ENERGY & ENVIRONMENT AWARDS

Skills for a greener world

EEA Level 3 End-point Assessment for Engineering Maintenance Technician – Single Discipline

Specification

QAN 610/6343/5
ST1426 V1.0

Specification for

EEA Level 3 End-point Assessment for Engineering Maintenance Technician – Single Discipline

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Updates to this specification

Since the first publication of the EEA Engineering Maintenance Technician (EMT) – Single Discipline Specification, the following updates have been made.

Version	Date first published	Section updated	Page(s)
v1.0	September 2025	First published	All

Section 1: At a Glance EPA Summary

Qualification name	EEA Level 3 End-point Assessment for Engineering maintenance technician – single discipline
Ofqual qualification number	610/6343/5
Standard reference	ST1426
Assessment plan	V1.0
Standard title	Engineering maintenance technician – single discipline
Specialist options	• Electrical engineering maintenance technician • Control and instrumentation engineering maintenance technician • Mechanical engineering maintenance technician
Level	3
On-programme duration	Typically 42 months Must spend a minimum of 12 months on the program and complete the required off-the-job training according to the apprenticeship funding rules
Gateway readiness	Mandatory requirements: • Employer or training provider must confirm the apprentice is ready to take the EPA • Apprentice must achieve English and mathematics qualifications in line with the apprenticeship funding rules • Compile and submit an EPA portfolio, which the interview will be based

	To confirm the apprentice has met all Gateway pre-requisites, employer must complete, sign and submit the Gateway Eligibility Form (GER) form to EEA. See Appendix B, Engineering maintenance technician – single discipline Supporting Documents 'Gateway Eligibility Form.'
End-point assessment duration	Typically 4 months after the Gateway
End-point assessment methods and their order	The assessment components can be delivered in any order. The result of one assessment method does not need to be known before starting the next: • Observation with questions • Interview (based on an EPA portfolio) • Multiple-choice test
End-point assessment methods and component grading	• Observation with questions: Fail; Pass; or Distinction • Interview (based on an EPA portfolio): Fail; Pass; or Distinction • Multiple-choice test: Fail or Pass
Overall Grading	Fail; Pass; Merit or Distinction
Certification	EEA request Apprenticeship completion certificates from the ESFA
Glossary of Terms	Appendix A, Engineering maintenance technician – single discipline Supporting Documents

Objective

The purpose of the Engineering maintenance technician (EMT) – single discipline end-point assessment (EPA) is to confirm that an apprentice is fully capable of doing their job before they receive their apprenticeship certificate. It also helps to demonstrate that what an apprentice has learned can be applied in the real world.

Once the apprentice has completed the EMT- single discipline end-point assessment requirements successfully and has been certified they could take on the following job role:

- Control and instrumentation craftsperson
- Control and instrumentation maintenance technician
- Control, instrumentation and automation technician
- Electrical craftsperson
- Electrical maintenance technician
- Engineering maintenance technician
- Engineering technician
- Maintenance and operations engineering technician
- Maintenance engineering technician
- Maintenance technician
- Mechanical craftsperson
- Mechanical maintenance technician

Professional recognition

The apprenticeship standard aligns with:

- Institution of Mechanical Engineers (IMechE) for Engineering Technician (EngTech)
- The Institution of Engineering and Technology (IET) for Engineering Technician (EngTech)

Gateway readiness

Gateway takes place before the EPA can start. The employer and training provider will review their apprentice's knowledge, skills and behaviours to see if they have met the minimum requirements of the apprenticeship set out in the apprenticeship standard and are ready to take the assessment. Only apprentices who complete Gateway successfully can start the EPA. Gateway pre-requisites are listed in the summary table above. The Gateway Eligibility Form must be completed see EMT – single discipline Supporting Documents Appendix B.

Recognition of prior learning (RPL)

Energy & Environment Awards does not recognise any apprentice prior learning (RPL) or prior achievement (RPA) for the purpose of amending the assessment requirements of any end-point assessments.

Please refer to the EEA RPL and RPA policy at: https://energyenvironmentawards.co.uk/wp-content/uploads/2025/08/RPL-and-RPA-Policy-V2.pdf

In order for EEA to award an end-point assessment qualification, the apprentice must successfully complete all required assessment components with EEA. This means that:

- each of the EPA components must be completed in full with EEA
- where an apprentice transfers to EEA from another EPAO they have to undertake the entire EPA with EEA
- components of the EPA cannot be certificated in isolation
- evidence for the portfolio and interview must be produced while the apprentice is on-programme to demonstrate current practice

This does not affect the Gateway requirements which must be met in order for an apprentice to be eligible for end-point assessment.

This does not affect any reasonable adjustments that may be granted.

Section 2: End-point Assessment Components

Component 1: Observation with questions

Overview

In the observation with questions, an independent assessor, approved by Energy & Environment Awards, will observe the apprentice in their workplace as they complete their day-to-day duties under normal working conditions. The apprentice will demonstrate the application of the relevant job role knowledge, skills and behaviours (KSBs) mapped to this assessment method through natural occurring evidence. Observations must take place in a realistic working environment that does not require special clearance. Simulation is not permitted, except in the exceptional circumstances such as national security restrictions, nuclear licenced sites or live gas environments, where access is limited.

The independent assessor will ask questions during or after the observation to clarify or confirm coverage of the mapped KSBs. To minimise disruption, questions will be asked during natural breaks in work or after tasks are completed to ensure there is no disruption to the apprentice's work flow. EEA will provide the apprentice with at least **two weeks' notice** of the assessment.

The following table outlines the procedure for conducting an observation with questions:

Assessors	1 Independent assessor, approved by EEA.
Practical structure	The total assessment time is 4 hours. The assessor can increase the time by up to 24 minutes (10%) to allow the apprentice to complete a task or respond to a question if necessary. The assessment **may be split into discrete sections** held on the same working day. **The apprentice may choose to end the observation with questions early.** Before doing so, they must be confident that they have demonstrated competence against all relevant assessment requirements. The independent assessor will ensure the apprentice fully understands the assessment requirements and the potential implications of ending the assessment early. Where appropriate, the independent assessor may advise the apprentice to continue with the assessment.

	The independent assessor must: • **only observe one apprentice at time** to ensure quality and rigour • ask questions to assess the level of competence against the grading descriptors. Questioning will take place during and after work completion The observation with questions may be split into discrete sections held on the same working day. There may be breaks during the observation to allow the apprentice to move from one location to another and for meal/comfort breaks. During these breaks, the clock will be stopped and then restarted to ensure that the assessment duration is not reduced. The breaks **must be invigilated** during the assessment, to maintain security of the EPA, in line with EEA's malpractice policy.
Under what exceptional circumstances can the observation with questions take place in a simulated environment? And What conditions must be met for this to be allowed?	In **exceptional cases** where the apprentice's usual workplace cannot be accessed due to **national security clearance, nuclear site restrictions or live gas safety concerns**, the observation with questions can take place in a simulated. In these situations, the independent assessor must seek guidance from EEA on how to arrange access and record evidence in line with the employer's requirements. The simulated environment will be chosen by EEA and must reflect the apprentice's natural working setting. Suitable locations could include a training provider's site, a training facility within the employer's premises, a test centre or another similar environment. **Only specific skills – S32; S44; S46; S48; S57 and S59 may be assessed in this simulated setting**. These may require minimal pre-installed elements to replicate real scenarios, and this must be agreed with EEA in advance.
Where will the assessment take place?	The observation with questions must take place at the apprentice's workplace in a real work setting under normal working conditions. **Simulation is not permitted under normal circumstances. Where access to the site is restricted, exceptional arrangements may apply see above.**

	Questioning that follows the observation must take place in a quiet location, free from distractions and influence.
What are the tasks that will be covered?	The apprentice will be observed carrying out **all** of the following core activities during the observation with questions: **Core** • organising own work • maintaining workplace health, safety, security, and environmental compliance • using work information and following working practices • completing work records • communicating with others The apprentice will also be observed carrying out **ONE** of the following specialist options: **Specialist Option - Electrical maintenance technician** • conducting planned electrical maintenance **Specialist Option - Control and instrumentation maintenance technician** • conducting planned control and instrumentation maintenance **Specialist Option - Mechanical maintenance technician** • conducting planned mechanical maintenance These activities provide the apprentice with the opportunity to demonstrate the KSBs mapped to this assessment component. **For further details refer to 'Knowledge, Skills and Behaviours (KSBs) Coverage' below pages [12 - 78].**
Who sets the task(s)?	EEA will review the employer and/or training provider planned tasks which are based on the activities listed above. The tasks completed should contribute to workplace productivity. See Appendix D, EMT – single discipline Supporting Documents 'Level 3 Engineering maintenance technician – single discipline observation with questions planning and approval form.'
What resources can	The employer/training provider will provide equipment and resources needed for the observation with questions.

the apprentice use?	Equipment and resources needed for the observation with questions must be: • the tools, plant, machinery, equipment and PPE required for the job • in good and safe working condition Relevant work instructions/manuals must be available in hard copy or electronically.
How many questions will the apprentice be asked?	The independent assessor: will ask a minimum of 4 questions may ask follow-up questions in order to seek clarification
What will the questions focus on?	Underpinning knowledge and/or skills and behaviours where an opportunity to observe them has not occurred.
Grading	Fail, Pass or Distinction.

Observation with questions knowledge, skills and behaviours (KSBs) coverage

The observation with questions covers:

Observation with questions Theme and Core KSBs: Organising own work	Amplification and Guidance

K4 Business operation considerations: quality, cost, delivery, and ethical practices.	• Costs
	  ○ Fixed: rent, property insurance, utilities, assets, equipment depreciation, business insurance, business rates
	  ○ Variable: wages, fuel, consumables, tools, sub-contractors and other third parties
	  ○ Warranties and service agreements
	• Service delivery
	  ○ Quality of work and outcomes
	  ○ Timeliness and responsiveness to requirements
	  ○ Customer satisfaction and feedback
	  ○ Compliance with safety and regulatory standards
	• Ethical considerations
	  ○ Fair and transparent pricing
	  ○ Environmental responsibility
	  ○ Welfare and working conditions
	  ○ Legal and regulatory compliance

K5 Planning, prioritisation, organisation, and time management techniques.	• Type of maintenance required (e.g. reactive, preventive, predictive) • Priority setting and adjustment based on operational needs • Maintenance schedules and planning approaches

Observation with questions Theme and Core KSBs: Organising own work	Amplification and Guidance

	• Scheduling methods (e.g. block scheduling, shift-based, downtime coordination)
	• Work orders and task tracking
	• Resource allocation including:
	  ○ Equipment including personal protective equipment (PPE)
	  ○ Parts and tools
	  ○ Specialist equipment
	  ○ Consumables
	  ○ Headcount and team coordination
	• Handover procedures to ensure continuity and clarity
	• Documentation tools and systems, such as:
	  ○ Gantt charts
	  ○ Spreadsheets
	  ○ Project management software (e.g. Microsoft Project)
	• Lean Maintenance Techniques, including:
	  ○ 5S
	  ○ Kaizen
	  ○ Condition-Based Maintenance (CBM)
	  ○ Total Productive Maintenance (TPM)
	  ○ Root Cause Analysis (RCA)
	• Performance Measurements Tools, such as:
	  ○ Key Performance Indicators (KPIs)
	  ○ SMART targets

Observation with questions Theme and Core KSBs: Organising own work	Amplification and Guidance
	○ Reliability-Centered Maintenance (RCM)
S2 Use planning, prioritising, organising, and time management techniques to plan tasks.	• Setting priorities based on task urgency and operational needs • Developing and following maintenance schedules • Applying scheduling methods (e.g. block scheduling, shift-based planning, downtime coordination) • Managing work orders and task tracking • Allocating resources effectively, including: ○ Equipment and PPE ○ Parts and tools ○ Specialist equipment ○ Consumables ○ Workforce planning • Conducting effective handovers to ensure continuity • Using documentation and planning systems, such as: ○ Gantt charts ○ Spreadsheets ○ Calendars ○ Project management software (e.g. Microsoft Project) • Apply lean maintenance techniques including: ○ 5S, ○ Kaizen ○ Condition-Based Maintenance (CBM) ○ Total Productive Maintenance (TPM)

Observation with questions Theme and Core KSBs: Organising own work	Amplification and Guidance
	○ Root Cause Analysis (RCA) • Monitoring performance using: ○ Key Performance Indicators (KPIs) ○ SMART targets ○ Reliability-Centered Maintenance (RCM)
S3 Identify and organise resources to complete tasks. For example, consumables.	• Identifying and organising: ○ Tools ○ Equipment ○ Documentation (hard copies and electronic formats) ○ Consumables ○ Human resources ○ Parts and materials ○ Facilities and workspace • Selecting and preparing: ○ Specialist PPE (e.g. electrical gloves, confined space gear, working at height equipment, hot work protection) ○ Technology and digital tools ○ Calibrated specific checks to meet • Conducting specific checks to meet regulatory equipment, such as: ○ Lifting Operations and Lifting Equipment Regulations (LOLER) ○ Provision and Use of Work Equipment Regulations (PUWER) ○ Portable Appliance Testing (PAT)

Observation with questions Theme and Core KSBs – Maintaining workplace health, safety, security, and environmental compliance	Amplification and Guidance

K9 Work environment hazards and risks. Risk assessments.	• Types of hazards
	  ○ Physical (e.g. noise, slips, trips and falls)
	  ○ Chemical (e.g. exposure to hazardous substances)
	  ○ Mechanical and electrical (e.g. moving parts, live circuits)
	  ○ Ergonomic (e.g. repetitive strain, poor posture)
	  ○ Psychosocial (e.g. stress, fatigue, lone working)
	• Risk Assessments
	  ○ Types: Generic and dynamic risk assessments
	  ○ Hazard identification: Recognising potential hazards associated with engineering maintenance tasks
	  ○ Risk Evaluation: Assessing the likelihood and severity of risks to determine appropriate control measures; identify new risks and evaluate
	  ○ Control measures: implement measures to mitigate identified risks, ensuring the safety of all personnel and the environment, management of actions
	  ○ Documentation: Accurately recording risk assessments, including identified hazards, risk levels and control measures

K10 Safe systems of work.	• Key elements of a Safe System at Work:
	  ○ Hazard identification
	  ○ Risk assessment
	  ○ Procedure, process development or optimisation

Observation with questions Theme and Core KSBs – Maintaining workplace health, safety, security, and environmental compliance	Amplification and Guidance
	○ Implentation of control measures ○ Training, competency and self-development ○ Effective communication ○ Monitoring and supervision ○ Review, continuous improvement and lessons learned ○ Emergency procedures (e.g. evacuation, accident response, electrocution protocols, use of insulator equipment such as plastic brooms) • Types of Safe Systems of Work (SSoW) ○ Standard Operating Procedures (SOPs) ○ Permit to Work Systems ○ Safe Work Method Statements (SWMS) ○ Risk Control Plans
K11 Personal protective equipment (PPE): selection, use, and care.	• Common PPE types: ○ Safety boots/shoes ○ Safety glasses ○ Overalls ○ Face masks ○ Protective gloves (e.g. general use, heat-resilient gauntlets, insulated electrical gloves) ○ Hard hat, bump caps ○ Goggles

Observation with questions Theme and Core KSBs – Maintaining workplace health, safety, security, and environmental compliance	Amplification and Guidance
	○ Weld masks ○ Respirator • Role specific PPE and safety equipment: ○ Gas monitors ○ Oxygen supply systems ○ Safety harnesses and fall arrest systems • PPE care and management: ○ Correct selection based on task and environment ○ Proper use and wearing techniques ○ Inspection for damage or wear ○ Cleaning, maintenance and storage ○ Replacement schedules and reporting defects
K12 Asset security requirements.	• Mechanical security: ○ Use of mechanical locks and secure storage ○ Maintenance and inspection of locking mechanisms • Access control: ○ Controlled access to restricted areas ○ Key management and authorisation protocols • Digital and cyber security: ○ Use of cyber systems to protect electronic data ○ Awareness of data protection policies and secure handling of digital information

Observation with questions Theme and Core KSBs – Maintaining workplace health, safety, security, and environmental compliance	Amplification and Guidance

	• General asset protection:
	  ○ Adherence to procedures for safeguarding tools, equipment and materials
	  ○ Reporting and escalation of security breaches or concerns

K15 Recycling and waste management requirements.	• Company procedures:
	  ○ Waste management and recycling policies
	  ○ Procedures for handling, segregating and disposal of waste appropriately
	  ○ Identification and separation of recyclable, non-recyclable and hazardous waste
	• Safe handling and disposal of hazardous materials:
	  ○ Use of appropriate containers and labelling
	  ○ Storage and transport in line with safety protocols
	  ○ Reporting and escalation procedures for spills or incidents
	• Relevant legislation and regulations:
	  ○ Hazardous Waste (England and Wales) Regulations 2005 which governs classification, tracking and safe disposal of hazardous waste
	  ○ Environmental Protection Act 1990, which sets the legal framework for waste management and pollution control, including the duty of care for waste producers

Observation with questions Theme and Core KSBs – Maintaining workplace health, safety, security, and environmental compliance	Amplification and Guidance
	○ Waste Electrical and Electronic Equipment (WEEE) Regulations 2013, which promotes the recovery, reuse and recycling of electrical and electronic equipment to reduce landfill
S7 Identify environmental and health and safety hazards and risks and apply control measures.	• Identifying environmental hazards and risks, such as: ○ Oils, greases, paints, coolants and other chemicals (e.g. those covered by Control of Substances Hazardous to Health (COSHH) ○ Contaminated waste and hazardous disposal materials ○ Volatile Organic Compounds (VOCs) ○ Ground and water pollution ○ Noise pollution and overuse of resources ○ Specialist hazards (e.g. air pollution and radiation) • Identifying health and safety hazards and risks, including: ○ Physical: slips, trips, falls, working at height, manual handling ○ Confined spaces and hot works ○ Chemical: exposure to harmful substances ○ Mechanical: injuries from moving machinery, tools and loose objects, sparks ○ Stored energy: hydraulic, pneumatic, steam, electrical, spring-loaded systems ○ Electrical: electrocution, burns or fires ○ Ergonomic**:** poor posture, repetitive strain; musculoskeletal disorders ○ Psychosocial: stress, fatigue, disputes, irregular hours, repetitive tasks

Observation with questions Theme and Core KSBs – Maintaining workplace health, safety, security, and environmental compliance	Amplification and Guidance
	○ Other hazards: radiation, oxygen depletion, excessive noise levels • Applying control measures using the hierarchy of control: ○ Elimination of the hazard ○ Substitution with a safer alternative ○ Engineering controls (e.g. guarding, isolation) ○ Administrative controls (e.g. procedures, training, supervision) ○ Use of PPE ○ Isolation of stored energy (e.g. Lock Out Tag Out Procedures)
S8 Apply health, safety, and environmental procedures in compliance with regulations, standards, and guidance. For example, signage and barriers, working at height, confined spaces, and COSHH.	• Apply relevant health and safety legislation and regulations, such as: ○ Health and Safety at Work Act 1974 (HSWA) ○ Management of Health and Safety at Work Regulations 1999 ○ Workplace (Health, Safety and Welfare) Regulations 1992 ○ Personal Protective Equipment Regulations (PPE) 2022 (amended) ○ The Provision and Use of Work Equipment Regulations (PUWER) 1998 ○ Lifting Operations and Lifting Equipment Regulations (LOLER) ○ Manual Handling Operations Regulations 1992 ○ Electricity at Work Regulations 1989 ○ Electrical Equipment (Safety) Regulations 2016 ○ Confined Spaces Regulations 1997 ○ Working at Height Regulations 2005 ○ Control of Substances Hazardous to Health (COSHH) Regulations 2002

