SIAS

Maintenance & Operations Engineering Technician (ST0154)

Level 3 Apprenticeship Standard

End-Point Assessment Specification

Contents

This specification describes the end-point assessment tests, the test rules and who should be involved. Preparing for end-point assessment including gateway requirements are also covered.

SIAS is the Science Industry Assessment Service. It is part of the Cogent Skills Group. For further information about apprenticeship standards and Trailblazers please contact info@siasuk.com.

In this guide, the term "employer" is used to refer to the host employer, which is the company where the apprentice gains their competency experience. It does not refer to an organisation such as an Apprenticeship Training Agency (ATA) that has the employment contract with the apprentice.

Qualification Objective

The aim of this qualification is to ensure that the apprentice is occupationally competent against the knowledge, skills and behaviours outlined in the assessment plan for this standard.

Electrical/Mechanical/Control and Instrumentation, Electrical System and Process Control, Electromechanical and Wind Turbine Technicians will undertake installation, testing, servicing, removal, replacement, maintenance, and repair of a range of equipment, sometimes complex, as part of planned preventative and reactive maintenance programmes. They may also undertake decommissioning activities when plant is being removed from service. Plant Operation Technicians will undertake the safe and efficient operation of complex integrated energy conversion and production plant and systems. These activities could include plant commissioning, isolation and testing, plant preparation, plant start-up and shut down, monitoring, and controlling plant and dealing with critical operational problems.

Prior Learning and Qualifications

Entry requirements are typically 3 GCSEs at grade C or higher including mathematics, English, and science, or equivalent and/or relevant experience.

Structure of the Qualification

The standard consists of specified knowledge, skills, and behaviours (KSBs) set out in the assessment plan. Some of these are core and will be assessed for every apprentice, others are specific to the pathway the apprentice is following and will only be assessed on apprentices registered for that pathway.

Maintenance & Operations Engineering Technician has the following pathways:

- Mechanical Technician
- Electrical Technician
- Control and Instrument Technician
- Electromechanical Technician
- Electrical Systems and Process Control Technician
- Plant Operations Technician
- Wind Turbine Technician

About Competence Evaluation

During the apprenticeship, regular evaluation of the competence of the apprentice against the apprenticeship standard will help to ensure that they achieve full occupational competence by the end of their training, and they are ready for end-point assessment. Confirmation from the employer that the apprentice is fully competent is needed before end-point assessment can take place.

As competence evaluation is an in-programme activity, the process that is used for this has not been mandated. It is for the employer supported by their training provider to decide how they wish to do this. To help with this SIAS has produced the SIAS Competence Tracker.

Competence Evaluation Log (CEL)

The evidence that the apprentice is ready for end-point assessment is the signed SIAS Competence Evaluation Log (CEL). The CEL covers the knowledge, skills and behaviours specified in the apprenticeship standard. The signed log shows that the apprentice has

demonstrated to the employer they are fully competent at the end of their training. It has the same status as a qualification certificate. Along with the qualification certificates, a signed completed CEL is one of the requirements for the Gateway.

Readiness for End-Point Assessment (EPA) – Gateway

Before going forward for the EPA, the employer must be satisfied that the apprentice has:

- Achieved a minimum level 2 English and Maths
- Satisfactory completion of the formal training plan agreed with the apprentice by the employer
- Sufficient evidence in the form of a portfolio to allow the apprentice to consistently demonstrate knowledge, skills and behaviours as described in the standard.

Stages of End-Point Assessment

The apprentices' knowledge, skills and behaviours will be measured against the Core Knowledge, Core Skills, Core Behaviours and Skill Specific Elements of the apprenticeship Standard.

These will be judged in three Stages as detailed below:

Stage 1 – Knowledge Assessment

Stage 2 – Practical Observation

Sage 3 – Technical Interview

Stage 1 Knowledge Assessment

Apprentices will be required to complete a standardised scenario-based knowledge assessment consisting of 30 multiple choice questions, taken under examination conditions. The assessment will be a 45-minute electronic or paper-based question paper and will enable apprentices to demonstrate core technical knowledge across the Maintenance & Operations Engineering Technician standard as detailed in Annex A. The questions will be determined and standardised by assessment organisations in consultation with representative employers.

The knowledge assessment will be marked 0-100% in accordance with the marking mechanism detailed in Figure 1.

Knowledge Assessment %	Points	Grade
≤ 59 (17 marks)	0	Fail
60-74 (18 – 22 marks)	1.5	Pass
75-84 (23 – 25 marks)	3	Merit
85-100 (26 – 30 marks)	4.5	Distinction

Fig 1

Stage 2 Practical Observation

Apprentices' knowledge, skills and behaviours will be observed by the Technical Expert during the Practical Observation stage of EPA. Whilst it is expected that a high percentage of the assessment criteria will be observed during this stage, the Technical Expert may apply alternative methods of assessment to judge the apprentices' knowledge, skills, and behaviours e.g., questioning, product evidence, testimony etc. The assessment must take place in a realistic work situation and on the actual plant and equipment.

