnosing and correcting faults in BEMS network systems and BEMS equipment
S17	Carrying out the testing, inspection and certification of BEMS related controls and equipment
S19	Carrying out updates to BEMS system hardware to ensure compatibility with latest products.
Behaviours	
B3	Commit to compliance with health and safety
B4	Strive to communicate effectively with work colleagues and clients using oral, written and electronic methods to communicate technical and other information.

Grading of Assessments

Grading Individual Assessments

Assessments will be assigned a grade at the assessment method level; they **will not** be assigned a grade at each component level.

Both assessment methods are graded in the same way, i.e.:

- If one or more pass grading descriptors are not met, the assessment will be graded as a fail.
- To achieve a pass **all** pass criteria must be met.
- To achieve a distinction all pass criteria **and all** distinction criteria must be met.

Aggregation of Individual Assessment Grades into an Overall Grade

All assessment methods must be passed for the EPA to be passed overall.

A distinction is achieved by meeting all of the pass criteria and all of the distinction criteria for both assessment methods. Both methods are weighted equally.

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

Project report and presentation with questioning	Practical Observation with questioning	Overall grade
Fail	Fail	Fail
Any grade	Fail	Fail
Fail	Any grade	Fail
Pass	Pass	Pass
Pass	Distinction	Pass
Distinction	Pass	Pass
Distinction	Distinction	Distinction

Any grade = fail, pass, or distinction

Resits and Retakes

Apprentices who fail one or more assessment method will be offered the opportunity to take a resit or a retake. Open Awards will provide feedback alongside the result notification to all apprentices who fail an assessment method. This feedback will be provided via the training provider, normally **within ten (10) workings days** of the assessment taking place.

Resits or retakes are only to be taken in the event that the original assessment grade is a fail. A resit or retake cannot be taken with the intention of increasing the original grade if an apprentice has passed their EPA. Therefore, feedback will not normally be provided to apprentices who achieve a pass or higher.

A resit does not require further learning, whereas a retake does.

Please note: A resit or retake of the Project Report and Presentation with Questioning assessment method will require the apprentice to submit a new project report. This will include submitting a new proposal for approval by Open Awards.

Apprentices will normally be asked different questions in the case of a re-sit or re-take. However, given the nature of the task it may be necessary for an assessor to ask identical or closely related questions to ensure assessment criteria have been met.

The maximum grade that can be achieved for a resit or retake is a pass.

Please see EPA window section for the timescales for resits/ retakes.

Quality Assurance

Independent End-point Assessor Standard Requirements

Independent End Point Assessors must meet the following criteria:

- have the competence to assess the apprentice at the level of this apprenticeship and hold any required qualifications and experience
- have recent relevant experience of the occupation or sector to at least occupational level 4 gained in the last 3 years or significant experience of the occupation or sector Competent to deliver the end-point assessment
- 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 occupation
- have no direct connection or conflict of interest with the apprentice, their employer or training provider; in all instances; there must be no conflict of interest

In addition, all IEPAs must attend an Open Awards' standardisation and training event at least once per year.

Internal Quality Assurance

Open Awards will complete quality assurance on assessments before results are released. Quality assurance is completed through observations and examination of documentation on a risk-based sampling model.

External Quality Assurance

External quality assurance for this apprenticeship standard is undertaken by Ofqual.

Indicative Content

The assessment specification can be found on our website and on IfATE's website in the published assessment plan for the standard.

Details of the indicative content that will be assessed by each assessment method of the apprenticeship standard is outlined below.

Assessment Method 1 – Project Report and Presentation with Questioning

KSB	Statement	Indicative Content
Knowledge		
K1	Understanding building control technologies and theory including: The primary role and function of the control system. The merits of automated control over manual control methods. The development of interface protocols so data can be shared and exchanged between the BEMS and 3rd party systems e.g. access systems and lighting systems.	The apprentice will understand: • that building energy management systems (BEMS) control various building services such as heating, ventilation, air conditioning (HVAC), and lighting to ensure optimal performance and energy efficiency. • That automated control offers advantages such as increased efficiency, precise regulation, and the ability to respond to changing conditions in real-time compared to manual control methods. • The protocols used to enable communication between the BEMS and other systems such as access control and lighting systems, facilitating data exchange for coordinated building operation.
K2	Understand the fundamentals of controlling HVAC (heating, ventilation and air conditioning) and building technology.	The apprentice will understand: • principles behind controlling HVAC systems, including temperature regulation, air distribution, and energy optimization. • Various building technologies and their control requirements, such as fire safety systems, security systems, and occupancy sensors, and how they integrate with the overall building control strategy. • How HVAC and building technologies integrate into the overall building control strategy.