Observation with questions Theme and Core KSBs – Maintaining workplace health, safety, security, and environmental compliance	Amplification and Guidance
	○ Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) 2013 ○ Health and Safety (First-Aid) Regulations 1981 • Apply environmental and waste management procedures, including: ○ Environmental Protection Act 1990 ○ Emergency response procedures (e.g. evacuation, first aid, fire safety) ○ Waste Electrical and Electronic Equipment (WEEE) Regulations 2013 ○ Safe disposal of materials (e.g. stripping copper from motors) ○ Pollution prevention and resource efficiency • Use of safety systems and procedures: ○ Permit to Work (PTW) systems ○ Emergency response procedures (e.g. evacuation, first aid, fire safety) ○ Use of signage and barriers to control access and indicate hazards ○ Documentation and record-keeping to support compliance
S9 Follow security procedures. For example, site access, document classification, and securing assets.	▪ Access control and identification: ○ Use of security ID passes ○ Adhering to site access protocols and restricted area permissions ▪ Document and information security: ○ Securing tools, equipment and materials when not is use ○ Locking and monitoring storage areas and workspaces ▪ Technology-enables security measures: ○ Use of electronic security systems such as:

Observation with questions Theme and Core KSBs – Maintaining workplace health, safety, security, and environmental compliance	Amplification and Guidance
	▪ Retina scans ▪ Fingerprint recognition ▪ Voice recognition ▪ Awareness of emerging technologies and AI based security systems • Reporting and escalation: ○ Following procedures for reporting security breaches or suspicious activity ○ Understanding the importance of timely communication and documentation
S12 Segregate items for reuse, recycling, and waste.	• Extracting materials, components or substances from maintenance tasks in a way that minimises damage and preserves potential reuse or recycling • Identifying and categorising items based on their suitability for: ○ Reuse (e.g. cleaned and inspected components) ○ Recycling (e.g. metals, plastics, electrical items) ○ Disposal (e.g. general waste, hazardous materials) • Segregating items into appropriate waste streams using: ○ Correct containers ○ Clear labelling ○ Safe and compliant storage methods • Ensuring reusable items are: ○ Cleaned

Observation with questions Theme and Core KSBs – Maintaining workplace health, safety, security, and environmental compliance	Amplification and Guidance
	○ Inspected ○ Stored appropriately for future use • Transferring recyclable materials to: ○ Designated collection points ○ Authorised recycling facilities • Disposing of non-recyclable or hazardous waste in line with: ○ Duty of care requirements ○ Environmental legislation and company procedures • Maintaining records of: ○ Waste handling ○ Segregation activities ○ Disposal or recycling routes (where required)
B1 Prioritise safe working practices. For example, risk aware, minimise risks, and proactively work towards preventing accidents.	• Risk awareness and proactive safety conduct: ○ Identifying hazards and conducting risk assessments ○ Making informed decisions to reduce or eliminate risks ○ Taking personal responsibility for safety and quality ○ Exercising STOP work authority when unsafe conditions are identified • Application of safety procedures and controls: ○ Developing and following procedures and control measures ○ Using appropriate PPE ○ Applying emergency procedures (e.g. evacuation, first aid, electrocution response

Observation with questions Theme and Core KSBs – Maintaining workplace health, safety, security, and environmental compliance	Amplification and Guidance

	• Competency and communication:
	  ○ Maintaining training and competency relevant to tasks
	  ○ Communicating clearly with colleagues and supervisors about safety concerns
	  ○ Participating in monitoring, supervision and safety briefings
	• Continuous improvement and learning:
	  ○ Reviewing incidents and near misses
	  ○ Applying lessons learned to improve future safety practices
	  ○ Contributing to updates of procedures and risk controls
	• Safe systems of work (SSoW):
	  ○ Standard Operating Procedures (SOPs)
	  ○ Permit to Work (PTW) Systems
	  ○ Safe Work Method Statements (SWMS)
	  ○ Risk Control Plans

Observation with questions Theme and Core KSBs – Using work information and following working practices	Amplification and Guidance
K19 Sources of engineering information.	• Technical documentation and reference materials: ○ Engineering drawings (hardcopy and electronic)

Observation with questions Theme and Core KSBs – Using work information and following working practices	Amplification and Guidance
	○ Computer-Aided Design (CAD) 2D and 3D drawings and models (via laptops, tablets) ○ Work instructions, method statements, standard work procedures ○ Manufacturer's technical documentation and manuals ○ Design specifications, test results and performance data ○ Plant configurations and layout diagrams ○ Engineering reference tables (e.g. Zeus tables) • Professional and institutional sources: ○ Engineering Institutions such as Institution of Mechanical Engineers (IMechE) and Institution of Engineering and Technology (IET) ○ The Engineering Council and other regulatory or professional bodies • Emerging technologies and digital tools: ○ Augmented Reality (AR) for interactive 3D visualisation and guidance ○ Rapid prototyping tools and models for design validation and maintenance planning
K20 Engineering standards - British (BSI and International (ISO).	• British Standards Institution (BSI): ○ The UK's national standards body ○ Develops and publishes British Standards (BS) ○ Ensures alignment with UK legislation and industry best practice • International Organisation for Standardisation (ISO): ○ An independent, non-governmental international body

Observation with questions Theme and Core KSBs – Using work information and following working practices	Amplification and Guidance
	○ Develops globally recognised standards (e.g. ISO9001 for quality management, ISO 14001 for environmental management) ○ Promotes international consistency and interoperability in engineering and manufacturing
K22 Quality management systems.	• Total Quality Management (TQM): A company wide approach focused on long-term success through customer satisfaction, involving all members of the organisation in improving processes, products and services • ISO 9001: An internationally recognised standard for quality management systems, setting out criteria for a systematic approach to managing quality and meeting customer regulatory requirements • Sector-specific standards: For example, BS EN 9100:2018 for the aerospace industry, which builds on ISO 9001 with additional requirements for safety, reliability and traceability • Continuous improvement methodologies: Lean management: Focused on reducing waste and increasing value in processes Six Sigma: A data driven approach to improving quality by identifying and eliminating defect and variability in processes

Observation with questions Theme and Core KSBs – Using work information and following working practices	Amplification and Guidance

K23 Standard operating procedures (SOP): what they are and why they are important.	• Structure and content of SOPs:
	  ○ Detailed written instructions
	  ○ Task-specific and structured formats
	  ○ Designed for consistency and repeatability
	• Purpose and benefits:
	  ○ Ensuring safety and reducing risk
	  ○ Promoting consistency and efficiency
	  ○ Supporting quality control and measurement
	  ○ Enabling accurate reporting and accountability
	  ○ Facilitating continuous improvement and lessons learnt reducing risk

K24 Foreign material exclusion requirements.	• Purpose of FME:
	  ○ Prevent introduction of debris, tools or other foreign objects into systems
	  ○ Maintain operational integrity and reliability
	• Impact on operations:
	  ○ Ensures precision in mechanical and electrical systems
	  ○ Protects safety of personnel and equipment
	  ○ Maintains product and service quality
	• Typical FEM practice:
	  ○ Use of FME zones and barriers
	  ○ Tool and material accountability
	  ○ Inspection and clean-as-you-go protocols

Observation with questions Theme and Core KSBs – Using work information and following working practices	Amplification and Guidance
	○ Documentation and reporting of FME incidents
S1 Review and use information. For example, work instructions, drawings, design specifications, and plant configurations.	• Technical documentation: ○ Work instructions, methods statements, Standard Operating Procedures (SOPs), Standard Work ○ Manufacturer's manuals and technical documentation ○ Design specifications, test results and engineering standards ○ Plan configurations and Zeus tables • Drawings and models: ○ Hardcopy and electronic engineering drawings ○ Computer-Aided Design (CAD) 2D and 3D models ○ Rapid prototypes and visualisation tools • Digital and emerging technologies: ○ Use of tablets, laptops and mobile devises for accessing technical data ○ Augmented Reality (AR)and other immersive technologies for 3D visualisation • Professional resources: ○ Engineering institutions such as the Institution of Mechanical Engineers (IMechE) and Institution of Engineering and Technology (IET) ○ The Engineering Council and its role in professional standards
S5 Identify equipment to work on. Check plant configuration is as defined.	• Identification of equipment:

Observation with questions Theme and Core KSBs – Using work information and following working practices	Amplification and Guidance
	○ Locate and confirm the correct asset or system based on work instructions or maintenance schedules ○ Cross-reference equipment tags, serial numbers or asset registers • Vehicle of plant configuration: ○ Check that the plant setup matches the defined configuration in technical documentation ○ Confirm alignment with design specifications, schematics or system diagrams ○ Validate that any recent changes or updates have been documented and approved • Use of supporting documentation: ○ Review work orders, maintenance schedules and configuration records ○ Liaise with supervisors or technical teams if discrepancies are found
S6 Prepare the work area for maintenance tasks.	• Work preparation: ○ Confirm job allocation and responsibilities ○ Review and organise relevant documentation (e.g. work orders, risk assessments) • Resource readiness: ○ Gather and check tools and equipment, including PPE ○ Ensure availability of power tools and power supply ○ Prepare spare components and consumables required for the task • Safety and access control:

Observation with questions Theme and Core KSBs – Using work information and following working practices	Amplification and Guidance
	○ Conduct and apply risk assessments ○ Confirm access arrangements and working boundaries ○ Implement isolation procedures for electrical and mechanical systems ○ Apply Lock Out Tag Out (LOTO) protocols using padlocks, keys and tags ○ Set up signs and physical barriers to cordon off the area and provide appropriate warning signage
S14 Apply engineering maintenance standards and procedures.	• Documentation and planning: ○ Review plant layout, technical documentation and maintenance procedures ○ Interpret engineering standards and apply them to specific tasks • Inspection and verification: ○ Conduct physical inspections of the work area and equipment ○ Review control system configurations and settings ○ Perform functional testing to confirm correct operation • Compliance and collaboration: ○ Check alignment with relevant regulations, standards and organisational procedures ○ Consult with operational and maintenance staff to confirm requirements and resolve discrepancies

Observation with questions Theme and Core KSBs – Using work information and following working practices	Amplification and Guidance

S15 Apply foreign material exclusion procedures.	• Contamination control:
	  ○ Apply procedures to prevent introduction of debris, tools or foreign materials
	  ○ Conduct cleaning and containment activities before, during and after maintenance
	• Cross- contamination prevention:
	  ○ Use colour coding systems for tools and materials
	  ○ Maintain designated clean areas and separate storage zones
	  ○ Apply clear labelling to identify and segregate items
	• Tool and equipment management:
	  ○ Exclude non-essential tools and equipment from FME zones
	  ○ Account for all items before and after task completion
	• Physical controls**:**
	  ○ Use barriers, covers and isolation techniques to protect sensitive systems
	  ○ Implement FEM checklist and documentation protocols

S16 Follow maintenance tools and equipment control procedures. For example, handling and storage.	• Storage and identification:
	  ○ Use correct labelling and coding systems
	  ○ Store tools and equipment appropriately (e.g. toolboxes, cabinets, racks, drawers)
	• Condition and safety:
	  ○ Inspect and maintain tools and equipment regularly

Observation with questions Theme and Core KSBs – Using work information and following working practices	Amplification and Guidance
	○ Handle and operate tools safely using appropriate techniques ○ Use PPE as required • Compliance and control: ○ Undertake training and competency checks for tool use ○ Apply calibration, quarantine and testing procedures (e.g. Portable Appliance Testing - PAT) ○ Disposal of obsolete or damaged equipment in line with organisational and environmental procedures ○ Follow recycling protocols where applicable ○ Apply control procedures for lifting equipment, including coding and inspection
S17 Reinstate the work area.	• Work area reinstatement: ○ Remove tools, equipment and temporary barriers ○ Clean surfaces and ensure the area id free from debris or contamination ○ Restore any systems or services that were isolated during maintenance • Waste management: ○ Identify and segregate waste types (recyclable, non-recyclable and hazardous) ○ Dispose of waste in accordance with environmental regulations and company procedures

Observation with questions Theme and Core KSBs – Using work information and following working practices	Amplification and Guidance
	○ Use appropriate containers and labelling for hazardous materials • Final checks: ○ Confirm the area is safe for operational use ○ Complete any required documentation or handover reports
S23 Identify and highlight issues (red pen) with drawings as found.	• Issue identification: ○ Detect inaccuracies, errors or omissions in technical documentation ○ Review drawings and specifications against actual conditions or updated requirements • Mark-up and communication: ○ Apply red pen or digital markup procedures in line with company standards ○ Ensure annotations are clear, traceable and appropriately documented ○ Communicate identified issues to relevant personnel (e.g. design, engineering or maintenance teams) • Documentation types: ○ Engineering drawings (hardcopy and digital) ○ CAD models (2D and 3D) ○ Technical specifications and design documents
B3 Take ownership for the delivery and quality of own work. For example, self-motivated, disciplined in the approach to	• Responsibility and discipline: ○ Understand and manage the scope of assigned maintenance tasks

Observation with questions Theme and Core KSBs – Using work information and following working practices	Amplification and Guidance
work tasks, and work carried out in line with standards.	○ Follow relevant regulations, safety standards and operational procedures • Quality and compliance: ○ Use tools and equipment correctly and safely ○ Perform inspection, testing and monitoring activities with attention to detail ○ Maintain quality and compliance throughout the task lifecycle • Self-management and improvement: ○ Set and manage priorities effectively ○ Conduct and apply risk assessments ○ Communicate appropriately before and during work activities ○ Record measurements, test results and reports accurately ○ Engage in self-evaluation and seek feedback to improve performance

Observation with questions Theme and Core KSBS – Completing work records	Amplification and Guidance
K25 Documentation requirements: documentation control, auditable records.	○ Documentation control: ○ Accessing the correct issue/version of documentation ○ Checking document status and validity ○ Understanding access permissions and security protocols

Observation with questions Theme and Core KSBS – Completing work records	Amplification and Guidance
	○ Retention periods and archiving procedures ○ Audible records: ○ Work orders and maintenance requests ○ Inspection and testing records ○ Maintenance and action logs ○ Concessions (e.g. limitations of use) ○ Corrective maintenance records ○ Parts and materials usage ○ Health and safety compliance records ○ Regulatory compliance documentation ○ Asset management records ○ Training and competency records ○ Compliance: ○ Adherence to internal documentation standards ○ Compliance with relevant regulatory and legal requirements
S21 Record information	• Maintenance documentation: ○ Record dates, times and types of failure (e.g. corrective maintenance, breakdown log) ○ Complete inspection sheets and equipment condition reports ○ Document types of predictive maintenance used, parts replace and consumables used ○ Log test results, corrective actions taken and lessons learned • Completion and verification:

Observation with questions Theme and Core KSBS – Completing work records	Amplification and Guidance
	○ Confirm task completion and sign-off as per company protocols ○ Record repair vs replace decisions, including cost, lead-time and downtime analysis • Compliance and safety: ○ Ensure records reflect health and safety measures taken ○ Maintain documentation to support regulatory compliance and audit requirements

Observation with questions Theme and Core KSBs – Communicating with others	Amplification and Guidance

K29 Verbal communication methods and techniques. Engineering maintenance terminology.	• Verbal communication methods and techniques:
	  ○ Clear verbal instructions – Deliver concise and accurate spoken instructions, especially in noisy, time-sensitive or safety-critical environments
	  ○ Tone and clarity – Use appropriate tone, pace and volume to ensure messages are understood across diverse teams and settings
	  ○ Active listening – Demonstrate attentive listening and appropriate verbal responses to confirm understanding and encourage collaboration
	  ○ Verbal briefings and handovers – Conduct effective verbal briefings, shift handovers and toolbox talks to ensure continuity and shared understanding
	  ○ Questioning and feedback – Use open and closed questions to clarify information and provide constructive verbal feedback during maintenance activities
	Engineering maintenance terminology:
	• Common terms – Understand key concepts such as preventive maintenance, corrective maintenance, predictive maintenance and reliability-centred maintenance
	• Equipment-specific vocabulary – Be familiar with terms related to systems and components such as bearings, couplings, lubrication and alignment

Observation with questions Theme and Core KSBs – Communicating with others	Amplification and Guidance
	• Technical documentation – Interpret manuals, schematics and maintenance logs; understand the importance of accurate verbal reporting of findings and actions • Industry standards – Recognise relevant standards and regulations, including those from the British Standards Institution (BSI) and the Health and Safety Executive (HSE) • Stakeholder communication – Communicate technical information clearly and verbally to non-technical stakeholders, ensuring understanding and transparency

S19 Communicate with others to give and receive information. For example, colleagues, customers, and stakeholders.	• Audience awareness:
	  ○ Understand the needs and expectations of different audiences (e.g. technical vs non-technical)
	  ○ Tailor messaging to suit the context and recipient
	• Communication techniques:
	  ○ Deliver clear and concise verbal and written messaging
	  ○ Use active listening to understand instructions, feedback and concerns
	  ○ Apply non-verbal communication appropriately (e.g. body language, eye contact)
	• Channels and tools:
	  ○ Select appropriate communication channels (e.g. face to face, email, phone) based on urgency and context
	  ○ Maintain accurate documentation and records of communication where required

Observation with questions Theme and Core KSBs – Communicating with others	Amplification and Guidance

	• Professional conduct
	  ○ Communicate respectfully and professionally at all times
	  ○ Use feedback mechanisms to support continuous improvement
	  ○ Collaborate effectively with others to support task completion and problem-solving

Observation with questions Theme and Specialist option KSBs – Conducting planned electrical maintenance	Amplification and Guidance

Electrical engineering maintenance technician.
 	
K34 Electrical isolation and de-isolation requirements: lockout tagout and testing for dead.
	• Preparation and authorisation:
	  ○ Identify all sources of electrical energy (e.g. mains, backup systems, stored energy)
	  ○ Notify all personnel affected by the isolation process
	  ○ Ensure only authorised personnel carry out isolation and de-isolation activities
	• Isolation procedures:
	  ○ Isolate equipment from all energy sources
	  ○ Apply lockout devices (may involve multiple locks for team isolation)
	  ○ Attach warning tags (Tagout) to clearly indicate isolation status
	• Testing and verification:
	  ○ Test for dead using approved and calibrated test equipment

Observation with questions Theme and Specialist option KSBs – Conducting planned electrical maintenance	Amplification and Guidance
	○ Confirm zero energy before commencing work • De-isolation and re-energisation: ○ Remove lockout/tagout devices following correct procedures ○ Re-energise equipment safely and conduct appropriate testing ○ Communicate completion of de-isolation to affected personnel
Electrical engineering maintenance technician. **K41** Electrical plant, equipment, and systems maintenance requirements: removing and replacing parts, inspecting, testing, setting up, adjusting, cleaning, and functional testing.	• Inspecting and testing: ○ Perform visual checks and functional tests ○ Use appropriate test equipment to assess system performance and integrity • Component replacement: ○ Safely remove and replace electrical parts such as panels, motors, generators and control units ○ Follow procedures for handling and installing components • System setup and adjustment: ○ Configure and adjust electrical aspects of: ▪ Plant and control systems; Power distribution networks; Motors and drives; Lighting systems; Circuit protection systems; Earthing and grounding systems; Backup power systems • Cleaning and maintenance: ○ Clean control panels, motors, switchgear, transformers, cables and wiring ○ Maintain cleanliness to prevent faults correct operation

Observation with questions Theme and Specialist option KSBs – Conducting planned electrical maintenance	Amplification and Guidance

	• Functional testing:
	  ○ Conduct final tests to confirm correct operation
	  ○ Ensure compliance with:
	  ▪ Safety requirements
	  ▪ Task specifications
	  ▪ Company policies and procedures
	  ▪ Personal and team responsibilities

Electrical engineering maintenance technician.
 	