K3	Understand hydrodynamics and hydronic systems in buildings e.g. the transfer of heat energy and cooling energy through a building using water.	The apprentice will understand: • how heat and cooling energy are transferred through a building using water-based systems, including the principles of fluid dynamics and heat transfer. • How to identify components of hydronic systems such as pumps, pipes, valves, and heat exchangers, and understand their roles in maintaining comfort and energy efficiency within a building. • How hydronic systems will help to maintain comfort and energy efficiency within a building.
K4	Understand thermodynamic relationships in air conditioning systems.	The apprentice will understand: • thermodynamic principles governing the operation of air conditioning systems, including refrigeration cycles, heat transfer processes, and psychrometry. • Identify refrigeration cycles, heat transfer processes, and how to interpret a psychrometry chart. • How to identify factors affecting the performance of air conditioning systems, such as temperature, humidity, airflow rates, and refrigerant properties, and their impact on comfort and energy consumption.
K5	Understand cooling systems, heat generation, and renewable technology.	The apprentice will understand: • the various cooling technologies, including refrigeration, evaporative cooling, and thermal storage systems, and their applications in buildings. • How to identify different heat generation methods such as boilers, heat pumps, and renewable energy sources such as solar thermal and geothermal systems. • Their role in meeting building heating requirements while considering sustainability and energy efficiency.

K6	Understand the principles and practices of measurement technology.	The apprentice will understand: • concepts such as accuracy, precision, calibration, and range. • The various types of sensors commonly used in building energy management systems (BEMS), such as temperature sensors, pressure sensors, flow sensors, and humidity sensors. • The different measurement techniques, such as analogue and digital measurements, as well as the factors influencing measurement accuracy and reliability.
K7	Understand Control Panel wiring, construction, and relay logic.	The apprentice will understand: • the function of enclosures, power distinction blocks, terminal blocks, fuses, circuit breakers, switches, indicator lights, and relays. • The different types of wires used in such as control panels, such as power wires, signal wires and grounding wires. • How to interpret basic wiring diagrams; identifying symbols representing various component and trace the flow of electricity through circuit diagram. • Operation of relaying and how a signal activates an electromagnet. They can recognise how multiple relays can be interconnected to perform simple control functions switching in turning on/off lights or motors based on switch inputs.

K8	Understand the control principles associated with the design, function, facilities management, and use of the building.	The apprentice will understand: • fundamentals of the building control systems and how they apply to regulating various aspects such as HVAC lighting and security and how it contributes to occupant's comfort, energy efficiency, and building safety. • Components of a building's control system such as sensors, controllers, activators, and a user's interface for monitoring and adjustments. • Switching based on setpoints (on/off control), pre-programmed operations based on time (scheduling), monitoring a desired level of parameters like temperature or humidity. • The importance of integrating various building control systems (HVAC, Lighting, Security).
K9	Understand communications technology protocols and media.	The apprentice will understand: • protocols used to set rules that govern data transmission between devices and networks. They can identify different types of communication media such as wired media and wireless media. • Communication protocols such as TCP/IP (Transmission control protocol/internet protocol), HTTP (Hypertext Transfer Protocol), and Wi-Fi (Wireless Fidelity). • Open systems interconnection (OSI) model, and how layered frameworks are used for network communication. They can explain the different layers (physical, data link, network, transport, session, presentation, and application) and their general functions. • Key characteristics of different communication media such as Bandwidth, latency, and reliability.

K10	Understand the practices and procedures for the installation of BEMS wiring systems.	The apprentice will understand: • the principles of safe electrical work and regulations governing safe electrical work practices. • The tools and equipment used for BEMS wiring. • How to differentiate between power cables, signal cables, and communication cables used in BEMS systems. • BEMS wiring practices such as following cable routing plans, proper cable separator, and labelling of cables. • The importance of performing continuity checks and verifying signal integrity.
K11	Understand the principles and practices for the commissioning of BEMS and associated equipment in buildings.	The apprentice will understand: • the purpose of BEMS commissioning. • The different stages of BEMS commission (pre-commissioning functional testing, integration testing, system performance testing, documentation, and handover). • Procedures involved in BEMS commissioning.
K12	Understand the principles for diagnosing and correcting faults in BEMS network systems and BEMS equipment in buildings.	The apprentice will understand: • common causes of BEMS faults, such as sensor malfunctions, communication network problems, controller failures, and actuator issues and various troubleshooting techniques. • The importance of using diagnostic tools. • How to apply corrective actions such as replacing faulty sensors or actuators, updating BEMS software or firmware, resting system components and performing basic calibration.

K13	Understand the energy efficiency and comfort control requirement within buildings.	The apprentice will understand: • the role of building energy efficiency in minimising energy consumption. They understand the importance of occupant comfort. • The importance of maximising energy efficiency and achieving optimal comfort. • Building codes and standards, and the various requirements for energy efficiency and occupant comfort.
K14	Understand the testing, inspection, and certification of BEMS-related controls equipment	The apprentice will understand: • BEMS equipment testing, including both factory testing for performance and on-site verification of function, communication, sensors, and actuator operations. • The importance of routine inspection such as identifying any physical damage, and potential safety hazards and verifying proper installations. • BEMS equipment certification.
K15	Understand the operation and application of BEMS field devices e.g. sensors.	The apprentice will understand: • role of sensors in collecting real-time data on various environmental conditions within a building. • The operation of BEMS sensors (temperature, humidity, CO2). They can identify sensor types (such as Light sensor, differential pressure sensors, and flow sensor). • The importance of selecting appropriate sensors based on the specific BEMS application and environmental conditions. • How sensor data are transmitted to BEMS controller through communication protocols.

K16	Understand relevant health & safety legislation and safe working practices applying to themselves and others. Give particular reference to understanding the requirements for the protection of and safe working with electrical installations and BEMS impact on 'wellbeing'.	The apprentice will understand: • health and safety regulations and the regulations that govern safe workplace practices. • Safe working practices such as using PPE and conducting basic risk assessment. • How to identify potential hazards associated with electrical installations such as electric shock, arch flash, and electric fires. • The role of BEMS in creating a healthy and comfortable building environment.
K17	Understand the general characteristics of electrical installations and how to assess them.	The apprentice will understand: • component of an electrical installation such as supply source, metering equipment, distribution board, protective devices, wiring, and electrical outlets. • How to differentiate between single-phase and three-phase installation and where they are applicable. • How to identify potential hazards and ensure installation complies with relevant safety regulations and codes. • How to assess the overall condition of wiring, components, and their ability to handle electrical load.
K18	Understand the requirements of inspection and testing of BEMS element of electrical installations.	The apprentice will understand: • the importance of regular inspection and testing of electrical installations. • Their role in the inspection and testing of electrical installations and BEMS components. • Aspects of BEMS electrical components that require inspection and testing such as the power supply to the BEMS system, wiring within the BEMS and controllers. • Electrical inspections and testing must comply with relevant safety regulations and standards.

K19	Understand the principles of control logic including the fundamentals of proportional and integral control.	The apprentice will understand: • control logic as an automated regulation system using measurements such as calculating output signals to adjust system towards setpoint. • Essential elements such as sensors, controllers, actuators and their functions. • Principles of proportional control and the difference between setpoint and process variable. • The combined responsiveness of Proportional Control with the ability of Integral control to eliminate steady-state error.
Skills		
S1	Applying the control principles associated with the design, function, and use of buildings	The apprentice will be able to: • develop comprehensive technical documentation for Building Automation Systems (BAS), including point lists, descriptions of operations, and cable schedules. • Interpret blueprints and schematics to identify control points. • Develop operation manuals, and ensure efficient installation and, maintenance. • Apply the functionalities of various building systems and their control components (sensors, actuators). • Apply basic control principles feedback loops, setpoint control, control algorithms, and actuator activation) for efficient building operation. • Apply advanced control strategies such as Demand-controlled ventilators (DCV), occupancy sensors, and integration with Renewable Energy sources. • Operate BAS user interface and perform basic troubleshooting. • Apply knowledge of how occupant actions can impact energy consumption.

S2	Incorporating hydrodynamics/hydronic systems into designs.	The apprentice will be able to: • apply core principles, interpret building specifications, and seamless integration of hydronic systems to enable ultimate optimization performance, energy efficiency, and comfort. • Understand basic flood properties (density, viscosity, pressure), and their influence a hydronic system behaviour. • Read and interpret diagrams illustrating hydronic system layout, pipe sizing, and component locations. • Calculate building heat load, select hydraulic system components, and perform basic hydraulic calculations. • Identify installation best practices and perform basic maintenance tasks. • Communicate hydronic design concepts to other designers (ie architects and engineers) and contractors.
S4	Incorporating cooling systems, heat generation, and renewable technology into designs as applicable.	The apprentice will be able to: • include building requirements and environmental impact to optimise performance, reduce energy consumption, and achieve operational and comfort goals. • Analyse local climate data to understand the cooling and heating needs of a building. • Apply the specific requirements of different building types and how they influence heating and cooling strategies. • Consider building envelope optimization to minimize overall energy demands for heating and cooling. • Evaluate cooling system options, select heating systems, and integrate basic renewables.