K42 Electrical maintenance tools, measurement, and test equipment application, operation, care and calibration requirements.
	• Tool and equipment selection:
	  ○ Choose appropriate tools and test equipment based on task requirements
	  ○ Understand the function and limitations of each device
	• Operation and setup:
	  ○ Adjust device settings and measurement ranges as required
	  ○ Carry out pre-use checks to confirm equipment functionality
	  ○ Use tools and equipment in accordance with manufacturer instructions and company procedures
	• Care and maintenance:
	  ○ Handle equipment safely and store correctly to prevent damage
	  ○ Maintain calibration and cleanliness
	  ○ Report faults and follow procedures for quarantine or repair
	• Examples of tools and test equipment may include:
	  ○ Hand tools: screwdrivers, pliers, wire strippers, crimpers

Observation with questions Theme and Specialist option KSBs – Conducting planned electrical maintenance	Amplification and Guidance
	○ Electrical test equipment: ▪ Multimeters/multifunction testers; Oscilloscopes; Ammeters/voltmeters; Megohmmeters/insulation resistance testers; Clamp meters; Earth resistance testers; Proving units; Battery testers; Circuit breaker testers; Thermal imaging camera (thermography); Vibration analysers; Leakage current tester; Continuity tester; Dielectric strength tester; Voltage testers and indicators; Acoustic detection equipment
Electrical engineering maintenance technician. **S27** Confirm safe electrical isolation (lockout tagout) method has been applied and test for dead.	• Preparation and authorisation: ○ Identify all sources of electrical energy (e.g. mains, stored energy, backup systems) ○ Notify all personnel affected by the isolation process ○ Ensure only authorised personnel are involved in isolation and de-isolation activities • Isolation procedures: ○ Isolate equipment from energy sources following approved methods ○ Apply lockout devices (may involve multiple locks for team isolation) ○ Attach warning tags (Tagout) to indicate isolation status • Testing for dead: ○ Use appropriate and calibrated test equipment to confirm zero energy ○ Follow company procedures for verifying safe conditions for verifying safe conditions before work begins

Observation with questions Theme and Specialist option KSBs – Conducting planned electrical maintenance	Amplification and Guidance

	• De-isolation and re-energisation:
	  ○ Remove lockout/tagout devices in accordance with procedure
	  ○ Re-energise equipment safely and conduct final testing
	  ○ Communicate completion of de-isolation to relevant personnel

Electrical engineering maintenance technician.
 	
S28 Select, check, and use electrical maintenance tools, measurement, and test equipment.
	• Selection and suitability:
	  ○ Choose tools and test equipment appropriate for the task and environment
	  ○ Understand the function and limitations of each device
	• Safety and functionality checks:
	  ○ Confirm equipment is safe to use and in good working condition
	  ○ Verify regulatory checks are current, including:
	  ▪ Portable Appliance Testing (PAT)
	  ▪ Calibration and certification
	• Operation and care:
	  ○ Use tools and equipment in line with manufacturer instructions and company procedures
	  ○ Handle and store equipment correctly to prevent damage
	  ○ Report faults and follow procedures for quarantine or repair
	Example of tools and test equipment may include:
	• Hand tools: screwdrivers, pliers, wire strippers, crimpers
	• Electrical test equipment:

Observation with questions Theme and Specialist option KSBs – Conducting planned electrical maintenance	Amplification and Guidance
	○ Multimeters/multifunction testers; Oscilloscopes; Ammeters/voltmeters; Megohmmeters/insulation resistance testers; Clamp meters; Earth resistance testers; Proving units; Battery testers; Circuit breaker testers; Thermal imaging cameras (thermography); Vibration analysers; Leakage current testers; Continuity testers; Dielectric strength testers; Voltage testers and indicators and Acoustic detection equipment
Electrical engineering maintenance technician. **S31** Inspect and test electrical aspects of plant. For example, visual checks, insulation and continuity checks, thermographic surveys, and voltage levels.	• Sensory Inspection: ○ Perform visual checks for signs of wear, damage or overheating ○ Detect unusual smells (e.g. burning insulation), noises (e.g. humming, rattling) and vibrations • Electrical testing: ○ Insulation resistance; Continuity; Bonding; Current and voltage levels; Resistance and phase unbalance; Dielectric strength; Earth resistance; Load conditions; Residual Current Device (RCD) functionality; Earth loop impedance • Advanced diagnostics: ○ Conduct thermographic surveys using thermal imaging equipment ○ Interpret test results to identify faults and recommend corrective actions
Electrical engineering maintenance technician.	• Removal and replacement of electrical items and components in line with: ○ Relevant health and safety regulations ○ Company policies and procedures

Observation with questions Theme and Specialist option KSBs – Conducting planned electrical maintenance	Amplification and Guidance
S32 Remove and replace electrical parts.	○ Manufacturer instructions ○ Job role and sector-specific requirements
Electrical engineering maintenance technician. **S34** Set up, align and adjust electrical aspects of plant.	• Installation and setup: ○ Install electrical equipment and components in line with specifications ○ Carry out wiring and cabling task, including selection of cable types and routing ○ Perform electrical terminations using appropriate methods and materials ○ Conduct tug tests to verify secure connections • Alignment of electrical systems and components: ○ Align sensors, actuators and control devices to ensure correct positioning and signal accuracy ○ Align electrical enclosures, panels and fixtures to meet mechanical and electrical tolerances ○ Use test instruments (e.g. multimeters, oscilloscopes) to verify alignment of voltage, current and signal parameters ○ Ensure alignment supports system integration, minimises interference and meets operational requirements • Adjustment and commissioning: ○ Commission electrical plant and systems to confirm correct operation ○ Check and adjust protection devices (e.g. circuit breakers, RCDs) ○ Configure and fine-tune control systems and voltage settings

Observation with questions Theme and Specialist option KSBs – Conducting planned electrical maintenance	Amplification and Guidance
	○ Adjust frequency drives and other programmable devices • Maintenance and optimisation: ○ Lubricate, clean and tighten electrical components and connections ○ Ensure all adjustments comply with relevant safety standards and company procedures
Electrical engineering maintenance technician. **S35** Clean parts. For example, removal of dust and debris.	• Cleaning electrical components and equipment such as: ○ Panels ○ Switchgear ○ Distribution boards ○ Ventilation grills and ducts Following: ○ Relevant safety protocols before starting the task ○ Correct cleaning procedures ○ Appropriate precautions to prevent damage or risk ○ Suitable techniques for the type of component and contamination
Electrical engineering maintenance technician. **S36** Conduct and confirm electrical and connected services de-isolation.	• Pre-de-isolation checks ○ Confirm completion of all maintenance tasks and safety checks ○ Verify equipment condition and readiness for operation ○ Ensure personnel safety and awareness of de-isolation activities • De-isolation procedures: ○ Remove all locks and tags applied during isolation (LOTO) ○ Maintain clear communication between all personnel involved

Observation with questions Theme and Specialist option KSBs – Conducting planned electrical maintenance	Amplification and Guidance
	○ Confirm system readiness for re-energisation • Re-energisation and verification: ○ Re-energise the system gradually and monitor for abnormalities ○ Conduct functional testing and commissioning checks ○ Complete maintenance records and documentation • Handover and return to service: ○ Follow reporting and handover procedures ○ Ensure the system is returned to normal operational status
Electrical engineering maintenance technician. **S37** Conduct functional testing.	• System re-energisation: ○ Follow approved procedures to re-energise equipment safely ○ Monitor system during start-up for any irregularities • Functional testing: ○ Perform functional tests to confirm that equipment and systems operate as expected ○ Use appropriate test equipment and methods based on system type and task requirements • Verification and documentation: ○ Confirm operational status and system stability ○ Complete maintenance records accurately ○ Notify relevant personnel that equipment is operational • Handover: ○ Follow handover procedures to ensure clear communication of task completion ○ Provide relevant information to stakeholders or operational teams

Observation with questions Theme and Specialist option KSBs: Conducting planned control and instrumentation maintenance	Amplification and Guidance

Control and instrumentation engineering maintenance technician.
 	
K47 Isolation and de-isolation of connected services considerations and requirements.
	• Identify the services to be isolated:
	  ○ Electrical power; Compressed air; Hydraulic pressure; Steam and other process fluids
	• Hazard and risk assessment:
	  ○ Evaluate potential hazards associated with each service
	  ○ Conduct risk assessments prior to isolation
	• Isolation devices and methods:
	  ○ Use of valves and shut-off valves; Lockout Tagout (LOTO) systems; Pressure relief systems; Blanking plates and physical barriers
	• Mechanical and electrical de-energisation:
	  ○ Isolate mechanical equipment and ensure zero energy state
	  ○ Confirm isolation through testing and verification
	• De-isolation procedures:
	  ○ Confirm completion of maintenance and safety checks
	  ○ Verify equipment condition and readiness
	  ○ Ensure personnel safety and remove all locks and tags
	  ○ Maintain clear communication between involved personnel
	  ○ Re-energise systems gradually and monitor performance
	  ○ Conduct functional testing and commissioning
	  ○ Complete maintenance records and documentation
	  ○ Hand back equipment to production safely and effectively
	• Special considerations for hazardous materials:

Observation with questions Theme and Specialist option KSBs: Conducting planned control and instrumentation maintenance	Amplification and Guidance
	○ Purge hazardous materials from systems ○ Ventilate the area to ensure safe working conditions ○ Use containment systems to prevent exposure or release
Control and instrumentation engineering maintenance technician. **K48** Electrical isolation and de-isolation requirements: lockout tagout, testing for dead.	• Identify the services to be isolated: ○ Electrical power ○ Compressed air ○ Hydraulic pressure ○ Steam and other process fluids • Hazard and risk assessment: ○ Evaluate potential hazards associated with each service ○ Conduct risk assessments prior to isolation • Isolation devices and methods: ○ Use of valves and shut-off mechanisms ○ Lockout Tagout (LOTO) systems ○ Pressure relief systems ○ Blanking plates and physical barriers • Mechanical and electrical de-energisation: ○ Isolate mechanical equipment and ensure a zero-energy state ○ Confirm isolation though appropriated testing and verification • De-isolation procedures: ○ Confirm completion of maintenance and safety checks ○ Verify equipment condition and readiness

Observation with questions Theme and Specialist option KSBs: Conducting planned control and instrumentation maintenance	Amplification and Guidance
	○ Ensure personnel safety and remove all locks and tags ○ Maintain clear communication among all involved personnel ○ Re-energise systems gradually and monitor performance ○ Conduct functional testing and commissioning ○ Complete maintenance records and documentation ○ Safely and effectively hand back equipment to production • Special considerations for hazardous materials: ○ Purge hazardous materials from systems ○ Ventilate the area to ensure safe working conditions ○ Use containment systems to prevent exposure or release
Control and instrumentation engineering maintenance technician. **K55** Control and instrumentation equipment and control systems maintenance requirements and methods: removing and replacing instruments and sensors, inspecting, testing, cleaning, setting up, calibration, and functional testing.	• Removing and replacing instruments and sensors: ○ Identify faulty or outdated components ○ Follow safe isolation procedures before removal ○ Select and install appropriate replacements ○ Ensure correct orientation, connection, and integration • Inspection of C&I equipment and control systems: ○ Visual and functional checks for wear, damage, or degradation ○ Use of diagnostic tools and techniques ○ Verification against technical specifications and tolerances • Testing of C&I equipment and control systems:

Observation with questions Theme and Specialist option KSBs: Conducting planned control and instrumentation maintenance	Amplification and Guidance
	○ Perform electrical and signal integrity tests ○ Validate input/output responses ○ Confirm system behaviour under normal and fault conditions • Cleaning of C&I equipment and control systems: ○ Use appropriate cleaning agents and tools ○ Prevent contamination or damage to sensitive components ○ Maintain cleanliness standards for operational reliability • Setting up C&I equipment and control systems: ○ Configure parameters and control logic ○ Align sensors and actuators to required positions ○ Integrate with wider control systems and networks • Calibration of C&I equipment and control systems: ○ Adjust instruments to meet defined accuracy standards ○ Use calibration tools and reference standards ○ Record calibration data and ensure traceability • Functional testing of C&I equipment and control systems: ○ Simulate operational conditions to verify performance ○ Confirm correct interaction between system components ○ Document results and address any deviations

Observation with questions Theme and Specialist option KSBs: Conducting planned control and instrumentation maintenance	Amplification and Guidance

Control and instrumentation engineering maintenance technician.
 	
K56 Control and instrumentation maintenance tools and equipment application, operation, care, and calibration requirements.
	• Tool and equipment selection:
	  ○ Identify tools appropriate to the maintenance task
	  ○ Match tools to specific control and instrumentation system requirements
	  ○ Consider environmental and safety factors when selecting tools
	• Functionality checks and operational use:
	  ○ Inspect tools and equipment prior to use
	  ○ Confirm operational readiness and calibration status
	  ○ Use tools in line with manufacturer instructions and company procedures
	• Care and maintenance of tools:
	  ○ Clean and store tools correctly to prevent damage or contamination
	  ○ Perform routine maintenance and servicing
	  ○ Report and replace damaged or faulty tools
	• Calibration requirements:
	  ○ Understand calibration intervals and standards
	  ○ Use certified calibration equipment and software
	  ○ Record calibration data and maintain traceability
	• Types of tools and equipment may include:
	  ○ PPE and safety tools
	  ○ Hand tools (e.g. screwdrivers, spanners, pliers)

Observation with questions Theme and Specialist option KSBs: Conducting planned control and instrumentation maintenance	Amplification and Guidance
	○ Measurement and diagnostic equipment (e.g. multimeters, oscilloscopes) ○ Signal generators and simulators ○ Calibration and test equipment, including software-based tools ○ Control systems maintenance tools, such as: ▪ Programmable Logic Controller (PLC) programming tools ▪ Loop controllers and indicators ▪ SCADA interface tools ○ Actuator and valve maintenance tools
Control and instrumentation engineering maintenance technician. **K60** Different types of cables; their specifications and application.	• Cable types and characteristics**:** ○ Unscreened – basic cable without shielding, used in low-interference environments ○ Screened – includes shielding to reduce electrical noise and interference ○ Armoured – provides mechanical protection, suitable for harsh environments ○ Single core – one conductor, used for simple connections ○ Multi-core – multiple conductors, used for complex signal or power transmission ○ Twisted pair – pairs of wires twisted to reduce electromagnetic interference

Observation with questions Theme and Specialist option KSBs: Conducting planned control and instrumentation maintenance	Amplification and Guidance
	○ Co-axial – used for high-frequency signals, with central conductor and shielding ○ Fibre-optic – transmits data using light, suitable for high-speed and long-distance communication ○ Thermocouple cable (Type K and Type J) – used for temperature measurement, with specific material combinations for accuracy and range • Specification and application: ○ Understand voltage, current, and signal requirements ○ Match cable type to environmental conditions (e.g. temperature, moisture, mechanical stress) ○ Ensure compatibility with Control and instrumentation systems ○ Follow installation standards and manufacturer guidelines
Control and instrumentation engineering maintenance technician. **S38** Conduct and confirm safe isolation of connected services.	• Identify the services to be isolated: ○ Electrical power ○ Compressed air ○ Hydraulic pressure ○ Steam • Assessment of hazards and risks: ○ Evaluate potential hazards associated with each service ○ Conduct risk assessments prior to isolation • Isolation devices and methods:

Observation with questions Theme and Specialist option KSBs: Conducting planned control and instrumentation maintenance	Amplification and Guidance
	○ Use of valves and shut-off valves ○ Lockout Tagout (LOTO) systems ○ Pressure relief systems ○ Blanking plates and physical barriers • Mechanical and electrical de-energisation: ○ Isolate mechanical equipment and ensure a zero-energy state ○ Confirm isolation through appropriate testing and verification • De-isolation considerations: ○ Confirm that all safety checks and maintenance tasks have been completed successfully ○ Verify equipment condition and readiness ○ Ensure personnel safety ○ Remove all locks and tags applied during isolation ○ Maintain clear communication among all involved personnel ○ Ensure the system is ready to re-energise ○ Re-energise systems gradually and monitor performance ○ Conduct functional testing ○ Return equipment to normal operations ○ Complete maintenance records and documentation • Special considerations for hazardous materials: ○ Purge hazardous materials from systems ○ Ventilate the area to ensure safe working conditions

Observation with questions Theme and Specialist option KSBs: Conducting planned control and instrumentation maintenance	Amplification and Guidance
	○ Use containment systems to prevent exposure or release
Control and instrumentation engineering maintenance technician. **S39** Confirm safe electrical isolation (lockout tagout) method has been applied and test for dead.	• Identify all sources of electrical energy: ○ Recognise all potential energy sources, including primary, secondary, and stored energy ○ Consider residual energy in capacitors or backup systems • Notify affected personnel: ○ Inform all individuals impacted by the isolation process ○ Ensure awareness of work being carried out and associated risks • Authorisation and responsibility: ○ Ensure only authorised personnel are involved in the isolation and de-isolation process ○ Follow organisational protocols for assigning and recording responsibility • Isolation procedures: ○ Isolate equipment from all energy sources ○ Apply lockout devices (may involve multiple locks) ○ Attach appropriate warning tags (tagout) to lockout points • Testing for dead: ○ Use appropriate, calibrated test equipment ○ Confirm zero energy state before commencing work ○ Follow company procedures for verification and documentation • De-isolation and re-energisation:

Observation with questions Theme and Specialist option KSBs: Conducting planned control and instrumentation maintenance	Amplification and Guidance
	○ Confirm all safety checks and maintenance tasks have been completed ○ Verify equipment condition and readiness for operation ○ Remove all locks and tags ○ Maintain clear communication among all involved personnel ○ Re-energise systems gradually and monitor for correct operation ○ Conduct functional testing ○ Return equipment to normal operation ○ Complete all required maintenance records and documentation
Control and instrumentation engineering maintenance technician. **S40** Select, check, and use control and instrumentation maintenance tools, measurement and test equipment.	• Tool, measurement and equipment selection: ○ Identify and select tools and measurement equipment appropriate to the specific maintenance task ○ Match tools to the type of instrumentation or control system being worked on ○ Consider safety, accuracy, resolution, and environmental suitability ○ Select measurement equipment based on required parameters (e.g. voltage, current, resistance, pressure, temperature, signal quality) • Functionality and calibration checks: ○ Inspect tools and equipment before use ○ Confirm operational readiness and calibration status ○ Identify and report any faults, damage or expired calibration certificates ○ Verify measurement accuracy using reference standards or known values

Observation with questions Theme and Specialist option KSBs: Conducting planned control and instrumentation maintenance	Amplification and Guidance

	• Correct use of tools, measurement and test equipment:
	  ○ Operate tools and instruments in accordance with manufacturer instructions and company procedures
	  ○ Apply correct techniques to avoid damage to equipment or components
	  ○ Use measurement equipment to obtain accurate readings for diagnostics, calibration and performance verification
	  ○ Record and interpret measurement data to support maintenance decisions
	• Care, maintenance, and calibration:
	  ○ Clean and store tools and instruments appropriately after use
	  ○ Carry out or arrange routine maintenance and recalibration
	  ○ Ensure calibration is up to date and traceable to national or international standards where applicable
	• Types of tools, measurement and test equipment may include:
	  ○ Hand tools (e.g. screwdrivers, pliers, spanners)
	  ○ Measurement and diagnostic equipment (e.g. multimeters, oscilloscopes, pressure gauges, thermocouples)
	  ○ Signal generators and simulators
	  ○ Calibration and test equipment, including software-based tools
	• Control systems maintenance tools, such as:
	  ○ PLC programming tools
	  ○ Loop controllers and indicators

Observation with questions Theme and Specialist option KSBs: Conducting planned control and instrumentation maintenance	Amplification and Guidance
	○ SCADA interface tools • Actuator and valve maintenance tools • PPE and safety tools
Control and instrumentation engineering maintenance technician. **S43** Inspect and test control and instrumentation systems.	• Visual inspection: ○ Check for signs of wear, damage, corrosion, or contamination ○ Verify correct installation and physical integrity of components • Functional testing: ○ Confirm that instruments and control systems operate as intended ○ Simulate inputs and observe system responses • Calibration: ○ Adjust instruments to meet defined accuracy standards ○ Use appropriate calibration tools and reference values ○ Record calibration results and ensure traceability • Loop checking and verification: ○ Confirm signal integrity and continuity across control loops ○ Verify correct operation of transmitters, controllers, and actuators • Electrical safety testing: ○ Perform insulation resistance and earth continuity tests ○ Ensure compliance with electrical safety standards • Functional and performance testing of control systems: ○ Validate system behaviour under normal and fault conditions ○ Confirm correct sequencing, interlocks, and alarms

Observation with questions Theme and Specialist option KSBs: Conducting planned control and instrumentation maintenance	Amplification and Guidance

	• Communication and data integrity testing:
	  ○ Check signal transmission and data accuracy across networks
	  ○ Verify communication protocols and interface functionality
	• Vibration and mechanical testing:
	  ○ Assess mechanical stability and identify sources of vibration
	  ○ Use vibration analysis tools where applicable
	• Functional safety testing:
	  ○ Test safety-related control functions (e.g. emergency shutdown systems)
	  ○ Confirm compliance with safety integrity level (SIL) requirements
	• Environmental testing:
	  ○ Evaluate system performance under environmental conditions such as temperature, humidity, or dust
	  ○ Ensure equipment is suitable for its operating environment

Control and instrumentation engineering maintenance technician.
 	