S5	Incorporating Control Panel wiring, construction, and relay logic into the design process.	The apprentice will be able to: • select appropriate control panels considering factors such as size and capacity environmental considerations, and compatibility. • Safely install essential BAS components within the control panel (power supply, controllers, I/O modules, communication modules). • Select wiring according to schematics, termination, and colour coding. • Apply basic relay logic concepts such as reading ladder diagrams, designing simple control strategies and troubleshooting basic relay logic circuits. • Contribute to the design process by developing point lists and collaborating on control panel layout and wiring schematics.
S8	Identifying requirements for the protection of electrical installations.	The apprentice will be able to: • identify electrical hazards and analyse hazard severity. • Identify common protective devices (ie surge protection, grounding, and circuit protection). • Identify codes and standards and interpret code requirements. • Stay updated and apply code requirements in practice. • Identify potential risks.
S9	Incorporating the needs of a variety of building stakeholders (e.g., owners/operators) within the design of the BEMS system.	The apprentice will be able to: • recognise the various stakeholders involved in a building's operation, such as owners' operations, occupants', and maintenance personnel. • Analyse stakeholder priorities. • Gather stakeholder input, and present design ideas (BEMS features & functionalities) • Select BEMS functionalities that address stakeholder needs. • Contribute to developing clear documentation and preparing basic training materials.

S10	Applying the practices and procedures for the installation of BEMS wiring systems.	The apprentice will be able to: • adhere to electrical safety regulations to minimize the risk and can utilize appropriate PPE for various installation tasks. • Select appropriate cables, terminate wires securely, install wires according to plans, and adhere to colour coding standards. • Identify BEMS system components and follow BEMS installation manuals. • Maintain accurate installation records of BEMS wiring processes such as cable types, routing paths, and connection points.
S11	Interpreting the requirements for the BEMS element of electrical installations.	The apprentice will be able to: • interpret electrical drawings and schematics. • Identify BEMS components such as sensors, actuators, controllers, and communication networks. • Understand the function of BEMS such as monitoring control, and data analysis for building energy optimization. • Identify relevant electrical codes and BEMS-related codes sections.
S12	Applying the principles and practices for the commissioning of BEMS systems and equipment in a variety of building types and environments.	The apprentice will be able to: • identify the various stages of BEMS commissioning such as pre-commissioning, functional testing, integration testing, performance testing, documentation, and handover. • Utilise pre-defined checks lists to methodically conduct BEMS commissioning procedures for various components and functionalities. • Demonstrate proficiency in using basic commissioning tools to measure system parameters and verify performance. • Record test results accurately and systematically for reference and troubleshooting purposes.

S14	Applying the principles for completing conditional site surveys, along with associated recommendations.	The apprentice will be able to: • conduct a thorough site visit to gather data. • Record data through appropriate methods such as visual inspection, taking notes, photographs, sketches and drawings. • Identify essential elements such as existing structures, utilities (water, sewer, electricity), topography, and vegetation. • Identify potential constraints on development based on site conditions. • Demonstrate a basic understanding of surveying principles such as using basic survey tools. • Interpret basic survey data. • Prepare basic site survey reports. • Communicate effectively with clients and colleagues.
S15	Applying knowledge of energy efficiency to optimise comfort in buildings while minimising energy usage.	The apprentice will be able to: • apply the fundamentals of heat transfer (conduction, convection, radiation) and their influence on building comfort. • Identify the role of building envelope components (walls, roof, windows) in thermal insulation and air leakage. • Identify essential building systems impacting comfort and energy use such as HVAC, lighting systems, and building envelope. • Identify passive design strategies that can improve comfort and reduce energy use.

S16	Identifying the requirements of inspection and testing of BEMS element of electrical installations within relevant legislative requirements, specifications, codes of practice, and industry recognised practices.	The apprentice will be able to: • identify relevant regulations that govern BEMS installation and how electrical codes outline specific testing requirements for BEMS components and wiring. • Identify common BEMS testing procedures such as continuity testing, insulation resistance testing, and functional testing. • Identify how specific code sections translate into testing requirements for BEMS wiring and components.
S18	Applying the principles and practices for the design and commissioning of standard network architectures (e.g., Ethernet TCP/IP, MSTP, and RS485).	The apprentice will be able to: • apply the components of a network such as routers, switches, cables, and protocols. • Identify network topologies (bus, star, mesh) and their suitability for different applications. • Apply the knowledge of Ethernet (physical layer) and TCP/IP (communication protocol) for network communication. • Apply the function of multiple spanning tree protocol (MSTP) in preventing network loops and ensuring data flow. • Recognise RS485 as a serial communication protocol commonly used for short-distance data transmission in building automation systems. • Apply basic network design principles to create simple network layouts for BEMS. • Choose appropriate cable types based on network protocol and distance requirements.
Behaviours		

B1	Be aware of the needs and concerns of others, especially in relation to diversity and equality.	The apprentice will be able to: • use inclusive terminology that respects people from diverse backgrounds. • Demonstrate active listening skills by paying attention to others, avoiding interruptions, and asking clarifying questions to understand different viewpoints. • Acknowledge the potential for unconscious biases and try to minimise its effect on interactions and decision-making. • Adhere to company policies and industry best practices that promote diversity and equal opportunity in the workplace.
B2	Create, maintain, and enhance productive working relationships.	The apprentice will be able to: • meet deadlines, fulfil commitments, and take ownership of their work. • Clearly and concisely convey information, actively listen to others, and seeks clarification when needed to ensure understanding. • Collaborate with colleagues, respect diverse perspectives, and work towards shared goals.
B5	Take responsibility for working independently and completing work to the appropriate specifications and codes of practice.	The apprentice will be able to: • demonstrate time management skills. • Prioritise own workload to meet set deadlines. • Clarify project requirements, specifications, and relevant codes of practice before starting work. • Maintain a commitment to quality by completing work to agreed specifications and adhering to relevant codes/legislation.

B7	Accepting responsibility for their own work and actions and that of others in their team.	The apprentice will be able to: • consistently meet deadlines. • Support the goals of the team. • Identify challenges effecting the team. • Offer help and support to colleagues. • Provide constructive feedback. • Receive and act upon constructive feedback.
B8	Accepting, prioritising, delegating, and undertaking technical and other tasks effectively.	The apprentice will be able to: • accept assigned tasks, ensuring they understand the requirements and deadline requirements. • Prioritise tasks effectively based on urgency, importance, and deadlines, • Recognise when task can be delegated to colleagues based on their skills and workload. • Communicate task details, expectations, and deadlines when delegating to others. • Manage time effectively to complete assigned tasks within deadlines while maintaining a healthy work-life balance.
B9	Committed to working effectively with colleagues, the public, clients, and other stakeholders.	The apprentice will be able to: • demonstrate strong interpersonal skills that promote positive working relationships with colleagues, the public, clients, and other stakeholders. • Represent their organisation with professionalism and integrity, adhering to ethical standards in all interactions with external parties. • Collaborate with others, actively contributing to achieving goals. • Adapt their communication style and approach to different personalities and stakeholder groups.

B10	Take responsibility for personal development, demonstrating commitment to learning and self-improvement.	The apprentice will be able to: • identify areas for personal and professional development and seeks out learning opportunities. • Seeks feedback on performance and demonstrates a willingness to learn from constructive criticism. • Apply newly acquired knowledge and skills to improve work performance. • Maintain a commitment to continuous learning by attending workshops, training courses, or reading industry publications. • Seeks guidance and mentorship from experienced colleagues to accelerate their learning and development.
B11	Exercise responsibilities in an ethical manner.	The apprentice will be able to: • demonstrate honesty and transparency in their actions and communications with colleagues, client, and stakeholders. • Adhere to established company policies, codes of conduct, and relevant laws and regulations. • Recognises basic ethical dilemmas (conflict of interest) in the workplace and seeks guidance when faced with such situations.
B12	Undertake work in a way that contributes to sustainable development.	The apprentice will be able to: • demonstrate how environmental, social, and economic sustainability principles, are incorporated into their own work practices and decision-making processes. • Seek opportunities to include the principles of recycling, waste management, conservation, and environmental sustainability in their working activities. • Adhere to the principles of sustainability while executing projects.