S44 Check calibration and make adjustments.
	• Check calibration status:
	  ○ Verify calibration dates and certification
	  ○ Inspect instruments for signs of drift or inaccuracy
	  ○ Use appropriate reference standards and calibration tools
	• Perform calibration checks:
	  ○ Compare instrument readings against known values
	  ○ Follow manufacturer and company calibration procedures
	  ○ Record results and identify any deviations from acceptable limits

Observation with questions Theme and Specialist option KSBs: Conducting planned control and instrumentation maintenance	Amplification and Guidance

	• Make adjustments:
	  ○ Adjust instruments to bring them within specified tolerances
	  ○ Use correct tools and software for adjustment
	  ○ Ensure adjustments do not compromise system integrity or safety
	• Post-calibration verification:
	  ○ Re-check instrument performance after adjustment
	  ○ Confirm accuracy and repeatability of readings
	  ○ Document calibration results and update records
	• Compliance and traceability:
	  ○ Ensure all calibration activities meet regulatory and organisational standards
	  ○ Maintain traceable records for audit and quality assurance purposes

Control and instrumentation engineering maintenance technician.
 	
S45 Check loop function.
	• Verify signal transmission:
	  ○ Confirm that signals are transmitted correctly from sensors to the control system
	  ○ Check for signal integrity, continuity, and correct scaling
	• Check control loop operation:
	  ○ Ensure the control loop operates within specified parameters
	  ○ Observe system response to setpoint changes and disturbances
	  ○ Identify and resolve issues such as oscillation, lag, or instability
	• Confirm actuator response:
	  ○ Verify that actuators respond appropriately to control signals

Observation with questions Theme and Specialist option KSBs: Conducting planned control and instrumentation maintenance	Amplification and Guidance
	○ Check for correct direction, speed, and range of movement ○ Ensure feedback signals are accurate and consistent • Loop documentation and traceability: ○ Refer to loop diagrams and control system documentation ○ Record test results and any adjustments made ○ Ensure compliance with commissioning or maintenance procedures • Use of appropriate tools and equipment: ○ Apply signal generators, simulators, and diagnostic tools ○ Use calibration and test equipment where required ○ Follow safety procedures and use appropriate PPE
Control and instrumentation engineering maintenance technician. **S46** Set up and adjust control and instrumentation systems.	• Install and mount equipment: ○ Position and secure instruments, sensors, and control devices ○ Ensure correct orientation, alignment, and environmental protection • Configure and set parameters in control systems: ○ Input and adjust control parameters (e.g. setpoints, ranges, alarm limits) ○ Configure communication settings and device addresses ○ Integrate devices into control networks and systems • Commission control loops: ○ Verify loop integrity and correct signal flow ○ Test loop functionality under simulated and live conditions ○ Confirm correct interaction between sensors, controllers, and actuators

Observation with questions Theme and Specialist option KSBs: Conducting planned control and instrumentation maintenance	Amplification and Guidance

	• Calibrate instruments and devices:
	  ○ Use appropriate calibration tools and reference standards
	  ○ Adjust devices to meet required accuracy and performance
	  ○ Record calibration results and ensure traceability
	• Test system functionality:
	  ○ Perform functional and performance testing of the complete system
	  ○ Validate system behaviour under normal and fault conditions
	  ○ Identify and resolve any issues or inconsistencies
	• Fine-tuning and adjustments:
	  ○ Optimise control parameters for stability and responsiveness
	  ○ Adjust for process-specific requirements or environmental factors
	  ○ Ensure system operates within defined tolerances
	• Documentation and handover:
	  ○ Complete setup and calibration records
	  ○ Update system documentation and configuration files
	  ○ Communicate system status and hand over to operations or production teams

Control and instrumentation engineering maintenance technician.	• Clean external surfaces:
	  ○ Remove dust, dirt, and debris from enclosures, panels, and housings
	  ○ Use appropriate cleaning materials to avoid damage to sensitive surfaces
	• Clean electrical contacts and connectors:

Observation with questions Theme and Specialist option KSBs: Conducting planned control and instrumentation maintenance	Amplification and Guidance
S47 Clean parts. For example, removal of dust and debris.	○ Use suitable contact cleaners and tools ○ Ensure no residue or contamination remains ○ Avoid damage to pins, sockets, or insulation • Clean instrumentation components: ○ Clean sensors, transmitters, and other C&I devices ○ Follow manufacturer guidance for cleaning delicate or precision parts • Clean instrumentation enclosures: ○ Remove accumulated dust or moisture ○ Check for ingress of contaminants and clean accordingly ○ Ensure seals and covers are intact after cleaning • Clean pipelines and flow paths: ○ Remove blockages or build-up in flow measurement systems ○ Use flushing or purging methods where appropriate ○ Ensure cleanliness does not compromise calibration or accuracy • Clean wiring and connections: ○ Remove dust and debris from wiring terminals and cable trays ○ Ensure labels and identification remain legible ○ Avoid disturbing connections or introducing faults during cleaning
Control and instrumentation engineering maintenance technician.	• Identify and work with common control and instrumentation equipment: ○ Sensors and transducers: ▪ Temperature sensors ▪ Pressure sensors

Observation with questions Theme and Specialist option KSBs: Conducting planned control and instrumentation maintenance	Amplification and Guidance
S48 Remove and replace instruments and sensors.	▪ Flow meters ▪ Level sensors ▪ Position and motion sensors • Controllers and process control systems: ○ Programmable Logic Controllers (PLCs) ○ Distributed Control Systems (DCS) ○ Supervisory Control and Data Acquisition (SCADA) systems ○ Human-Machine Interfaces (HMI) • Actuators and final control elements: ○ Valves and actuators ○ Motors and drives ○ Relays and contactors • Communication and networking equipment: ○ Industrial communication protocols (e.g. Modbus, Profibus, Ethernet/IP) ○ Wireless and Internet of Things (IoT) sensors • Removal procedures: ○ Isolate equipment and ensure safe working conditions ○ Disconnect wiring, tubing, or mounting hardware as required ○ Handle components carefully to avoid damage or contamination • Replacement procedures: ○ Select correct replacement parts based on specification and compatibility

Observation with questions Theme and Specialist option KSBs: Conducting planned control and instrumentation maintenance	Amplification and Guidance
	○ Install and connect new instruments or sensors securely and accurately ○ Ensure correct orientation, calibration status, and integration with control systems • Post-installation checks: ○ Verify correct operation of replaced components ○ Perform functional testing and calibration if required ○ Update documentation and maintenance records
Control and instrumentation engineering maintenance technician. **S49** Re-connect instrumentation power supply, cables, pipework, and services.	• Follow relevant safety procedures and regulations: ○ Comply with health, safety, and environmental requirements ○ Apply safe isolation and lockout/tagout procedures where necessary ○ Use appropriate personal protective equipment (PPE) • Adhere to company policies and procedures: ○ Follow organisational standards for reconnection tasks ○ Ensure documentation and permits are in place where required • Use correct tools and equipment: ○ Select and use appropriate tools for electrical, pneumatic, or hydraulic reconnections ○ Inspect tools for condition and suitability before use • Follow manufacturer guidelines: ○ Refer to technical manuals and datasheets for correct reconnection methods ○ Ensure compatibility of components and connections

Observation with questions Theme and Specialist option KSBs: Conducting planned control and instrumentation maintenance	Amplification and Guidance

	• Re-connect services safely and effectively:
	  ○ Reconnect power supplies, signal cables, and communication lines
	  ○ Reconnect pipework for air, fluid, or gas services
	  ○ Check for correct polarity, continuity, and sealing
	  ○ Secure all connections to prevent leaks, faults, or interference
	• Post-reconnection checks:
	  ○ Inspect and test all reconnected systems for correct operation
	  ○ Verify system integrity and safety before re-energisation
	  ○ Complete documentation and handover procedures

Control and instrumentation engineering maintenance technician.
 	
S50 Conduct and confirm electrical and connected services de-isolation.
	• Confirm completion of safety checks and maintenance tasks:
	  ○ Ensure all planned work has been completed
	  ○ Verify that no tools, materials, or personnel remain in hazardous areas
	• Verify equipment condition:
	  ○ Inspect equipment for readiness and integrity
	  ○ Confirm that all components are correctly reassembled and secure
	• Ensure personnel safety:
	  ○ Confirm that all personnel are clear of the work area
	  ○ Maintain awareness of any residual risks
	• Remove locks and tags:
	  ○ Ensure all lockout/tagout devices applied during isolation are removed
	  ○ Follow company procedures for authorisation and documentation
	• Maintain clear communication:

Observation with questions Theme and Specialist option KSBs: Conducting planned control and instrumentation maintenance	Amplification and Guidance
	○ Coordinate with all involved personnel during the de-isolation process ○ Communicate readiness and next steps clearly and effectively • Prepare system for re-energisation: ○ Confirm that the system is safe and ready to be re-energised ○ Check that all connections and services are restored correctly • Re-energise system gradually: ○ Apply power and services in a controlled manner ○ Monitor system behaviour during initial start-up • Monitor system performance: ○ Observe for any abnormal conditions or faults ○ Take corrective action if necessary • Conduct functional testing: ○ Verify that the system operates as intended ○ Confirm correct interaction between components and control systems • Return to normal operations: ○ Ensure the system is fully operational and stable ○ Communicate handover to operations or production teams • Complete maintenance records: ○ Document all de-isolation activities ○ Update logs, permits, and system status records

Observation with questions Theme and Specialist option KSBs: Conducting planned control and instrumentation maintenance	Amplification and Guidance

Control and instrumentation engineering maintenance technician.
 	
S51 Conduct functional testing.
	• Follow re-energising procedures:
	  ○ Apply power and services in a controlled and safe manner
	  ○ Ensure all safety checks and authorisations are complete
	• Perform functional testing:
	  ○ Test system components and control loops under operational conditions
	  ○ Simulate inputs and verify expected outputs and responses
	• Confirm equipment and systems are operating as expected:
	  ○ Validate system behaviour against specifications and performance criteria
	  ○ Identify and resolve any anomalies or faults
	• Monitor system to ensure correct operation:
	  ○ Observe system performance during initial operation
	  ○ Check for stability, accuracy, and responsiveness
	• Complete maintenance records:
	  ○ Document all testing activities and outcomes
	  ○ Record any adjustments or corrective actions taken
	• Notify relevant personnel:
	  ○ Communicate that equipment is operational and ready for handover
	  ○ Ensure all stakeholders are informed of system status

Observation with questions Theme and Specialist option KSBs – Conducting planned mechanical maintenance	Amplification and Guidance

Mechanical engineering maintenance technician.
 	
K67 Isolation and de-isolation of connected services: considerations and requirements
	• Identify the services to be isolated (for example):
	  ○ Electrical power
	  ○ Compressed air
	  ○ Hydraulic pressure
	  ○ Steam
	• Assessment of hazards and risks:
	  ○ Evaluate potential hazards associated with each service
	  ○ Conduct risk assessments prior to isolation
	• Use of isolation devices (for example):
	  ○ Valves and shut-off valves
	  ○ Lockout Tagout (LOTO) systems
	  ○ Pressure relief systems
	  ○ Blanking plates and physical barriers
	• De-energise and isolate mechanical equipment:
	  ○ Ensure zero-energy state before commencing work
	  ○ Confirm isolation through appropriate testing and verification
	• De-isolation considerations (for example):
	  ○ Confirm that all safety checks and maintenance tasks have been completed successfully
	  ○ Verify equipment condition and readiness
	  ○ Ensure personnel safety
	  ○ Remove all locks and tags applied during isolation

Observation with questions Theme and Specialist option KSBs – Conducting planned mechanical maintenance	Amplification and Guidance
	○ Maintain clear communication among personnel involved in the de-isolation process ○ Ensure system is ready to re-energise ○ Re-energise system gradually ○ Monitor system performance ○ Conduct functional testing ○ Effectively hand back the equipment to production after maintenance has been completed ○ Complete maintenance records and documentation • Special considerations for hazardous materials (for example): ○ Purge hazardous materials from systems ○ Ventilate the area to ensure safe working conditions ○ Use containment systems to prevent exposure or release
Mechanical engineering maintenance technician. **K68** Mechanical maintenance requirements and techniques: removing and replacing parts, inspecting, testing, setting up, adjusting, cleaning, and lubricating.	• Checking the condition and operation of mechanical aspects of plant and equipment • Removing and replacing mechanical parts • Examining mechanical parts for defects • Setting up and adjusting mechanical aspects of plant • Cleaning parts • Lubricating mechanical assemblies

Observation with questions Theme and Specialist option KSBs – Conducting planned mechanical maintenance	Amplification and Guidance
	The apprentice should also know how to correctly carry out functional testing to confirm correct operation in line with task requirements.

Mechanical engineering maintenance technician.
 	
K69 Mechanical maintenance tools and equipment application, operation, care, and calibration requirements.
	• Operation, care and calibration of mechanical maintenance tools and equipment
	• Complying with all health and safety and regulatory measures required
	• Types of tools and equipment may include:
	  ○ Hand tools
	  ○ Power tools
	  ○ Measuring and testing tools
	  ○ Lifting and handling equipment

Mechanical engineering maintenance technician.
 	
S52 Check and confirm safe isolation of connected services.
	The apprentice should be able to check and confirm the safe isolation and de-isolation of connected services in mechanical maintenance environments.
	Key activities to be able to do and demonstrate include:
	• Identify the services to be isolated, for example:
	  ○ Electrical power
	  ○ Compressed air
	  ○ Hydraulic pressure
	  ○ Steam
	• Assessment of hazards and risks:
	  ○ Evaluate potential hazards associated with each service
	  ○ Conduct risk assessments prior to isolation

Observation with questions Theme and Specialist option KSBs – Conducting planned mechanical maintenance	Amplification and Guidance

	• Use of isolation devices, for example:
	  ○ Valves and shut-off valves
	  ○ Lockout Tagout (LOTO) systems
	  ○ Pressure relief systems
	  ○ Blanking plates
	• De-energise and isolate mechanical equipment:
	  ○ Ensure zero-energy state before commencing work
	  ○ Confirm isolation through appropriate testing and verification
	• De-isolation considerations – key points:
	  ○ Confirm that all safety checks and maintenance tasks have been completed successfully
	  ○ Verify equipment condition
	  ○ Ensure personnel safety
	  ○ Remove all locks and tags applied during isolation
	  ○ Maintain clear communication between personnel involved in the de-isolation process
	  ○ Ensure system is ready to re-energise
	  ○ Re-energise system gradually
	  ○ Monitor system performance
	  ○ Conduct functional testing
	  ○ Return equipment to normal operations
	  ○ Complete maintenance records and documentation

Observation with questions Theme and Specialist option KSBs – Conducting planned mechanical maintenance	Amplification and Guidance

	• Special considerations for hazardous materials – key points:
	  ○ Purge hazardous materials from systems
	  ○ Ventilate the area to ensure safe working conditions
	  ○ Use containment systems to prevent exposure or release

Mechanical engineering maintenance technician.
 	
S53 Select, check, and use mechanical maintenance tools and equipment.
	• Operation, care and calibration of mechanical maintenance tools and equipment
	• Compliance with all relevant health and safety and regulatory measures
	• Types of tools and equipment may include:
	  ○ Hand tools
	  ○ Power tools
	  ○ Measuring and testing tools
	  ○ Lifting and handling equipment

Mechanical engineering maintenance technician. **S56**: Check condition and operation of mechanical aspects of plant and equipment. For example, pumps.	• Inspection and assessment of equipment such as: ○ Rotating machinery; Belts; Bearings; Gears; Valves; Pumps; Hydraulic systems; Seals and gaskets; Alignment and adjustment mechanisms; Control systems; Heating and cooling systems

Observation with questions Theme and Specialist option KSBs – Conducting planned mechanical maintenance	Amplification and Guidance
Mechanical engineering maintenance technician. **S57** Remove and replace mechanical parts.	• Gears; Pumps; Belts; Pulleys; Springs; Seals and gaskets; Bearings; Shafts and couplings; Frames; Brackets; Enclosures; Reservoirs; Filters; Motors
Mechanical engineering maintenance technician. **S58** Examine mechanical parts for defects. For example, pump seals.	• Inspection for defects such as: ○ Visible damage; Wear; Leaks; Corrosion; Maladjustment; Discolouration; Cracks; Fraying; Incorrect tension; Misalignment

Mechanical engineering maintenance technician.
 	
S59 Set up, align, and adjust mechanical aspects of plant.
	• Adjustment of parameters such as:
	  ○ Position; Alignment; Clearances; Tension; Meshing; Speed; Torque; Pressure
	• Using tools and equipment such as:
	  ○ Hand tools; Gauges; Cranes and hoists; Alignment tools; Feeler gauges; Micrometres; Tension gauges

Mechanical engineering maintenance technician. **S60** Clean parts. For example, removal of dust and debris.	• Manual cleaning using brushes, cloths and compressed air • Use of cleaning agents and equipment such as: Solvents and detergents; Ultrasonic cleaning systems; Pressure washing

Observation with questions Theme and Specialist option KSBs – Conducting planned mechanical maintenance	Amplification and Guidance
Mechanical engineering maintenance technician. **S61** Lubricate mechanical assemblies.	• Application of lubricants such as: Oils; Greases; Solid lubricants (e.g. graphite, PTFE) • Dry lubricants (e.g. used in food industry environments)
Mechanical engineering maintenance technician. **S62** Confirm electrical and connected services deisolation.	• Confirm that all safety checks and maintenance tasks have been completed successfully • Verify equipment condition • Ensure personnel safety • Remove any locks and tags applied during isolation • Maintain clear communication between personnel involved in the de-isolation process • Ensure the system is ready to re-energise • Re-energise the system gradually • Monitor system performance • Conduct functional testing • Return equipment to normal operations • Complete maintenance records and documentation
Mechanical engineering maintenance technician.	• Follow re-energising procedures • Perform functional testing of equipment and systems • Confirm that equipment and systems are operating as expected

Observation with questions Theme and Specialist option KSBs – Conducting planned mechanical maintenance	Amplification and Guidance
S63 Conduct functional testing.	• Monitor system performance to ensure correct operation • Complete maintenance records and documentation • Notify relevant personnel that equipment is operational

Observation with questions roles and responsibilities

Role	Responsibility
Independent Assessor	Explain, to the apprentice, the format and timescales of the observation with questions before it starts. Conduct and assess the observation with questions. Use language in the delivery of the EPA that is appropriate to level 3. Invigilate and supervise the apprentice during the observation with questions, including moving between tasks and breaks, to prevent malpractice in line with the EEA invigilation procedures. Record and report assessment outcome decisions for each apprentice, following instructions and using assessment recording documentation provided by EEA.
Employer/Training Provider	The training provider must liaise effectively with the employer to ensure the apprentice is prepared for the observation with questions. Provide the venue for the observation with questions which must be suitably equipped to allow the apprentice to attempt all aspects of the observation. Provide all necessary tools and equipment for the apprentice. Ensure the apprentice has access to the resources used on a daily basis. Provide EEA with access to any employer-specific documentation as required for example, company policies Use the EEA observation with questions review service to review, discuss and approve the fitness for purpose of the assessment task. Ensure that any required supervision during the EPA period, as stated in this Specification, is in place. Employer/training provider must remain independent from the delivery of the EPA.
EEA	EEA will review the arrangements for the observation with questions planned by the employer/training provider

Role	Responsibility
	Arrange for the observation with questions to take place, in consultation with the employer/training provider and independent assessor

Component 2: Interview based on an EPA portfolio

Overview

The interview is based on the apprentice's EPA portfolio and focuses on holistic evidence covering the KSBs relating to the interview. The apprentices may refer to their EPA portfolio to help answer interview questions.