Assessment Method 2 – Practical Observation with Questioning

KSB	Statement	Indicative Content
Skills		
S1	Applying the control principles associated with the design, function, and use of buildings	The apprentice will be able to: • develop comprehensive technical documentation for Building Automation Systems (BAS), including point lists, descriptions of operations, and cable schedules. • Interpret blueprints and schematics to identify control points. • Develop operation manuals, and ensure efficient installation and, maintenance. • Apply the functionalities of various building systems and their control components (sensors, actuators). • Apply basic control principles feedback loops, setpoint control, control algorithms, and actuator activation) for efficient building operation. • Apply advanced control strategies such as Demand-controlled ventilators (DCV), occupancy sensors, and integration with Renewable Energy sources. • Operate BAS user interface and perform basic troubleshooting. • Apply knowledge of how occupant actions can impact energy consumption.

S2	Incorporating hydrodynamics/hydronic systems into designs.	The apprentice will be able to: • apply core principles, interpret building specifications, and seamless integration of hydronic systems to enable ultimate optimization performance, energy efficiency, and comfort. • Understand basic flood properties (density, viscosity, pressure), and their influence a hydronic system behaviour. • Read and interpret diagrams illustrating hydronic system layout, pipe sizing, and component locations. • Calculate building heat load, select hydraulic system components, and perform basic hydraulic calculations. • Identify installation best practices and perform basic maintenance tasks. • Communicate hydronic design concepts to other designers (ie architects and engineers) and contractors.
S3	Applying the principles and practices of measurement technology.	The apprentice will be able to: • interpret sensor data. • Analyse trends. • Make informed decisions to optimize system • Performance and energy efficiency.

S4	Incorporating cooling systems, heat generation, and renewable technology into designs as applicable.	The apprentice will be able to: • include building requirements and environmental impact to optimise performance, reduce energy consumption, and achieve operational and comfort goals. • Analyse local climate data to understand the cooling and heating needs of a building. • Apply the specific requirements of different building types and how they influence heating and cooling strategies. • Consider building envelope optimization to minimize overall energy demands for heating and cooling. • Evaluate cooling system options, select heating systems, and integrate basic renewables.
S5	Incorporating Control Panel wiring, construction, and relay logic into the design process.	The apprentice will be able to: • select appropriate control panels considering factors such as size and capacity environmental considerations, and compatibility. • Safely install essential BAS components within the control panel (power supply, controllers, I/O modules, communication modules). • Select wiring according to schematics, termination, and colour coding. • Apply basic relay logic concepts such as reading ladder diagrams, designing simple control strategies and troubleshooting basic relay logic circuits. • Contribute to the design process by developing point lists and collaborating on control panel layout and wiring schematics.
S6	Applying communications technology protocols and media (e.g., MODBUS and BACNET).	The apprentice will be able to: • to interpret system requirements. • Configure communication networks. • Troubleshoot communication issues to ensure seamless • Integration and data exchange between system components.

S7	Applying relevant safety legislation, codes of practice, and safe working practices to themselves and others.	The apprentice will be able to: • interpret safety regulations. • Implement appropriate safety measures. • Promote a culture of safety among team members to prevent accidents and injuries.
S8	Identifying requirements for the protection of electrical installations.	The apprentice will be able to: • identify electrical hazards and analyse hazard severity. • Identify common protective devices (ie surge protection, grounding, and circuit protection). • Identify codes and standards and interpret code requirements. • Stay updated and apply code requirements in practice. • Identify potential risks.
S9	Incorporating the needs of a variety of building stakeholders (e.g., owners/operators) within the design of the BEMS system.	The apprentice will be able to: • recognise the various stakeholders involved in a building's operation, such as owners' operations, occupants', and maintenance personnel. • Analyse stakeholder priorities. • Gather stakeholder input, and present design ideas (BEMS features & functionalities) • Select BEMS functionalities that address stakeholder needs. • Contribute to developing clear documentation and preparing basic training materials.
S10	Applying the practices and procedures for the installation of BEMS wiring systems.	The apprentice will be able to: • adhere to electrical safety regulations to minimize the risk and can utilize appropriate PPE for various installation tasks. • Select appropriate cables, terminate wires securely, install wires according to plans, and adhere to colour coding standards. • Identify BEMS system components and follow BEMS installation manuals. • Maintain accurate installation records of BEMS wiring processes such as cable types, routing paths, and connection points.