The EPA portfolio is **not assessed**. The EPA Portfolio Template is designed to assist the apprentice during their interview. The apprentice should use the EPA Portfolio Template to collate evidence in preparation for their interview. It should only contain evidence compiled throughout the apprenticeship. The EPA Portfolio Template will be issued to employers/training providers by their EEA Service Delivery Coordinator and must be completed and submitted to EEA at Gateway.

The apprentice will be given at least **2 weeks notice** of the interview.

The following table outlines the procedure for conducting an interview based on an EPA portfolio:

Assessors	1 independent assessor approved by EEA will conduct the interview.
Interview structure based on an EPA portfolio	The apprentice's Manager/Mentor must support the completion of the EPA Portfolio Template tasks in accordance with company policy and procedures. **Types and number of questions:** • The independent assessor must ask a minimum of 9 questions • Standardised open questions which will be based on the contents of the evidence in the EPA portfolio to ensure the apprentice's level of knowledge, skills and behaviours • Additional follow up questions are allowed, to seek clarification **Location:** Employer's premises or a suitable venue for example a training provider's premises. **Time:** • The interview must last 75 minutes (1 hour 15 minutes) • The independent assessor has the discretion to increase the time of the interview by up to 6 minutes (10%) to allow the apprentice to complete their last answer **The interview will be:** • conducted by 1 independent assessor

	• face to face or remote, as agreed • recorded in writing using the interview record template provided by EEA • video recorded using relevant technology such as Microsoft Teams or an audio recording device • conducted under examination conditions The apprentice must have access to their EPA portfolio throughout the interview. Although questioning will cover ALL the elements of the EMT - single discipline standard (listed below in this section of the Specification), the independent assessor will prioritise areas according to what they see in the EPA portfolio. **For further guidance on the EPA portfolio refer to Section 5 Practical Guidance on an EPA Portfolio.** **Ending the interview early:** The apprentice may choose to end the interview early. The apprentice must be confident they have demonstrated competence against the assessment requirements. The independent assessor will ensure the apprentice is fully aware of all the assessment requirements and the apprentice understands the implications of ending an assessment early if they choose to do so. The independent assessor may suggest the assessment continues. The independent assessor or EEA cannot suggest or choose to end any assessment method early (unless in an emergency).
What topics will be covered?	**For further details refer to 'Knowledge, Skills and Behaviours (KSBs) Coverage below pages [83 - 112].**
When will the EPA portfolio be referred to?	The EPA portfolio: • will be reviewed by the independent assessor before the interview • can be referred to by the apprentice to illustrate their answers **Note**: the EPA portfolio is **not** directly assessed.
Grading	Fail, Pass or Distinction

Interview based on an EPA portfolio knowledge, skills and behaviours (KSBs) coverage

The interview based on an EPA portfolio covers the following (Task references relate to Tasks specified in the EPA Portfolio Template):

Interview based on an EPA Portfolio. Theme and Core KSBs: Impact of sector on maintenance activities	Amplification and guidance

K1: Sectors in which engineering maintenance takes place. Impact of sector on maintenance activities.	Manufacturing and Production
	• Impact:
	  ○ High focus on minimising downtime to maintain production targets
	  ○ Planned Preventive Maintenance (PPM) is key to avoid equipment failure
	  ○ Use of automated systems requires both mechanical and electrical maintenance skills
	  ○ Maintenance often done in tight time windows (e.g. between production shifts)
	Process Industries
	• Impact:
	  ○ Equipment often runs continuously, requiring detailed planning for shutdowns
	  ○ Maintenance involves specialised systems (e.g. pumps, heat exchangers, control valves).
	  ○ Strict health, safety, and environmental procedures (e.g. hazardous area zoning).
	  ○ Technicians may be involved in turnaround projects (planned major overhauls)

Interview based on an EPA Portfolio. Theme and Core KSBs: Impact of sector on maintenance activities	Amplification and guidance

	Power and Utilities
	• Impact:
	  ○ Maintenance is often safety-critical due to high voltages, pressures or hazardous materials
	  ○ Strong emphasis on compliance with regulatory bodies (e.g. Ofgem, HSE).
	  ○ Use of predictive maintenance tools (e.g. thermal imaging, vibration analysis).
	  ○ Technicians may work on-call or in remote areas to ensure uptime
	Healthcare and Medical
	• Impact:
	  ○ Maintenance ensures the functionality of critical systems (e.g. HVAC, backup power, medical gases)
	  ○ Work must often be done discreetly and hygienically, often outside patient hours
	  ○ Quick response times needed due to the importance of life-saving equipment
	  ○ Strong focus on compliance and documentation (e.g. NHS Trust protocols)
	Transportation and Infrastructure
	• Impact:

Interview based on an EPA Portfolio. Theme and Core KSBs: Impact of sector on maintenance activities	Amplification and guidance
	○ Maintenance supports the safety and availability of transport assets (e.g. trains, lifts, escalators) ○ Often performed out-of-hours or during shutdowns to minimise disruption ○ Involves work on mobile assets and in outdoor or trackside environments ○ Technicians may need special access training (e.g. working on railways or at height) Defence and Security • Impact: ○ High importance on confidentiality, reliability and resilience of systems ○ Maintenance may include specialist or bespoke equipment (e.g. radar, secure power systems) ○ Stringent security clearance and compliance with MOD standards ○ Work may be in controlled or remote environments, requiring extra planning Facilities Management • Impact: ○ Covers a wide range of building systems: lighting, air conditioning, lifts, plumbing, etc. ○ Often reactive and varied, depending on the building use (e.g. offices, schools, etc.)

Interview based on an EPA Portfolio. Theme and Core KSBs: Impact of sector on maintenance activities	Amplification and guidance
	○ Requires good customer service skills and flexibility in tasks ○ Maintenance may include Building Management Systems (BMS) and emergency systems. Construction and Building Services • Impact: ○ Maintenance of site equipment like cranes, hoists, and temporary electrics ○ Often involves routine inspections and safety checks. ○ Work carried out in active construction zones, requiring strong safety awareness. ○ Technicians may also install or maintain fixed systems in new builds

Interview based on an EPA Portfolio. Theme and Core KSBs: Roles and responsibilities	Amplification and guidance
K2: Maintenance disciplines and functional areas and how they work together.	• Preventative Maintenance practices such as: ○ Routine servicing and inspections ○ Replacement of parts (e.g. filters, seals) ○ Top up of lubricants and grease ○ Extending equipment life and reducing failure rates • Reactive Maintenance practices such as:

Interview based on an EPA Portfolio. Theme and Core KSBs: Roles and responsibilities	Amplification and guidance
	○ Repairing systems after breakdown ○ Replacing failed components (e.g. belts, switches, sensors, bearings, cable connections, terminals, joints) ○ Restoring systems to operational condition • Predictive Maintenance practices such as: • Use of condition monitoring techniques: ○ Infrared thermography ○ Vibration monitoring ○ Temperature, pressure and flow monitoring ○ Acoustics and ultrasound equipment ○ Detect potential failures before they occur • Reliability-centered maintenance (RCM): ○ Improving system reliability ○ Reducing unnecessary maintenance activity and costs ○ Prioritising operational critical equipment ○ Enhancing safety and compliance ○ Using maintenance strategies to define strategies • Total Productive Maintenance (TPM) such as: ○ Applying LEAN maintenance strategies ○ Streamlining maintenance workflows ○ Using condition-based maintenance ○ Conducting Root Cause Analysis (RCA) ○ Improved workforce training

Interview based on an EPA Portfolio. Theme and Core KSBs: Roles and responsibilities	Amplification and guidance
	○ Integrating operational and maintenance teams • Be aware of functional integration and collaboration, including: ○ Maintenance teams ○ Operations ○ Reliability engineering ○ Spares and parts provision
K3: Individual maintenance technician's roles and responsibilities. Escalation procedures.	• Ensuring plant and equipment remain in an optimal operational condition • Minimise downtime and improving efficiency Typical roles and responsibilities may include: • Performing scheduled servicing and inspections • Carrying out lubrication, cleaning and minor adjustments of plant and equipment • Using specialist tools and equipment to conduct maintenance activities, including condition monitoring tools • Working in a safe and competent manner • Following any Safe Systems of Work (SSoW), Standard Operating Procedures (SOPs), Permits to Work as required by the workplace and industry • Report and recording findings from their maintenance activities • Knowing when and how to escalate issues outside their scope of responsibility and who to report to

Interview based on an EPA Portfolio. Theme and Core KSBs: Roles and responsibilities	Amplification and guidance

K16: Emergency incident and response procedures.	• Familiarity with and ability to execute emergency procedures, including:
	  ○ Fire safety protocols
	  ○ First aid response
	• Awareness of the location and use of emergency resources, including:
	  ○ Emergency exits
	  ○ First aid kits
	  ○ Eye wash stations
	  ○ Fire extinguishers

S4: Respond and adapt to work demands. For example, adapt working methods to reflect changes in working environment, re-prioritise workloads to react to breakdowns and fault scenarios.	• Adapting working methods due to changes in:
	  ○ Weather conditions
	  ○ Working environments (e.g. working at height, in a confined spaces)
	• Taking responsibility for assessing and accepting or rejecting work in high risk environments
	  ○ Understanding protocols for challenging allocated tasks deemed too high risk
	• Re-prioritising workloads in response to:
	  ○ Operational constraints
	  ○ Changing requirements
	  ○ Equipment breakdowns or fault scenarios

S10: Follow emergency incident and response procedures.	• Executing emergency procedures, including:
	  ○ Fire safety protocols
	  ○ First aid response
	• Awareness of emergency resources and locations, including:

Interview based on an EPA Portfolio. Theme and Core KSBs: Roles and responsibilities	Amplification and guidance
	○ Nearest emergency exits ○ Muster points ○ First aid kits ○ Eye wash stations ○ Fire extinguishers
S20: Escalate issues outside limits of responsibility.	• Escalating concerns such as: • Health and safety issues • Safeguarding concerns • Maintenance problems beyond their remit • Welfare concerns affecting themselves or others

Interview based on an EPA Portfolio. Theme and Core KSBs: Work sustainably	Amplification and guidance
K14: The UK's net zero commitment. Principles of sustainability.	• The UK Government's pledge to reduce greenhouse gas (GHG) emissions to net zero by 2050 • Key policies and strategies supporting this commitment, such as: ○ Phasing out coal-fired power generation by 2024 ○ Expanding the use of renewable energy sources ○ Banning the sale of new petrol and diesel cars by 2035 ○ Investing in public transport infrastructure ○ Supporting carbon capture and storage technologies

Interview based on an EPA Portfolio. Theme and Core KSBs: Work sustainably	Amplification and guidance
	○ Replacing traditional heating systems with low-carbon alternatives
S11: Apply sustainability principles. For example, minimising waste.	• Environmental Awareness: ○ Clearly articulate their understanding of environmental legislation and regulations relevant to their maintenance activities ○ Discuss strategies for identifying and mitigating environmental risks associated with maintenance activities • Sustainable Practices: ○ Explain how they implement energy-efficient practices and use sustainable materials in their work ○ Describe how they promote and apply the principles of reduce, reuse and recycle in all work activities • Waste Management: ○ Explain their approach to managing and disposing of waste materials in accordance with environmental regulations ○ Describe how they segregate waste, extract materials safely for recycling and ensure hazardous substances are handled appropriately
B2: Consider sustainability when using resources and carrying out tasks.	• Efficient Resource Use: ○ Provide examples of how they optimise the use of resources, such as replaceable items, water and energy, to minimise waste ○ Discuss the selection and use of tools and equipment that have a lower environmental impact

Interview based on an EPA Portfolio. Theme and Core KSBs: Participating in continuous improvement	Amplification and guidance
K26: Continuous improvement (CI) systems and techniques.	• Kaizen - continuous incremental improvement through small, ongoing positive changes • 5S - Sort, Set, Shine, Standardise and Sustain, used to organise and maintain efficient workspaces • Six Sigma – data driven methodology for reducing defects and improving quality • LEAN – principles focused on maximising value and minimising waste in processes • Other CI techniques relevant to their organisation or sector
S25: Apply continuous improvement techniques to identify improvement suggestions.	• How they have applied any relevant CI techniques to support their company's CI system • An example of a suggestion for improvement they have made, even if the company does not have a formal CI system in place • How they have used development opportunities within the company to implement a recognised CI system aimed at optimising processes and procedures • Use development opportunities at the company to implement a recognised system for CI aimed at optimising processes and procedures
S26: Carry out and record planned and unplanned learning and development activities.	• Maintaining a CPD log or record of learning • Participation in additional trade or technical courses • Engagement with industry-related articles or publications • Completion of additional academic, technical, or professional qualifications

Interview based on an EPA Portfolio. Theme and Core KSBs: Participating in continuous improvement	Amplification and guidance
	• Involvement in off-the-job training activities • Learning gained through on-the-job training experiences
B5: Committed to continued professional development to maintain and enhance competence.	• How they demonstrate a proactive attitude toward learning and development • Their commitment to staying updated with the latest technological advancements in engineering and maintenance processes, procedures, techniques, and strategies • How they engage in continuous learning and professional development to enhance their knowledge and understanding of the sector • How they identify areas for development and take ownership of their learning to improve their performance and contribution to the organisation

Interview based on an EPA Portfolio. Theme and Core KSBs: Teamworking	Amplification and guidance
K27: Team working principles.	• Team building; being a team player; goal setting; good communication; roles and responsibilities; accountability; trust and respect; collaboration; flexibility; effective leadership; motivation; morale
K28: Principles of equity, diversity, and inclusion in the workplace.	• Respect and dignity • Equal opportunities • Fair treatment and non-discrimination • Accessibility and reasonable adjustments

Interview based on an EPA Portfolio. Theme and Core KSBs: Teamworking	Amplification and guidance
S18: Apply team working principles.	• Effective communication; collaboration and cooperation; conflict resolution; trust and reliability; diversity and inclusion; adaptability and flexibility; leadership and initiative
B4: Team-focus to meet work goals and support inclusivity. For example, support others, show respect to others, and create and maintain productive working relationships.	• Supporting others, such as: Encouraging collaboration; Providing constructive feedback; Celebrating achievements • Showing respect to others, such as: Modelling respectful behaviour; Promoting active listening; Addressing conflicts promptly • Creating and maintaining productive working relationships, such as: Setting clear goals; Encouraging open communication; Fostering inclusivity

Interview based on an EPA Portfolio. Theme and Core KSBs: Produce written documents	Amplification and guidance
K30: Written communication techniques.	• Red pen activities (e.g. amending job details, technical information); use of email to record communication; updating electronic systems used within their sector or industry,(e.g. desktop, laptop, tablet for onsite or field work); written test; group chat or messaging platforms
S22:Produce or update documents. For example, handover notes and reports.	• Handover notes; reports; general tips or written guidance shared with colleagues

Interview based on an EPA Portfolio. Theme and Core KSBs: Digital and information technology	Amplification and guidance
K31: Digital and information technology to support engineering maintenance. General data protection regulation (GDPR). Cyber security.	• Data protection – the importance of safeguarding personal and commercially sensitive data, and ensuring it is not released to unauthorised persons • GDPR awareness – understanding the General Data Protection Regulation (GDPR) requirements relevant to their role, including key principles such as lawfulness, fairness, transparency, purpose limitation, data minimisation, accuracy, storage limitation, integrity, confidentiality, and accountability • Cybersecurity – awareness of cybersecurity risks and protective measures, including Encryption, firewalls, and access controls; Regular system updates and patching; Strong passwords and multi-factor authentication; Common cyber threats such as malware, phishing, ransomware, denial of service (DoS), and social engineering attacks • Network, information, and application security – understanding the role of secure systems and practices in maintaining operational integrity
S24: Use digital and information technology. For example, databases, data sharing platforms, email, management information systems, and word processing. Follow cyber security and GDPR requirements.	• Use of digital tools such as databases, data sharing platforms, email, management information systems, and word processing software • How they have followed cyber security protocols and complied with GDPR requirements when handling data or using digital systems

Interview based on an EPA Portfolio. Specialist option: Electrical maintenance technician Theme: Problem solving and fault-finding	Amplification and guidance
K43: Common electrical plant, equipment, and systems failure modes.	• Electrical plant and equipment, such as; Single-phase and three-phase electrical systems; Electrical outlets and switches; Switchgear and contactors; Isolators; Electrical control panels and distribution boards; Bus bars; Transformers; AC and DC motors and generators; Control systems (e.g. PLCs and SCADA); Boilers and heaters; Residual Current Devices (RCDs), circuit breakers, and Surge Protection Devices (SPDs); Cables and wiring types: single core, multi-core, twin and earth, steel wire armoured, shielded; Cable characteristics: voltage rating, insulation class (I and II), current carrying capacity, cable sizing (CSA metric and SWG imperial) • Common failure modes, such as: Earth loop impedance failures; Wiring and connection faults: open circuit, short circuit, earth faults, loose or corroded connections, cable damage; Insulation failures; Phase unbalance; Overload conditions; Electrical component failures: circuit breakers, fuses, motors, generators, capacitors, batteries, and electronic circuit components; Power supply issues: blackout, brownout, overvoltage, undervoltage
K44: Electrical fault-finding and rectification techniques; diagnostic equipment.	• Fault-finding methods, such as: ○ 6-point method ○ Half split method ○ Unit substitution ○ Input/Output ○ Functional testing ○ Use of manuals and circuit diagrams

Interview based on an EPA Portfolio. Specialist option: Electrical maintenance technician Theme: Problem solving and fault-finding	Amplification and guidance
	○ Sensory checks (visual checks, smell, noise, feel) ○ Movement checks ○ Measurement techniques • Electrical test equipment, including: ○ Multimeters/multifunction testers ○ Oscilloscopes ○ Ammeters and voltmeters ○ Megohmmeters/insulation resistance testers ○ Clamp meters ○ Earth resistance testers ○ Circuit breaker testers ○ Battery Chargers ○ Leakage current testers ○ Continuity testers ○ Dielectric strength testers ○ Voltage testers and indicators ○ Proving units • Safety categories for electrical test equipment, such as CAT I, II, III, IV • Portable Appliance Testing (PAT) and Class I / Class II insulation systems • Diagnostic equipment, such as: ○ Thermal imaging camera (thermography) ○ Heat guns

Interview based on an EPA Portfolio. Specialist option: Electrical maintenance technician Theme: Problem solving and fault-finding	Amplification and guidance
	○ Vibration analysers ○ Acoustics equipment
K45: Problem solving and critical reasoning techniques.	• Structured problem-solving techniques, such as ○ Brainstorming (individual and group) ○ Logical thinking (cause and effect) ○ Fishbone diagram (Ishikawa diagram) ○ Pattern recognition ○ Root Cause Analysis (RCA) ○ Elimination techniques • Continuous improvement frameworks, including: ○ PDCA Cycle: Plan, Do, Check, Act ○ DMAIC Process – Define, Measure, Analyse, Improve, Control
S29: Use electrical diagnostic equipment and apply fault-finding and rectification techniques.	• How they applied fault-finding methods and diagnostic techniques in real maintenance scenarios • Use of appropriate diagnostic equipment (as outlined in K44) to identify faults • How they interpreted test results or observations to determine the root cause of the issue • The steps they took to safely and effectively rectify the fault and restore system functionality

Interview based on an EPA Portfolio. Specialist option: Electrical maintenance technician Theme: Problem solving and fault-finding	Amplification and guidance
S30: Apply problem solving and critical reasoning techniques.	• How they applied specific techniques (as outlined in K45) such as Root Cause Analysis (RCA), the PDCA cycle, or logical elimination to resolve a fault or issue • How they used structured approaches like brainstorming, fishbone diagrams, or the DMAIC process to analyse and break down complex problems • How they evaluated different options and made decisions based on evidence, reasoning, and system behaviour • A real example where their use of critical reasoning led to a successful resolution of an electrical fault or improvement in system performance

Interview based on an EPA Portfolio Specialist option: Electrical maintenance technician Theme: Cable installation and termination	Amplification and guidance
K40: Cable termination methods.	• Terminal block screws; soldering; crimping; ring/spade terminals under screw connection; in-line push-in connectors; cable glands; compression terminations; wire trap terminations; Insulation Displacement Connections (IDC)
S33: Prepare and terminate electrical cables.	• Cable routing and bending techniques • Cable identification and colour coding

Interview based on an EPA Portfolio Specialist option: Electrical maintenance technician Theme: Cable installation and termination	Amplification and guidance
	• Stripping back insulation to appropriate lengths • Applying cable protection (e.g. sleeving, conduit, trunking) • Termination methods appropriate to the cable and application • Use of cable supports and strain relief to ensure mechanical integrity • Ensuring terminations meet safety, quality, and regulatory standards

Interview based on EPA Portfolio. Specialist option: Control and instrumentation maintenance technician Theme: Problem solving and fault-finding	Amplification and guidance

K57: Common control and instrumentation equipment and control system failure modes.	Common Control and Instrumentation Equipment
	• Sensors and Transducers:
	  ○ Temperature sensors
	  ○ Pressure sensors
	  ○ Flow meters
	  ○ Level sensors
	  ○ Position and motion sensors
	• Controllers and Process Control Systems:
	  ○ Programmable Logic Controllers (PLCs)
	  ○ Distributed Control Systems (DCS)
	  ○ Supervisory Control and Data Acquisition (SCADA)
	  ○ Human-Machine Interfaces (HMI)
	• Actuators and Final Control Elements:

Interview based on EPA Portfolio. Specialist option: Control and instrumentation maintenance technician Theme: Problem solving and fault-finding	Amplification and guidance
	○ Valves and actuators ○ Motors and drives ○ Relays and contactors • Communication and Networking Equipment: ○ Industrial communication protocols (e.g. Modbus, Profibus, Ethernet/IP) ○ Wireless sensors and Internet of Things (IoT) devices Typical Failure Modes • Sensor and Transducer failure modes: ○ Signal drift ○ Open Circuit ○ Short Circuit ○ Environmental degradation (e.g. heat, moisture, vibration) • Signal Transmission Failure Modes: ○ Signal loss or attenuation ○ Electrical noise interference ○ Latency or timing issues • Controller Failure Modes: ○ Central processing unit (CPU) lockup or system crashes ○ Incorrect logic execution ○ Communication faults ○ Power supply interruptions • Actuator and Final Control Element Failure Modes: ○ Mechanical sticking or jamming ○ Overheating ○ Delayed or sluggish response

Interview based on EPA Portfolio. Specialist option: Control and instrumentation maintenance technician Theme: Problem solving and fault-finding	Amplification and guidance
	○ Incomplete or failed actuation (e.g. valve fails to open/close) • Power Supply and Electrical Failure Modes: ○ Power surge or voltage spikes ○ Voltage drops or brownouts ○ Backup battery depletion or failure • Calibration and Drift Failure Modes: ○ Loss of measurement sensitivity ○ Offset errors ○ Span errors • Environmental and Mechanical Failure Modes: ○ Exposure to temperature extremes ○ Vibration and mechanical shock ○ Corrosion, moisture ingress and contamination
K58: Control and instrumentation maintenance fault-finding and rectification techniques; diagnostic equipment.	Maintenance Techniques - This may involve: • Routine Maintenance - This may involve: ○ Calibration ○ Cleaning ○ Inspection for physical damage ○ Lubrication • Predictive Maintenance – This may involve: ○ Vibration monitoring of pumps and motors ○ Pressure and temperature monitoring to detect leaks or blockages ○ Signal trending to identify performance degradation

Interview based on EPA Portfolio. Specialist option: Control and instrumentation maintenance technician Theme: Problem solving and fault-finding	Amplification and guidance

	• Preventative Maintenance - This may involve:
	  ○ Vibration monitoring of pumps and motors
	  ○ Pressure and temperature monitoring to detect leaks or blockages
	  ○ Signal trending to identify performance degradation
	Fault-Finding and Diagnostic Techniques - This may involve:
	• Symptom Identification
	• Data gathering
	• Use of test equipment:
	  ○ Multimeters
	  ○ Oscilloscopes
	  ○ Loop testers
	• Highway addressable remote transducer (HART) communicators
	• Isolation
	• Visual inspection
	• Signal testing
	• Power supply checks
	• Connections checks
	• Software and configuration checks
	Rectification techniques such as:
	• Recalibration
	• System reset
	• Devise reset

Interview based on EPA Portfolio. Specialist option: Control and instrumentation maintenance technician Theme: Problem solving and fault-finding	Amplification and guidance
	• Component replacement • Lubrication and tightening • Wire repair or replacement • Power supply replacement • Sensor replacement • System update or reinstall • Reprogramming • Check communication protocols
K59: Problem solving and critical reasoning techniques.	Problem Solving Techniques • Fault-finding approaches • Logical thinking (cause and effect relationships) • Pattern recognition in system behaviour • Root Cause Analysis (RCA) • Elimination methods to isolate faults • PDCA Cycle: Plan, Do, Check, Act • DMAIC Process: Define, Measure, Analyse, Improve, Control Critical Reasoning Skills • Evaluating evidence and data to support conclusions • Identifying assumptions and potential biases • Drawing logical inferences from system behaviour • Prioritising actions based on risk and impact

Interview based on EPA Portfolio. Specialist option: Control and instrumentation maintenance technician Theme: Problem solving and fault-finding	Amplification and guidance
	• Reflecting on outcomes to improve future decision-making

S41: Use control and instrumentation diagnostic equipment and apply fault-finding and rectification techniques.	Fault-Finding and Diagnostic Techniques - This may involve:
	• Half-split method for isolating faults
	• Equipment substitution or replacement
	• Symptom identification
	• Data gathering and analysis
	• Use of test equipment such as:
	  ○ Multimeters
	  ○ Oscilloscopes
	  ○ Loop testers
	  ○ Highway Addressable Remote Transducer (HART) communicators
	• Isolation techniques
	• Visual inspection
	• Signal testing
	• Power supply checks
	• Connection checks
	• Software and configuration checks
	Rectification Techniques
	• Recalibration of sensors or instruments
	• System reset procedures
	• Device reset procedures

Interview based on EPA Portfolio. Specialist option: Control and instrumentation maintenance technician Theme: Problem solving and fault-finding	Amplification and guidance
	• Component replacement • Lubrication and tightening of mechanical parts • Wire repair or replacement • Power supply replacement • Sensor replacement • System update or reinstall • Reprogramming of control systems • Verification and adjustment of communication protocols

S42: Apply problem solving and critical reasoning techniques.	Application of Problem Solving Techniques
	• Fault-finding to isolate and resolve system issues
	• Logical thinking to identify cause and effect relationships
	• Pattern recognition in system behaviour and data trends
	• Root Cause Analysis (RCA) to determine underlying faults
	• Elimination methods to narrow down potential causes
	Use of Structured Problem Solving Models
	• PDCA Cycle:
	  ○ Plan — define the problem and develop a strategy
	  ○ Do — implement the solution
	  ○ Check — evaluate the outcome
	  ○ Act — standardise successful solutions or adjust as needed
	• DMAIC Process:

Interview based on EPA Portfolio. Specialist option: Control and instrumentation maintenance technician Theme: Problem solving and fault-finding	Amplification and guidance
	○ Define — clearly state the problem ○ Measure — collect relevant data ○ Analyse — identify root causes ○ Improve — implement corrective actions ○ Control — sustain improvements and monitor performance Demonstration of Critical Reasoning • Evaluating evidence and system data to support decisions • Prioritising actions based on risk, impact, and urgency • Reflecting on outcomes to improve future fault-finding approaches • Communicating reasoning and decisions effectively to others

Specialist option: Mechanical maintenance technician Theme: Problem solving and fault-finding	Amplification and guidance
K70: Common maintenance problems relating to mechanical aspects of plant and equipment.	Common Mechanical Maintenance Problems • Belt problems: Breaking; Slipping; Cracking • Bearing problems: Wear; Lubrication issues; Overloading; Overheating • Pump Failures: Cavitation; Leaking; Blockages; Over heating • Gearbox failures: Damage to gear teeth; Overheating; Lubrication; Leaks; Misalignment

Specialist option: Mechanical maintenance technician Theme: Problem solving and fault-finding	Amplification and guidance
	• Motor failures: Excessive vibration or noise; Overheating; Electrical faults; Lubrication issues • Valve Issues: Sticking or jamming; Maladjustment; Leaking; Corrosion • Drive Shaft issues: Misalignment; Bearing wear or failure; Shaft wear • Heat Exchanger Issues: Blockages; Leaks; Corrosion • Structural failures: Cracks; Corrosion; Welding defects • Hydraulic system failures: Leaks; Pump failure; Fluid contamination
K71: Mechanical maintenance fault-finding and rectification techniques; diagnostic equipment.	• Sensory checks:; Visual inspection; Detection of unusual smells; Listening for uncharacteristic noises; Touch-based checks (e.g. vibration, heat, wear) • Measurement and Monitoring Tools:; Pressure and flow gauges/meters; Laser alignment tools; Load testing equipment; Vibration analysis tools; Infrared thermography devices; Ultrasonic testing equipment; Oil health monitoring systems • Non-Destructive Testing (NDT): Penetrating dyes; Other NDT methods appropriate to mechanical systems Rectification techniques such as: • Component replacement • Regular servicing and maintenance • Realignment of mechanical components • Structural repairs, including Welding; Use of mechanical fasteners; Reinforcement techniques • Pump and valve maintenance

Specialist option: Mechanical maintenance technician Theme: Problem solving and fault-finding	Amplification and guidance
	• Gearbox repairs • Cleaning of mechanical systems • Balancing of rotating equipment • Mechanical adjustments to restore functionality
K72: Problem solving and critical reasoning techniques	• Root Cause Analysis (RCA) • 5 Whys technique • Fault Tree Analysis (FTA) • Fishbone diagram (Ishikawa) • Failure Mode and Effect Analysis (FMEA) • Mind mapping and group problem solving • Simulation and modelling to test hypotheses and validate solutions
S54: Use mechanical diagnostic equipment and apply fault-finding and rectification techniques.	The apprentice should refer to the diagnostic techniques and equipment listed in K71 and provide examples of how they have particularly applied these within their role. This includes, but is not limited to: • Sensory checks (e.g. visual, auditory, tactile) • Use of diagnostic tools (e.g. vibration analysis, thermography, ultrasonic testing) • Application of rectification techniques (e.g. component replacement, realignment, structural repairs)

Specialist option: Mechanical maintenance technician Theme: Problem solving and fault-finding	Amplification and guidance

S55: Apply problem solving and critical reasoning techniques	The apprentice should refer to the techniques listed in K72 and provide examples of how they have applied these in practice. This includes, but is not limited to:
	• Use of structured problem-solving techniques such as:
	  ○ Root Cause Analysis (RCA)
	  ○ 5 Whys technique
	  ○ Fault Tree Analysis (FTA)
	  ○ Fishbone diagrams (Ishikawa)
	  ○ Failure Mode and Effects Analysis (FMEA)
	• Application of collaborative and visual methods:
	  ○ Mind mapping
	  ○ Group problem solving
	  ○ Simulation and modelling to test and validate solutions
	• Demonstration of critical reasoning through:
	  ○ Logical decision-making
	  ○ Prioritisation of actions
	  ○ Evaluation of outcomes and reflection on effectiveness

Specialist option: Mechanical maintenance technician Theme: Bench fitting techniques	Amplification and guidance
K73: Bench fitting techniques: cutting threads, mechanical fitting, and joining.	• Marking out • Sawing • Drilling • Filing • Chiselling • Thread cutting (using taps and dies) • Deburring • Scraping • Riveting • Bending and shaping • Mechanical fastening methods (e.g. bolts, screws and clamps)
S64: Apply bench fitting techniques.	Safety practices: • Wear appropriate PPE to prevent injuries • Maintaining a clean and organised workstation to support efficiency and safety • Handle cutting fluids safely to avoid skin irritation and maintain a safe environment Measuring and Marking Out: • Using measuring instruments to ensure accurate dimensions • Mark out workpieces precisely to support correct fabrication and assembly Hand Tools Usage: • Sawing and filing to shape and finish components • Drilling and tapping to create holes and threads with precision

Specialist option: Mechanical maintenance technician Theme: Bench fitting techniques	Amplification and guidance
	Practical Application • Fabricating components or assemblies by interpreting drawings and applying bench fitting techniques (e.g. marking out, sawing, filing, drilling, tapping) • Operate pillar drills including understanding drill bit geometry and sharpening methods Quality Control • Ensuring manufactured items meet specified tolerances through careful use of hand tools and inspection techniques

Interview based on an EPA portfolio roles and responsibilities

Role	Responsibility
Independent Assessor	Record and report assessment outcome decisions for each apprentice, following instructions and using assessment recording documentation provided by EEA. Review the apprentice's EPA portfolio prior to the question and answer session. In the event of an apprentice requesting to end the interview early, the assessor must ensure the apprentice is fully aware of all the assessment requirements for the session. Requests must be documented in line with instructions provided by EEA.
Employer/Training Provider	The interview must be scheduled with EEA for a date and time which allow the apprentice to be well prepared. Ensure the apprentice has access to their EPA portfolio before and on the day of the interview.
EEA	Arrange for the interview to take place, in consultation with the employer/training provider and independent assessor.

Component 3: Multiple-choice test

Overview

The multiple-choice test is a computer-based test which consists of 40 multiple-choice questions. Paper-based tests are available on request.

Apprentices have 60 minutes to complete the test.

The multiple-choice questions will have four possible answers of which one will be correct.

The Pass mark is 28 correct answers.

For this paper:

- a (scientific) calculator is allowed
- access to the internet or intranet is NOT allowed
- apprentices cannot refer to any reference books or materials

Apprentices must take the test in a quiet space, free from distractions and influence, in the presence of an invigilator.

Apprentices must be given at least **2 weeks notice** of the date and time of the multiple-choice test.

Multiple-choice test coverage

The multiple-choice test consists of 40 core knowledge questions.
The table below lists each of the knowledge elements, assessed in the knowledge assessment. Amplification and Guidance can be found in the table above.

Number of Questions	Knowledge	Amplification and Guidance
1 - 3	**Core K6** Equipment Life Cycle Considerations	6.1 Awareness of maintenance strategies and their impact on equipment longevity (e.g. preventive, predictive, reactive) 6.2 Understanding of environmental factors affecting equipment performance and degradation (e.g. temperature, humidity, contamination) 6.3 Awareness of training requirements for personnel to ensure correct operation, maintenance and safety throughout the equipment life cycle 6.4 Knowledge of cost considerations including acquisition, operation, maintenance and disposal costs 6.5 Understanding of equipment efficiency and how it influences operational performance and energy consumption over time 6.6 Awareness of disposal methods and end-of-life considerations, including environmental compliance and sustainability

Number of Questions	Knowledge	Amplification and Guidance
1 - 3	**Core. K7** Maintenance strategies: planned preventative maintenance (PPM), condition-based maintenance (CBM), scheduled maintenance, total productive maintenance (TPM), breakdown and run to failure maintenance.	7.1 Knowledge of Planned Preventative Maintenance (PPM) – regular, scheduled tasks to prevent equipment failure and extend asset life 7.2 Understanding of Scheduled Maintenance – maintenance activities performed at fixed intervals based on time or usage 7.3 Awareness of Condition-Based Maintenance (CBM) – maintenance triggered by monitoring equipment condition (e.g. vibration, temperature, wear) 7.4 Knowledge of Total Productive Maintenance (TPM) – holistic approach involving all staff to improve equipment reliability and performance 7.5 Understanding of Reactive or Breakdown Maintenance – maintenance carried out after equipment failure 7.6 Awareness of Run to Failure Maintenance – strategy where equipment is allowed to operate until failure, typically for non-critical assets 7.7 Knowledge of Corrective Maintenance – repairs made to restore equipment after identifying faults during inspections or operations 7.8 Awareness of Shutdown Maintenance – planned maintenance during plant shutdowns to address major repairs or upgrades

Number of Questions	Knowledge	Amplification and Guidance
1 - 3	**Core K8** Health and safety regulations – key features and impact on role: ATEX - safety requirements for workplaces and equipment used in explosive atmospheres, Control of Asbestos Regulations, Control of Major Accident Hazards (COMAH) Regulations, Control of Substances Hazardous to Health (COSHH) Regulations, Dangerous Substances and Explosive Atmospheres Regulations (DSEAR), Display Screen Equipment Regulations (DSE), Health and Safety at Work Act (HASAWA), Lifting Operations and Lifting Equipment Regulations (LOLER), Management of Health and Safety at Work, Manual Handling Operations Regulations, Personal Protective Equipment (PPE) at Work Regulations, Provision and Use of Work Equipment Regulations (PUWER), The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR), Working at Height Regulations, Working in Confined Spaces Regulations,	8.1 Health and Safety at Work Act (HASAWA) – overarching duties for employers and employees to ensure safe working environments 8.2 Provision and Use of Work Equipment Regulations (PUWER) – requirements for safe selection, maintenance and use of work equipment 8.3 Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) – legal obligations for reporting workplace incidents and near misses 8.4 Lifting Operations and Lifting Equipment Regulations (LOLER) – safe planning, use and inspection of lifting equipment 8.5 Management of Health and Safety at Work Regulations – risk assessment and emergency procedures for managing workplace safety 8.6 Manual Handling Operations Regulations – guidance on safe lifting, carrying and moving of loads 8.7 Working at Height Regulations – control measures for tasks performed above ground level 8.8 Confined Spaces Regulations – safety requirements for working in enclosed or restricted spaces 8.9 Workplace (Health, Safety and Welfare) Regulations – standards for workplace conditions including lighting, ventilation and cleanliness

Number of Questions	Knowledge	Amplification and Guidance
	Workplace (health, safety, and welfare) Regulations.	8.10 Personal Protective Equipment (PPE) at Work Regulations – provision and use of appropriate PPE to mitigate risks 8.11 Control of Substances Hazardous to Health (COSHH) Regulations – safe handling and control of harmful substances 8.12 Control of Major Accident Hazards (COMAH) Regulations – prevention and mitigation of major industrial accidents 8.13 Dangerous Substances and Explosive Atmospheres Regulations (DSEAR) – control of fire and explosion risks from hazardous substances 8.14 Display Screen Equipment Regulations (DSE) – ergonomic and health requirements for screen-based work 8.15 Control of Asbestos Regulations – procedures for managing asbestos risks in the workplace 8.16 ATEX Regulations – safety requirements for equipment and workplaces in explosive atmospheres
2 - 3	**Core K13** Environmental regulations and standards – impact on role: Environmental Management Systems standard, Environmental Protection Act, and Hazardous Waste Regulations.	13.1 Awareness of Environmental Management Systems (EMS) and ISO 14001:2015 – international standard for reducing environmental impact and improving sustainability 13.2 Knowledge of the Environmental Protection Act 1990 – legal duties for waste management, pollution control, and statutory nuisances 13.3 Understanding of the Environment Act 2021 – UK framework for environmental governance, including targets for air quality, biodiversity, water and waste

Number of Questions	Knowledge	Amplification and Guidance
		13.4 Awareness of the Hazardous Waste (England and Wales) Regulations 2005 – requirements for classification, handling, movement and disposal of hazardous waste 13.5 Knowledge of the Waste Electrical and Electronic Equipment (WEEE) Regulations 2013 – obligations for safe disposal, recycling and recovery of electrical and electronic equipment
1 - 3	**Core K17** Algebraic methods. Trigonometric methods and standard formulae to determine areas and volumes. Statistical methods to display data (mean, mode, median). Elementary calculus techniques: coefficient, gradient of a curve, rate of change.	17.1 Knowledge of algebraic methods including solving and manipulating linear equations 17.2 Understanding of trigonometric methods for calculating angles, distances and relationships in mechanical systems 17.3 Awareness of standard geometric formulae used to determine areas and volumes of common shapes and components 17.4 Knowledge of statistical methods to display and interpret data, including mean, mode and median 17.5 Understanding of elementary calculus techniques including differentiation and integration 17.6 Awareness of coefficients, gradients of curves and rate of change in relation to system performance and analysis
3 - 4	**Core K18** Properties of engineering materials and impact on use.	18.1 Knowledge of mechanical properties including strength, hardness, ductility, toughness and elasticity 18.2 Awareness of thermal properties such as thermal conductivity, thermal expansion and melting point