S11	Interpreting the requirements for the BEMS element of electrical installations.	The apprentice will be able to: • interpret electrical drawings and schematics. • Identify BEMS components such as sensors, actuators, controllers, and communication networks. • Understand the function of BEMS such as monitoring control, and data analysis for building energy optimization. • Identify relevant electrical codes and BEMS-related codes sections.
S12	Applying the principles and practices for the commissioning of BEMS systems and equipment in a variety of building types and environments.	The apprentice will be able to: • identify the various stages of BEMS commissioning such as pre-commissioning, functional testing, integration testing, performance testing, documentation, and handover. • Utilise pre-defined checks lists to methodically conduct BEMS commissioning procedures for various components and functionalities. • Demonstrate proficiency in using basic commissioning tools to measure system parameters and verify performance. • Record test results accurately and systematically for reference and troubleshooting purposes.
S13	Applying the principles for diagnosing and correcting faults in BEMS network systems and BEMS equipment.	The apprentice will be able to: • use diagnostic tools and methodologies. • Interpret system logs and diagnostic data and isolate faults. • Apply troubleshooting techniques for resolving issues in BEMS systems. • Implement corrective actions to restore system functionality.

S14	Applying the principles for completing conditional site surveys, along with associated recommendations.	The apprentice will be able to: • conduct a thorough site visit to gather data. • Record data through appropriate methods such as visual inspection, taking notes, photographs, sketches and drawings. • Identify essential elements such as existing structures, utilities (water, sewer, electricity), topography, and vegetation. • Identify potential constraints on development based on site conditions. • Demonstrate a basic understanding of surveying principles such as using basic survey tools. • Interpret basic survey data. • Prepare basic site survey reports. • Communicate effectively with clients and colleagues.
S15	Applying knowledge of energy efficiency to optimise comfort in buildings while minimising energy usage.	The apprentice will be able to: • apply the fundamentals of heat transfer (conduction, convection, radiation) and their influence on building comfort. • Identify the role of building envelope components (walls, roof, windows) in thermal insulation and air leakage. • Identify essential building systems impacting comfort and energy use such as HVAC, lighting systems, and building envelope. • Identify passive design strategies that can improve comfort and reduce energy use.

S16	Identifying the requirements of inspection and testing of BEMS element of electrical installations within relevant legislative requirements, specifications, codes of practice, and industry recognised practices.	The apprentice will be able to: • identify relevant regulations that govern BEMS installation and how electrical codes outline specific testing requirements for BEMS components and wiring. • Identify common BEMS testing procedures such as continuity testing, insulation resistance testing, and functional testing. • Identify how specific code sections translate into testing requirements for BEMS wiring and components.
S17	Carrying out the testing, inspection, and certification of BEMS related controls and equipment.	The apprentice will be able to: • conduct rigorous inspections and tests and certify BEMS components for operational use. • Conduct functional tests, verify compliance with standards, and issue certification documents. • Interpret testing protocols and specifications.
S18	Applying the principles and practices for the design and commissioning of standard network architectures (e.g., Ethernet TCP/IP, MSTP, and RS485).	The apprentice will be able to: • apply the components of a network such as routers, switches, cables, and protocols. • Identify network topologies (bus, star, mesh) and their suitability for different applications. • Apply the knowledge of Ethernet (physical layer) and TCP/IP (communication protocol) for network communication. • Apply the function of multiple spanning tree protocol (MSTP) in preventing network loops and ensuring data flow. • Recognise RS485 as a serial communication protocol commonly used for short-distance data transmission in building automation systems. • Apply basic network design principles to create simple network layouts for BEMS. • Choose appropriate cable types based on network protocol and distance requirements.

S19	Carrying out updates to BEMS system hardware to ensure compatibility with the latest product .	The apprentice will be able to: • interpret manufacturer instructions and specifications. • Identify hardware compatibility requirements. • Perform hardware upgrades according to industry best practices. • Install firmware updates. • Replace hardware components. • Verify system compatibility and functionality after updates are completed.
Behaviours		
B1	Be aware of the needs and concerns of others, especially in relation to diversity and equality.	The apprentice will be able to: • use inclusive terminology that respects people from diverse backgrounds. • Demonstrate active listening skills by paying attention to others, avoiding interruptions, and asking clarifying questions to understand different viewpoints. • Acknowledge the potential for unconscious biases and try to minimise its effect on interactions and decision-making. • Adhere to company policies and industry best practices that promote diversity and equal opportunity in the workplace.
B2	Create, maintain, and enhance productive working relationships.	The apprentice will be able to: • meet deadlines, fulfil commitments, and take ownership of their work. • Clearly and concisely convey information, actively listen to others, and seeks clarification when needed to ensure understanding. • Collaborate with colleagues, respect diverse perspectives, and work towards shared goals.