Number of Questions	Knowledge	Amplification and Guidance
		18.3 Understanding of electrical properties including conductivity, resistivity and dielectric strength 18.4 Knowledge of chemical properties such as corrosion resistance, reactivity and oxidation resistance 18.5 Awareness of physical properties including density, specific gravity and transparency 18.6 Understanding of environmental properties such as UV resistance and recyclability 18.7 Knowledge of manufacturing properties including machinability, weldability and malleability 18.8 Awareness of how material properties impact functionality, durability, cost, safety and sustainability in engineering applications
1 - 3	**Core K21** Engineering representations, sketches, drawings, and graphical information conventions.	21.1 Knowledge of technical drawings used to convey detailed engineering information, including orthographic and isometric views 21.2 Awareness of schematic diagrams representing system layouts and functional relationships (e.g. electrical, pneumatic, hydraulic) 21.3 Understanding of flowcharts used to represent processes, sequences and decision points in engineering systems 21.4 Knowledge of graphs and charts used to display data trends, performance metrics and comparisons

Number of Questions	Knowledge	Amplification and Guidance
		21.5 Awareness of freehand sketches used for quick visual communication of ideas, modifications or faults 21.6 Understanding of graphical information conventions including: Standardisation systems (e.g. British Standards [BS], International Standards [ISO]), Line types and styles (e.g. hidden, centre, cutting plane), Dimensioning and tolerances, Symbols and annotation practices, Use of scales and proportion, Colour coding for system identification and safety
1 - 3	**Core K32** Industry 4.0 - the integration of physical systems with internet connectivity and cloud computing: technologies, systems, and benefits.	32.1 Awareness of interconnectivity of physical systems and technologies including: Data-driven decision making, Automation and robotics, Artificial Intelligence (AI), Cloud computing, Additive manufacturing (3D printing), Augmented Reality (AR) and Virtual Reality (VR) 32.2 Understanding of cybersecurity principles and the importance of protecting connected systems and data 32.3 Knowledge of cyber-physical systems – integrated networks of sensors, actuators, and control systems linked via digital platforms 32.4 Awareness of the benefits of Industry 4.0 including: Increased productivity, Cost savings, Enhanced quality, Improved sustainability, Better decision making, Greater customisation and operational flexibility

Number of Questions	Knowledge	Amplification and Guidance
1 - 2	**Core S13** Use mathematical principles and formulae to support engineering maintenance.	13.1 Multiple-choice questions for the assessment of S13 will be scenario based to assess the application of mathematical principles and formulae used to support engineering maintenance.
2 - 3	**Specialist: Electrical engineering maintenance technician.** **K33** Electricity at Work regulations. IET wiring regulations	33.1 Awareness of the Electricity at Work Regulations 1989 – legal duties for ensuring electrical systems are constructed, maintained and used to prevent danger 33.2 Knowledge of BS 7671 – Requirements for Electrical Installations (IET Wiring Regulations), including design, installation and verification standards for safe electrical systems 33.3 Understanding of GS38 guidance – safe selection and use of electrical test equipment, including probe design, insulation, and protection against electric shock and short circuits
2 - 3	**Specialist: Electrical engineering maintenance technician.** **K35** Principles of single phase and three-phase equipment, plant, and systems, the operation of motors and generators, and the use of monitoring and protection equipment.	35.1 Understanding of single-phase electrical systems – characteristics, applications, and limitations in maintenance environments 35.2 Knowledge of three-phase electrical systems – principles of operation, advantages, and use in industrial plant and equipment 35.3 Awareness of motor operation – types (e.g. AC, DC, induction), starting methods, and performance characteristics

Number of Questions	Knowledge	Amplification and Guidance
		35.4 Understanding of generator operation – principles of energy conversion, excitation methods, and load handling 35.5 Knowledge of monitoring devices used in electrical systems, including: Voltmeters and ammeters, Temperature and vibration sensors, Power quality analysers 35.6 Awareness of protection devices used to safeguard electrical systems, including: Circuit breakers and fuses, Overload relays, Residual Current Devices (RCDs), Surge protection devices
2 - 3	**Specialist: Electrical engineering maintenance technician.** **K36** Electrical engineering principles: circuit terminology, Ohm's Law, transformer theory, and power calculations.	36.1 Knowledge of circuit terminology including: circuit, node, branch, loop, mesh, voltage, current, resistance, power, series and parallel configurations 36.2 Understanding of Ohm's Law and its application in calculating voltage, current and resistance in electrical circuits 36.3 Awareness of Kirchhoff's Laws – Kirchhoff's Current Law (KCL) and Kirchhoff's Voltage Law (KVL) – and their use in circuit analysis 36.4 Knowledge of transformer theory including principles of electromagnetic induction, turns ratio, voltage transformation and efficiency 36.5 Understanding of electrical power calculations for both AC and DC systems, including real, reactive and apparent power

Number of Questions	Knowledge	Amplification and Guidance
		36.6 Awareness of coefficients and their role in electrical equations and system analysis
2 - 3	**Specialist: Electrical engineering maintenance technician.** **K37** Functions and applications of electrical circuits.	37.1 Understanding of the functions of electrical circuits, including: Power distribution, Energy conversion, Signal processing and transmission, Control of systems and devices, Energy storage 37.2 Awareness of the applications of electrical circuits across various sectors, including: Domestic and industrial environments, Communications and transportation systems, Power generation and distribution, Medical equipment and healthcare technologies, Consumer electronics, Safety and security systems
2 - 3	**Specialist: Electrical engineering maintenance technician.** **K38** Types of diagrams used to represent circuits; symbols and abbreviations used to represent components in electrical schematics.	38.1 Awareness of different types of electrical diagrams used in maintenance and fault diagnosis, including: Circuit diagrams, Wiring diagrams, Block diagrams, Layout diagrams, Single-line diagrams, Earthing diagrams, Control diagrams 38.2 Understanding of standard symbols and abbreviations used in electrical schematics to represent components such as resistors, capacitors, switches, relays, transformers, and protective devices 38.3 Knowledge of graphical conventions including line types, connection points, and signal paths

Number of Questions	Knowledge	Amplification and Guidance
		38.4 Awareness of documentation standards (e.g. BS and IEC) governing the use of symbols and diagram formats
2 - 3	**Specialist: Electrical engineering maintenance technician.** **K39** Different types of cables; their specifications and application.	39.1 Awareness of different cable types used in electrical systems, including: Low voltage and high voltage cables, Armoured cables, Coaxial and Ethernet cables, Fire-resistant and fire-retardant cables, Instrumentation cables, Twin and earth cables, Control cables 39.2 Understanding of cable specifications, including: Voltage rating, Conductor type (e.g. copper, aluminium, mica), Insulation type, Armour type (e.g. steel wire armour, aluminium armour), Shielding methods (e.g. braided, foil) 39.3 Knowledge of cable applications across various environments, including: Residential and commercial installations, Power distribution systems, Underground and outdoor installations, Portable tools and appliances, Signal transmission and communications, Emergency systems and safety-critical environments
1 - 3	**Specialist: Control and instrumentation engineering maintenance technician.** **K46** Electricity at Work regulations. IET wiring regulations.	46.1 Awareness of the Electricity at Work Regulations 1989 – legal duties to ensure electrical systems are constructed, maintained and used safely to prevent danger

Number of Questions	Knowledge	Amplification and Guidance
		46.2 Knowledge of BS 7671 – Requirements for Electrical Installations (IET Wiring Regulations), including standards for design, installation and verification of electrical systems 46.3 Understanding of GS38 guidance – safe selection and use of electrical test equipment, including probe design, insulation and protection against electric shock 46.4 Awareness of relevant British Standards for control and instrumentation systems, including: BS EN 61508 – Functional safety of electrical/electronic/programmable electronic safety-related systems, BS EN 61010 – Safety requirements for electrical equipment for measurement, control and laboratory use, BS EN 61131 – Standards for programmable logic controllers (PLCs)
1 - 3	**Specialist: Control and instrumentation engineering maintenance technician.** **K49** Control and instrumentation engineering principles, terminology, and calculations.	49.1 Understanding of measurement and monitoring principles used in instrumentation systems 49.2 Awareness of control system types and functions, including open-loop and closed-loop systems 49.3 Knowledge of signal transmission methods including analogue and digital signals, and communication protocols 49.4 Understanding of actuation principles including mechanical, electrical, pneumatic and hydraulic actuators

Number of Questions	Knowledge	Amplification and Guidance
		49.5 Awareness of automation technologies and their role in process control and optimisation 49.6 Knowledge of safety systems including interlocks, alarms, emergency shutdown systems and fail-safe design 49.7 Familiarity with key control and instrumentation terminology including: Process variables, Set point, Error, Controller output, Hysteresis, Dead time, Control range and span, Calibration, Control loop 49.8 Understanding of instrumentation calculations including: Conversion of analogue signals to engineering units, Flow rate calculations, PID control equation components, Thermocouple voltage-to-temperature conversion
1 - 3	**Specialist: Control and instrumentation engineering maintenance technician.** **K50** Control and instrumentation equipment installation and connection requirements.	50.1 Knowledge of cable selection based on application, signal type, environmental conditions and safety requirements 50.2 Awareness of connection types used in instrumentation systems, including screw terminals, push-in connectors, plugs and sockets 50.3 Understanding of conduit systems for cable protection and routing, including material types and installation practices 50.4 Awareness of correct location and positioning of instrumentation components such as sensors, actuators and

Number of Questions	Knowledge	Amplification and Guidance
		control panels to ensure accurate measurement and system performance 50.5 Knowledge of cable marking and labelling practices to support identification, maintenance and fault diagnosis
1 - 3	**Specialist: Control and instrumentation engineering maintenance technician.** **K51** Operating principles of Control and instrumentation devices: flow, level, pressure, and temperature instruments, analysers, transducers, transmitters, gauges, and pneumatics.	51.1 Understanding of key operating principles used in instrumentation devices, including: Bernoulli's Principle, Faraday's Law of Electromagnetic Induction, Coriolis Effect, Doppler Principle, Buoyancy, Capacitance, Hydrostatic Pressure, Piezoelectric Pressure 51.2 Knowledge of control and measurement devices used in instrumentation systems, including: Pressure instruments: Bourdon tubes, diaphragm sensors, manometers, Temperature instruments: Thermocouples, resistance temperature detectors (RTDs), thermistors, bimetallic and infrared thermometers, Analytical instruments: pH analysers, gas analysers, conductivity meters, oxygen analysers, Signal devices: Transducers, transmitters, analogue and digital gauges, Pneumatic devices: Pneumatic actuators, pneumatic controllers, I/P converters, air regulators and filters
1 - 3	**Specialist: Control and instrumentation engineering maintenance technician.**	52.1 Understanding of open-loop control systems – systems that operate without feedback, typically used in simple or non-critical applications

Number of Questions	Knowledge	Amplification and Guidance
	K52 Open and closed loop systems. First and second order control systems. Proportional–integral–derivative controller (PID controller or three-term controller).	52.2 Knowledge of closed-loop control systems – systems that use feedback to compare actual output with desired output and adjust accordingly 52.3 Awareness of first-order control systems – systems with a single energy storage element, characterised by exponential response and time constant 52.4 Understanding of second-order control systems – systems with two energy storage elements, capable of oscillation and damping behaviour 52.5 Knowledge of Proportional–Integral–Derivative (PID) controllers – including the role of each term: Proportional (P) – corrects error based on present value, Integral (I) – corrects accumulated past error, Derivative (D) – predicts future error based on rate of change
1 - 3	**Specialist: Control and instrumentation engineering maintenance technician.** **K53** Functions and applications of control and instrumentation systems: programmable logic controller (PLC), Direct Digital Control (DDC), Distributed Control	53.1 Understanding of Programmable Logic Controllers (PLC) – used in process and control applications across manufacturing, infrastructure, power plant operations, water treatment plants, and conveyor belt systems 53.2 Awareness of Direct Digital Control (DDC) systems – used to monitor and control microprocessor-based systems, including HVAC systems, environmental control, and industrial processes

Number of Questions	Knowledge	Amplification and Guidance
	System (DCS), and Supervisory Control And Data Acquisition (SCADA).	53.3 Knowledge of Distributed Control Systems (DCS) – used for process control and monitoring in large-scale industrial facilities; integrates multiple control systems across sectors such as oil and gas, power generation, chemical processing, and the food and drink industry 53.4 Understanding of Supervisory Control and Data Acquisition (SCADA) systems – used to monitor and control industrial processes across large geographic areas; enables real-time data collection, alarm provision, data logging, and historical data analysis in sectors such as utilities, transportation, oil and gas pipelines, and mining
1 – 3	**Specialist: Control and instrumentation engineering maintenance technician.** **K54** Types of control and instrumentation diagrams.	54.1 Awareness of control and instrumentation diagrams, system commissioning, calibration, modification activities, fault diagnosis for maintenance 54.2 Knowledge of different types of diagrams, including block diagrams, schematic diagrams, wiring diagrams, loop diagrams and P&IDs (Piping and Instrumentation Diagrams) 54.3 Understanding of how to interpret symbols, signal paths, and component relationships within diagrams 54.4 Awareness of how diagrams support system commissioning, calibration, and modification activities

Number of Questions	Knowledge	Amplification and Guidance
		54.5 Knowledge of documentation standards and conventions used in control and instrumentation diagrams (e.g. IEC, ISA)
2 - 4	**Specialist: Mechanical engineering maintenance technician.** **K61** Electricity at Work regulations	61.1 Awareness of the legal duties placed on employers and employees under the Electricity at Work Regulations 1989, Health and Safety Executive (HSE) 61.2 Knowledge of safe working practices, isolation, lock out tag out (LOTO), authorised persons, PPE hierarchy of controls, 61.3 Knowledge of processes and procedures for safe systems of work, electrocution, reporting of injuries, diseases and dangerous occurrences regulations (RIDDOR), test equipment fit for use, provisional and use of work equipment regulations (PUWER), portable appliance testing (PAT), earthing and bonding of equipment and structures
2 - 4	**Specialist: Mechanical engineering maintenance technician.** **K62** Pneumatic and hydraulic system principles; Air compressors, hydraulic pumps, filters, regulators, lubricators	62.1 Understanding of Pascal's Law and its application in hydraulic systems 62.2 Awareness of energy conversion principles in pneumatic and hydraulic systems 62.3 Knowledge of pressure generation, control and measurement in fluid power systems 62.4 Understanding of flow characteristics and regulation in pneumatic and hydraulic circuits 62.5 Knowledge of air compressor types, operation and maintenance requirements

Number of Questions	Knowledge	Amplification and Guidance
		62.6 Knowledge of hydraulic pump types and their role in system performance 62.7 Awareness of the function and maintenance of filters, regulators and lubricators in fluid systems
2 - 4	**Specialist: Mechanical engineering maintenance technician.** **K63** Mechanical principles, terminology, and calculations: stress, strains, bending moment, heat transfer, fluid dynamics.	63.1 Understanding of core mechanical principles – including statics, dynamics, thermodynamics, fluid mechanics, heat transfer, hydraulics, and pneumatics 63.2 Awareness of mechanical terminology – such as force, torque, equilibrium, stress, strain, Young's modulus, bearings, gears, pulleys, couplings, power, and efficiency 63.3 Knowledge of mechanical calculations – including Newton's Second Law, kinetic energy, work done, Bernoulli's equation, flow rate, gear ratios, and belt and pulley systems
2 - 4	**Specialist**: **Mechanical engineering maintenance technician.** **K64** Functions and application of mechanical aspects of plant and mechanical equipment.	64.1 Understanding of mechanical functions – including power transmission, motion conversion, load bearing, energy efficiency, and safety 64.2 Awareness of mechanical applications – across industrial plants, automotive systems, heavy machinery, utility systems, power generation, and the oil and gas sector 64.3 Knowledge of mechanical equipment functions – including: Bearings – reduce friction and support loads, Gear systems –

Number of Questions	Knowledge	Amplification and Guidance
		transmit torque, alter speed, and change direction of rotation, Valves – regulate, direct, or control the flow of fluids, Heat exchangers – transfer heat between fluids without mixing them, Compressors – increase the pressure of gases, Power transmission systems – belts and pulleys, chains and sprockets, couplings, Structural components – frames and supports, dampers and springs, Sealing systems – seals, gaskets, and O-rings, Pumps – enable movement of liquids and gases, Turbines – convert fluid energy into mechanical energy
2 - 4	**Specialist**: **Mechanical engineering maintenance technician.** **K65** Different types of mechanical fasteners and their uses.	65.1 Understanding of fabricated assemblies, permanent joints, non-permanent joints, thread types and forms, splines, consumables for assembly, lubricants, PTFE tape, anti-seize compounds, adhesives, assembly settings torque tightening, tools 65.2 Awareness different types of fasteners, screws, bolts, nuts, washers, fittings, studding, rivets, threaded inserts, couplings, pins, clips, clamps, tie wire, lifting components, tools for assembling and disassembly fasteners, materials, heat treatment, protective finish 65.3 Understanding of different types of fasteners and applications on equipment, machines, and systems

Number of Questions	Knowledge	Amplification and Guidance
2 - 4	**Specialist**: **Mechanical engineering maintenance technician.** **K66** Types of diagrams used to represent mechanical installations and assemblies; symbols and abbreviations used to represent parts in diagrams.	66.1 Types of engineering drawings, diagrams, data for mechanical equipment including assembly drawings, detail drawings, installation drawings, tooling drawings, schematics, and types of projection used in drawings 66.2 Knowledge of engineering drawing standards/codes, conventions, quality compliance, requirements 66.3 Use of engineering drawing symbols, drawing conventions for mechanical parts and features, abbreviations used in drawings, use of Computer Aided Design (CAD), 3D models, 2D drawings and symbol libraires

Multiple-choice Test Roles and Responsibilities

Role	Responsibility
Invigilator	Is typically provided by the employer or training provider. Attend induction training as directed by EEA. Not invigilate an assessment, solely, if they have delivered the assessed content to the apprentice. Invigilate and supervise the apprentice during tests and in breaks during assessment methods to prevent malpractice in line with the EEA's invigilation procedures.
Employer/Training Provider	Ensure that the multiple-choice test is scheduled with EEA for a date and time which allow the apprentice to be well prepared. Follow EEA guidance in setting up and confirming IT provision for the on-screen test.
EEA	Arrange for the multiple-choice test to take place, in consultation with the employer/training provider. Mark multiple-choice test answers accurately according to the mark scheme and procedures.

Section 3: Grading and Grading Descriptors

Component 1: Observation with questions

The apprentice must demonstrate core KSBs in an integrated way.

A Fail will be awarded if an apprentice has not achieved **all** the Pass descriptors.

To gain a Pass, an apprentice must successfully achieve **all** the descriptors for each KSB, as shown below.

To achieve a Distinction an apprentice must successfully achieve **all** the Pass descriptors and **all** of the descriptors from each of the Distinction boxes.

Pass descriptors for the observation with questions

Observation with questions - Themed KSBs	To achieve a Pass the apprentice must achieve **ALL** of the following:
Core: Organising own work. K4; K5;S2 and S3	Uses planning, prioritising, organising, and time management techniques to plan tasks and identifies and organises resources required to complete tasks with consideration for quality, cost, delivery, and ethical practices. (K4; K5; S2 and S3)
Core: Maintaining workplace health, safety, security, and environmental compliance. K9; K10; K11; K12; K15; S7; S8 S9; S12 and B1.	Identifies potential hazards and risks in the work environment and applies control measures in line with safe systems of work. (K9 and S7) Priorities safe working practices by applying health, safety, and environmental procedures in compliance with regulations, standards, and guidelines including selection, use, and care of PPE. (K10; K11; S8 and B1)

Observation with questions - Themed KSBs	To achieve a Pass the apprentice must achieve **ALL** of the following:
	Follows security procedures in line with task and company requirements. (K12 and S9) Segregates items for reuse, recycling, and waste in line with the company's recycling and waste management requirements. (K15 and S12)
Core: Using work information and following working practices. K19; K20; K22; K23; K24; S1; S5; S6; S14; S15; S16; S17; S23 and B3.	Reviews and uses information including engineering information to plan and complete tasks. (K19 and S1) Identifies equipment to work on and checks plant configuration is as defined, identifying and highlighting issues with drawings as found in line with company procedures. (S5 and S23) Prepares the work area for maintenance in line with task requirements and company procedures. (S6) Takes ownership for the delivery and quality of work by applying British (BSI) and International (ISO) engineering maintenance standards and procedures to support their company's quality management systems. (K20; K22; K23; S14 and B3) Applies foreign material exclusion procedures in line with task requirements and company procedures. (K24 andS15) Follows maintenance tools and equipment control requirements in line with company procedures. (S16) Reinstates the work area in line with task requirements and company procedures. (S17)

Observation with questions - Themed KSBs	To achieve a Pass the apprentice must achieve **ALL** of the following:
Core: Completing work records. K25 and S21	Records information for work tasks in line with their company's procedures for documentation control and auditable records. (K25 and S21)
Core: Communicating with others. K29 and S19	Uses communication methods and techniques and industry terminology suitable for the context. (K29 and S19)
Specialist option: Electrical maintenance technician - Conducting planned electrical maintenance. K34; K41; K42; S27; S28; S31; S32; S34; S35; S36 and S37.	Confirms safe electrical isolation (lockout tagout) method has been applied and tests for dead in line with task requirements and company procedures. (K34; S27 and S36) Conducts and confirms electrical and connected services deisolation in line with task requirements and company procedures. (K34; S27 and S36) Selects electrical maintenance tools, measurement, and test equipment suitable for the task. Checks to ensure functionality. Uses in line with operation and care requirements. (K42 and S28) Conducts planned electrical maintenance in line with task requirements and company procedures including inspecting and testing electrical aspects of plant, removing and replacing electrical parts, setting up and adjusting electrical aspects of plant, and cleaning parts. (K41, S31, S32, S34, S35 and S37) Conducts functional testing to confirm operation in line with task requirements. (K41, S31, S32, S34, S35 and S37)

Observation with questions - Themed KSBs	To achieve a Pass the apprentice must achieve **ALL** of the following:
Specialist option: Control and Instrumentation technician - Conducting planned control and instrumentation. K47; K48; K55; K56; K60; S38; S39; S40; S43; S44; S45; S46; S47; S48; S49; S50 and S51.	Conducts and confirms isolation of connected services in line with task requirements and company procedures. (K47; K48; S38; S39; S49 and S50) Confirms safe electrical isolation (lockout tagout) method has been applied and tests for dead in line with task requirements and company procedures. (K47; K48; S38; S39; S49 and S50) Re-connects instrumentation power supply, cables, pipework, and services in line with task requirements and company procedures. (K47; K48; S38; S39; S49 and S50) Conducts and confirms electrical and connected services deisolation. (K47; K48; S38; S39; S49 and S50) Selects control and instrumentation maintenance tools and equipment suitable for the task. Checks to ensure functionality. Uses in line with operation, care, and calibration requirements. (K56 and S40) Conducts planned control and instrumentation maintenance in line with task requirements and company procedures including inspecting and testing Control and instrumentation systems, checking calibration and making adjustments, checking loop function, setting up and adjusting control and instrumentation systems, cleaning parts, and removing and replacing instruments and sensors. (K55, S43, S44, S45, S46, S47, S48 and S51)

Observation with questions - Themed KSBs	To achieve a Pass the apprentice must achieve **ALL** of the following:
	Conducts functional testing to confirm operation in line with task requirements. (K55, S43, S44, S45, S46, S47, S48 and S51)
Specialist option: Mechanical maintenance technician - Conducting planned mechanical maintenance. K67; K68; K69; S52; S53; S56; S57; S58; S59; S60; S61; S62 and S63.	Checks and confirms safe isolation of connected services in line with task requirements and company procedures. (K67, S52 and S62) Confirms electrical and connected services deisolation in line with task requirements and company procedures. (K67, S52 and S62) Selects mechanical maintenance tools and equipment suitable for the task. Checks to ensure functionality. Uses in line with operation, care, and calibration requirements. (K69 and S53) Conducts planned mechanical maintenance in line with task requirements and company procedures including checking condition and operation of mechanical aspects of plant and equipment, removing and replacing mechanical parts, examining mechanical parts for defects, setting up and adjusting mechanical aspects of plant, cleaning parts, and lubricating mechanical assemblies. (K65; S56; S57; S58; S59; S60; S61 and S63) Conducts functional testing to confirm operation in line with task requirements and company procedures. (K68; S56; S57; S58; S59; S60; S61 and S63)

Distinction descriptors for the observation with questions

Observation with questions - Themed KSBs	To achieve a Distinction the apprentice must achieve **ALL** of the Pass descriptors and **ALL** of the Distinction descriptors
Core: Organising own work K4; K5 and S2.	Justifies planning decisions in terms of efficiencies achieved and the balance of safety, environmental impact, quality, cost, delivery, and ethical practice. (K4; K5 and S2)
Core: Maintaining workplace health, safety, security, and environmental compliance. K10 and S8	Explains the importance of applying health, safety, and environmental procedures in their work. (K10 and S8)
Core: Using work information and following working practices.	NA
Core: Completing work records.	NA
Core: Communicating with others. K29 and S19	NA

Observation with questions - Themed KSBs	To achieve a Distinction the apprentice must achieve **ALL** of the Pass descriptors and **ALL** of the Distinction descriptors
Specialist option: Electrical maintenance technician - Conducting planned electrical maintenance. K41; S31; S32; S34; S35 and S37.	Justifies their approach to planned electrical maintenance. (K41, S31, S32, S34, S35 and S37)
Specialist option: Control and Instrumentation technician - Conducting planned control and instrumentation. K55; S43; S44; S45; S46; S47; S48 and S51.	Justifies their approach to planned control and instrumentation maintenance. (K55, S43, S44, S45, S46, S47, S48 and S51)
Specialist option: Mechanical maintenance technician - Conducting planned mechanical maintenance. K68; S56; S57; S58; S59; S60; S61 and S63.	Justifies their approach to planned mechanical maintenance. (K68, S56, S57, S58, S59, S60, S61 and S63)

Component 2: Interview based on an EPA portfolio

The apprentice must demonstrate core KSBs in an integrated way.

To gain a Pass, an apprentice must successfully achieve **all** the assessment descriptors for each KSB, as shown below.

To achieve a Distinction, an apprentice must successfully achieve **all** the Pass assessment descriptors and **all** descriptors from each of the Distinction boxes.

Interview (based on an EPA portfolio)	To achieve a Pass the apprentice must achieve **ALL** of the following:
Core: Impact of sector on maintenance activities. K1	Explains the impact of the sector that they work in on their maintenance activities. (K1)
Core: Roles and responsibilities. K2; K3; K16; S4; S10 and S20	Outlines their role as a maintenance technician including their limits of responsibility and how they escalate issues in line with company procedures. (K3 and S20) Describes how they respond and adapt to meet demands in their work with different maintenance disciplines and functional areas. (K2 and S4) Describes how they have or would respond in an emergency situation in line with their company's emergency incident procedures. (K16 and S10)
Core: Working sustainability. K14; S11 and B2.	Describes how they consider and apply principles of sustainability when using resources and carrying out tasks to support the UK's net zero commitment. (K14, S11 and B2)

Interview (based on an EPA portfolio)	To achieve a Pass the apprentice must achieve **ALL** of the following:
Core: Participating in continuous improvement. K26; S25; S26 and B5.	Describes how they have applied continuous improvement (CI) techniques to identify viable suggestions to support their company's CI system. (K26 and S25) Describes planned and unplanned learning and development activities they have carried out and recorded to meet personal development needs, showing a commitment to future CPD. (S26 and B5)
Core: Teamworking. K27; K28; S18 and B4	Describes how they apply team working principles to meet work goals and support inclusivity in line with their company's policy on equity, diversity, and inclusion. (K27; K28; S18 and B4)
Core: Produce written documents. K30 and S22	Describes how they apply written communication techniques to produce or amend documents in their work that are suitable for the context. (K30 and S22)
Core: Digital and information technology. K31 and S24	Describes how they use digital and information technology in their work in compliance with their organisation's cyber security requirements and the General Data Protection Regulation (GPDR). (K31and S24)
Specialist Option: Electrical maintenance technician Electrical maintenance problem solving and fault-finding. K43; K44; K45; S29 and S30	Describes how they use electrical diagnostic equipment and apply fault-finding, rectification, problem solving, and critical reasoning techniques identify and rectify common electrical plant, equipment, and systems failure modes in line with task requirements and company procedures. (K43; K44; K45; S29 and S30)

Interview (based on an EPA portfolio)	To achieve a Pass the apprentice must achieve **ALL** of the following:
Specialist Option: Electrical maintenance technician Cable installation and termination. K40 and S33	Describes how they prepare and terminate electrical cables using methods in line with the task requirements and company procedures. (K40 and S33)
Specialist Option: Control and instrumentation maintenance technician Problem solving and fault-finding. K57; K58; K59; S41 and S42	Describes how they use control and instrumentation diagnostic equipment and apply fault-finding, rectification, problem solving, and critical reasoning techniques to identify and rectify common control and instrumentation system failure modes in line with task requirements and company procedures. (K57; K58; K59; S41 and S42)
Specialist Option: Mechanical maintenance technician Mechanical maintenance problem solving and fault-finding. K70; K71; K72; S54 and S55	Describes how they use mechanical diagnostic equipment and apply fault-finding, rectification, problem solving, and critical reasoning techniques to identify and rectify common problems relating to mechanical aspects of plant and equipment in line with task requirements and company procedures. (K70; K71; K72; S54 and S55)
Specialist Option Mechanical maintenance technician Bench fitting techniques. K73 and S64	Describes how they apply bench fitting techniques including cutting threads, mechanical fitting, and joining in line with task requirements and company procedures. (K73 and S64)

Distinction descriptors for the interview based on an EPA portfolio

Interview (based on an EPA portfolio)	To achieve a Distinction the apprentice must achieve **ALL** of the Pass Descriptors and **ALL** of the Distinction Descriptors:
Core: Impact of sector on maintenance activities	NA
Core: Roles and responsibilities	NA
Core: Working sustainability. K14; S11 and B2	Justifies the application of sustainability practices in maintenance activities. (K14, S11 and B2)
Core: Participating in continuous improvement. K26 and S25	Justifies the potential impact of the improvement suggestions with consideration to benefits and potential risks. (K26 and S25)
Core: Teamworking.	NA
Core: Produce written documents.	NA
Core: Digital and information technology.	NA
Specialist Option: Electrical maintenance technician Electrical maintenance problem solving and fault. K43 and S30	Justifies diagnostic methods they have used in the identification and rectification of faults and system failure modes. (K43, S30)

Interview (based on an EPA portfolio)	To achieve a Distinction the apprentice must achieve **ALL** of the Pass Descriptors and **ALL** of the Distinction Descriptors:
Specialist Option: Electrical maintenance technician Cable installation and termination.	NA
Specialist Option: Control and instrumentation maintenance technician Problem solving and fault-finding. K57 and S42	Justifies diagnostic methods they have used in the identification and rectification of system failure modes (K57 and S42)
Specialist Option: Mechanical maintenance technician Mechanical maintenance problem solving and fault-finding K70 and S55	Justifies diagnostic methods they have used in the identification and rectification of issues relating to mechanical aspects of plant and equipment. (K70, S55)
Specialist Option Mechanical maintenance technician Bench fitting techniques K73 and S64	NA

Component 3: Multiple-choice test

The following grade boundaries apply to the multiple-choice test assessment:

Grade	Minimum mark	Maximum mark
Fail	0	27
Pass	28	40

Overall grading

The apprenticeship will be graded fail, pass, merit or distinction. The final grade will be determined by collective performance in the three assessment components.

In order to gain a pass, an apprentice must achieve at minimum of a pass in each EPA component. A pass represents full competence against the standard. To achieve a merit grade, an apprentice must achieve a distinction in the observation with questions and a pass in the other assessment components. To achieve an overall distinction the apprentice must achieve a distinction in the observation with questions and interview based on an EPA portfolio and a pass in the multiple-choice test.

The observation with questions, interview based on an EPA portfolio and multiple-choice test are all marked separately and awarded a fail, pass, or distinction.

The multiple-choice test is based on the percentage score achieved. The grade and mark for the observation with questions and interview is based on the number and level of descriptors achieved.

The overall grade for the EMT Single-Discipline Standard is based on the grades in individual components as follows:

Observation with questions	Interview based on an EPA portfolio	Multiple-choice Test	Overall grading
Distinction	Distinction	Pass	Distinction
Distinction	Pass	Pass	Merit
Pass	Distinction	Pass	Pass
Pass	Pass	Pass	Pass
Fail	Any grade	Any grade	Fail
Any grade	Fail	Any grade	Fail
Any grade	Any grade	Fail	Fail

The grading descriptors that will be applied for each assessment descriptors along with additional details can be found in Section 3 of this Specification.

Section 4: Resits and retakes

Apprentices who fail one or more EPA components can re-sit or re-take the failed component at the employer's discretion. The apprentice's employer needs to agree that a re-sit or re-take is appropriate. A re-sit does not need further learning, but a re-take does. Apprentices should have a supportive action plan to prepare for a re-sit or a re-take.

The employer and EEA should agree the timescale for a re-sit or re-take. A re-sit is typically taken within 2 months of the EPA outcome notification. The timescale for a re-take is dependent on how much re-training is required and is typically taken within 4 months of the EPA outcome notification.

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

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

The apprentice will get a maximum EPA grade of a pass if they need to re-sit or re-take one or more assessment methods, unless EEA determines there are exceptional circumstances.

The EEA resit and re-take policy can be found at:
https://energyenvironmentawards.co.uk/wp-content/uploads/2025/08/Re-sit-and-Re-take-Policy-v-6.0.pdf

Section 5: Practical Observation Guidance

Level 3 Engineering maintenance technician – single discipline observation with questions planning and approval form

Purpose

EEA must approve employer's observation with questions assessment. The purpose of the approval is to provide EEA with assurance that the practical assessment will be conducted in line with the EMT – single discipline assessment plan. The approval must take place before the first observation with questions assessment is carried out. To access the service, see Appendix D, EMT – Single Discipline Supporting Documents 'Level 3 Engineering maintenance technician – single discipline observation with questions planning and approval form.'

Submitting the form to EEA

To obtain approval, employers must complete the Level 3 Engineering maintenance technician – single discipline observation with questions planning and approval Form'. This must be submitted to the EEA Service Delivery Team for approval at least 2 months before Gateway.

EEA Approval Process

Once the EMT – single discipline observation with questions planning and approval form has been received the approval process will be conducted by EEA. The outcomes will be shared with the employer/training provider no later than 5 working days following the review.

The employer/training provider must ensure:

- the task(s) being observed is suitable and sufficient and is to be carried out at a suitable premises. Site access for the assessor and any specific requirements must be advised in advance
- all equipment and resources are suitable for the task, in good safe working condition and certification where applicable

Please be aware:

- Observation with questions approval does not guarantee the apprentice will pass the assessment
- No health and safety risk assessment has been carried out by EEA
- EEA approval does not remove any of the training provider obligations to ensure full coverage of the standard, and full compliance with relevant legislation
- EEA approval is based only on information supplied and is not a guarantee that the observation tasks/briefs, selected plant/machinery/equipment on the day of the assessment will be sufficient for the observation with questions
- The information provided in the Level 3 Engineering maintenance technician – single discipline observation with questions planning and approval form must not be shared with the apprentice

Preparing for the Observation with questions

Where possible, the employer/training provider should provide the apprentice with the opportunity to carry out a practice observation with questions as close to the real assessment described in Section 2 of the specification (Component 1).

The employer/training provider should prepare a practical task similar to (but not identical to) the tasks being used for the live assessment. A suitable person should be chosen to play the part of the assessor.

A template is provided to help ensure that the activities assessed during the practical assessment will give complete coverage of the standard. See Appendix E, EMT – Single Discipline Supporting Documents 'Practice Observation with Questions Template.'

Preparing for the Interview based on an EPA portfolio

An Interview based on an EPA portfolio should take place between the apprentice and the person acting the role of an assessor. The apprentice should draw on evidence from their EPA portfolio during the discussion.

Guidance on an EPA Portfolio

Throughout the on-programme part of their apprenticeship, the apprentice must compile an EPA portfolio to support them in the interview. The Interview will draw on the evidence contained in the EPA portfolio.

The EPA portfolio should reflect their individual experiences and the activities carried out during this period and meet the requirements outlined in the assessment plan.

A completed EPA portfolio is one of the Gateway requirements.

The EPA portfolio is **not assessed**. It serves the following purposes:

- It provides the opportunity for each apprentice to provide examples of the knowledge, skills and behaviours that will be assessed in the interview
- A carefully prepared EPA portfolio will support the apprentice during the interview
- It allows the assessor to review the EPA portfolio before the interview to help focus and contextualise the questions the apprentice will be asked

The EPA portfolio is a record of how each apprentice demonstrated the knowledge, skills and behaviours that are assessed in the interview. Apprentices will have access to their EPA portfolio during the interview. When the employer/training provider registers their apprentices with EEA they will have access to the EPA Portfolio Template.

The role of the employer/training provider

Employer/training providers are expected to support the apprentice in preparing their portfolio by:

- providing clear instruction and deadlines to allow the apprentice to plan and compile their portfolio in preparation for the Gateway meeting
- advising on which pieces of evidence to select
- authenticating evidence as valid
- signing off the EPA portfolio
- submitting the portfolio to EEA as part of Gateway requirements.

What to expect in the practice interview?

The practice interview will be based on the EPA portfolio which will provide the apprentice with the opportunity to practice discussing their KSBs gained throughout their on-programme and by referring to the evidence from their portfolio using their responses to the tasks and associated evidence. A suitable person should be chosen to play the part of the assessor.

A practice interview template is provided to help prepare the appropriate questions to ask and to record the apprentices' performance. See Appendix F, EMT – Single Discipline Supporting Documents 'Practice Interview Based on an EPA Portfolio Template.'

As part of the practice exercise, apprentices should have access to their EPA portfolio to support their responses.

Preparing for the multiple-choice test

While on-programme, the employer and/or training provider should brief the apprentice on the areas to be assessed by the multiple-choice test, as detailed in Section 2 in this specification. It is good practice to identify the areas within the learning programme where the relevant knowledge is delivered, ensuring that apprentices are aware that elements of these might come up in the test.

The multiple-choice test is aligned to the standard rather than a specific job role that the apprentice may be doing. The questions have been written to reflect the EMT - single discipline and specialist role as a whole and not focussed on specific plant, machinery, or employer-specific processes.

In readiness for end-point assessment, the apprentice should complete a practice multiple-choice test. This should be undertaken in advance of the live multiple-choice test, with enough time to mark the test, and provide feedback to the apprentices. A practice multiple-choice test is available as a printable copy – See Appendix C, EMT - Single Discipline Supporting Documents 'Practice Multiple-choice Test.'

For maximum effect, ensure the test is taken in exam conditions similar to those that will be experienced in a live test.

Section 6: Authenticity and security of apprentice work

The apprentices must be advised by their training provider and employer that copying of any work (whether it is from another apprentice or from internal, external documents or source) and presenting it as their own will be deemed as malpractice and will lead to their work being disqualified. Apprentices must not share their work or allow any person to copy their work as this is not allowed and would also be deemed as malpractice.

In signing off the portfolio, training providers and employers must be satisfied that the evidence in the portfolio is:

- **adequate**: evidence must cover all relevant KSBs within the assessment plan. Adequate does not mean a large quantity of evidence. The evidence should focus on quality rather than quantity
- **authentic**: apprentices must be able to confirm and talk about the evidence that they submit with the independent assessor, appointed by EEA. It is vitally important apprentices only submit evidence relating to them
- **appropriate**: all evidence must be relevant to the KSBs assessed during the interview based on an EPA portfolio
- **recent and up to date**: all evidence must be linked to the tasks in the EPA portfolio template. The evidence must be recent and current which demonstrate the apprentice's competence. The independent assessors, appointed by EEA, will assess current competencies. Apprentices must gather evidence during their on-programme training