B3	Commit to compliance with health and safety.	The apprentice will be able to: • adhere to all relevant health and safety regulations, policies, and procedures in the workplace. • Demonstrate knowledge of potential hazards and risks associated with their work tasks and takes appropriate precautions to mitigate them. • Proactively identify and report any safety concerns or violations, contributing to a culture of safety within the organisation.
B4	Strive to communicate effectively with work colleagues and clients using oral, written, and electronic methods to communicate technical and other information.	The apprentice will be able to: • demonstrate the ability to communicate technical terms clearly to both technical experts and non-technical audiences. • Adapt communication style and medium to meet the needs of individuals and situations. • Utilise communication technologies systems, messaging, email and video conferencing, that are user-friendly, effective, and have collaborative tools.
B5	Take responsibility for working independently and completing work to the appropriate specifications and codes of practice.	The apprentice will be able to: • demonstrate time management skills. • Prioritise own workload to meet set deadlines. • Clarify project requirements, specifications, and relevant codes of practice before starting work. • Maintain a commitment to quality by completing work to agreed specifications and adhering to relevant codes/legislation.

B6	Solve problems within their scope of responsibility by applying technical and behavioural skills and knowledge to define the problem, identify, evaluate, and select alternatives, and implement solutions.	The apprentice will be able to: • define problems with within their scope of responsibility. • Identify potential solutions that are feasible and adhere to relevant codes or procedures. • Evaluate potential solutions based on effectiveness, efficiency, and potential risks or limitations. • Select alternative solutions, when appropriate. • Implement solutions to bring about resolution to identified problems.
B7	Accepting responsibility for their own work and actions and that of others in their team.	The apprentice will be able to: • consistently meet deadlines. • Support the goals of the team. • Identify challenges effecting the team. • Offer help and support to colleagues. • Provide constructive feedback. • Receive and act upon constructive feedback.
B8	Accepting, prioritising, delegating, and undertaking technical and other tasks effectively.	The apprentice will be able to: • accept assigned tasks, ensuring they understand the requirements and deadline requirements. • Prioritise tasks effectively based on urgency, importance, and deadlines, • Recognise when task can be delegated to colleagues based on their skills and workload. • Communicate task details, expectations, and deadlines when delegating to others. • Manage time effectively to complete assigned tasks within deadlines while maintaining a healthy work-life balance.

B9	Committed to working effectively with colleagues, the public, clients, and other stakeholders.	The apprentice will be able to: • demonstrate strong interpersonal skills that promote positive working relationships with colleagues, the public, clients, and other stakeholders. • Represent their organisation with professionalism and integrity, adhering to ethical standards in all interactions with external parties. • Collaborate with others, actively contributing to achieving goals. • Adapt their communication style and approach to different personalities and stakeholder groups.
B10	Take responsibility for personal development, demonstrating commitment to learning and self-improvement.	The apprentice will be able to: • identify areas for personal and professional development and seeks out learning opportunities. • Seeks feedback on performance and demonstrates a willingness to learn from constructive criticism. • Apply newly acquired knowledge and skills to improve work performance. • Maintain a commitment to continuous learning by attending workshops, training courses, or reading industry publications. • Seeks guidance and mentorship from experienced colleagues to accelerate their learning and development.
B11	Exercise responsibilities in an ethical manner.	The apprentice will be able to: • demonstrate honesty and transparency in their actions and communications with colleagues, client, and stakeholders. • Adhere to established company policies, codes of conduct, and relevant laws and regulations. • Recognises basic ethical dilemmas (conflict of interest) in the workplace and seeks guidance when faced with such situations.

B12	Undertake work in a way that contributes to sustainable development.	The apprentice will be able to: • demonstrate how environmental, social, and economic sustainability principles, are incorporated into their own work practices and decision-making processes. • Seek opportunities to include the principles of recycling, waste management, conservation, and environmental sustainability in their working activities. • Adhere to the principles of sustainability while executing projects.

Open Awards Policies

Current versions of the following Open Awards policies are accessible through the Secure Portal.

These policies include:

- End Point Assessment Pricing Policy
- Reasonable Adjustments and Special Considerations Policy
- Data Protection
- Enquiries and Appeals Policy
- Complaints Policy
- Malpractice and Maladministration Policy
- Equality and Diversity Policy
- Sanctions Policy
- Safeguarding Policy
- Conflict of Interest Policy
- Fair Access Policy

In addition, the current version of the following relevant document may be obtained by training providers, employers or apprentices by contacting Open Awards directly:

- Instructions for Conducting Controlled Assessment Remotely

Support

For information about Open Awards support offer, including information on our policies, quality assurance, re-sits, appeals, complaints and general enquiries, please see our website: **www.openawards.org.uk** or contact our customer service team on 0151 494 2072 or via email at **enquiries@openawards.org.uk**.

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