Whilst the actual time taken for the observation will vary, it should be noted that time is relevant to the complexity of the activity. Therefore, employers, training providers, mentors and apprentices should identify an activity that is sufficiently complex that allows the apprentice to showcase their highest and broadest levels of KSB during the observation. The actual activity completed by the apprentice should reflect the time taken to complete by a safe and competent tradesperson. However, the actual time should be no longer than 1 shift i.e., 8 hours. Details of the observed activity will be agreed in advance of the assessment through the collaboration of the employer, SIAS and where applicable, the training provider.

During the practical observation, the apprentice will be asked standardised questions relating to the activity they are performing. Follow up questions may also be asked to establish the apprentices understanding of their actions.

The practical observation will be marked 0-100% in accordance with the marking mechanism detailed below and against the elements of the standard detailed in the MOET Assessment Plan.

Marks of achievement will be awarded for each element being assessed. All Pass assessment criteria must be achieved during the practical observation in order for the apprentice to be awarded a Pass. Apprentices that do not achieve all Pass assessment criteria will be graded Fail.

A Pass will be achieved should the apprentice demonstrate compliance to all the Pass assessment criteria. Additional marks can be awarded, when and only when, a minimum of a Pass for the Element has been achieved.

Where the Technical Expert judges that the apprentices observed KSB have exceeded a Pass and meets the assessment criteria for Merit additional marks for the element will be awarded.

In cases where a Merit has been awarded and the Technical Expert judges that the apprentices observed KSB have exceeded a Merit and meets the assessment criteria for a Distinction, additional marks for the element will be awarded.

Pass Criteria	Merit Criteria	Distinction Criteria
• Achieves practical activities as described in Assessment method Matrix and meets the expectations of technical experts • Follows policies and procedures; applies health and safety knowledge. Takes personal responsibility for own health, safety, and security and that of anyone who may be affected by their actions • Accuracy and finish of work meets company standards • Effectively contributes to team success, and suggests valid ideas	• Works with others to identify areas for improvement and follows through on agreed implementation • Demonstrates positive professional relationships with individuals to support specific issues • Adapts the method and style of communications to changing circumstances and needs. • Consistently demonstrates compliance and makes suggestions to reduce risks	• Exemplary health & safety performance. • Identifies health & safety deficiency and provides solutions • Consults and involves, people from team and other areas to achieve greater understanding • Takes additional responsibility and autonomy to achieve high performance outcomes • Through positive relationships is able to actively address conflict with positive outcomes • Pre-empts risks prior to task commencement and puts actions in place to prevent them occurring

• Speaks confidently when asked, listens to others, and takes required action • Demonstrates consistent application of policies and procedures • Consistently demonstrates compliance and proactively identifies workplace hazards		
All Pass criteria must be achieved to receive a Pass for this element	All Pass criteria plus at least 3 merit criteria must be achieved to receive a merit for this element	All Pass criteria and all merit criteria plus at least 4 distinction criteria must be achieved to receive a distinction for this element

On completion of the assessment, the accumulated marks will be added up and points awarded in accordance with the information shown in Fig 3. (Taken from the MOET Assessment Plan)

Practical Observation Grade	Points
Fail	0
Pass	3.5
Merit	7
Distinction	10.5

Fig. 3

Stage 3 Technical Interview

Apprentices' KSB will be assessed by two Technical Experts during the Technical Interview stage. The interview will be based on the content of an Evidence Portfolio brought to the interview by the apprentice and compiled during the latter stages of the apprenticeship. The evidence will be used by the apprentice to support claims of competence across three scenario question areas.

Typically, the question areas will be comprised of the skill specific aspects of the Standard as detailed below, using the mechanical pathway as an example.

- Scenario Question area 1 - Position, assemble, install, and dismantle mechanical plant and equipment to agreed specifications
- Scenario Question area 2 - Replace, repair and/or remove components in mechanical plant and equipment and ensure its return to operational condition.
- Scenario Question area 3 - Diagnose and determine the cause of faults in mechanical plant and equipment

Note that it is expected that the element "Carry out planned, unplanned and preventative maintenance procedures on plant and equipment" will underpin the three Scenario Question areas and therefore will be judged holistically.

The apprentices will be required to describe and explain their actions to facilitate the scope of their work activities *i.e., Position, assemble, install, and dismantle mechanical plant and equipment to agreed specifications.*

The evidence should be built up of work that they have completed towards the latter stages of their apprenticeship, as this work is more likely to demonstrate a higher level of KSB thus enhancing the apprentice's opportunity to gain higher levels of achievement.

The selection of the evidence is the responsibility of the apprentice/employer and should showcase the apprentice's consistency and breadth of KSB.

Evidence can be taken from a range of different work activities and should be naturally generated. Evidence should be current and valid.

The Evidence Portfolio should be made up of a Work Pack for each Scenario Question area. Each Work Pack should have three different examples of work activities relating to the Scenario Question area.

See Figure 4 for an example of the Evidence Portfolio for Scenario Question 1.

	Scenario Question 1 area - Position, assemble, install, and dismantle mechanical plant and equipment to agreed specifications
Work Activity:	Work Pack
Installing a mechanical filter	Method statement of the procedures to install a mechanical filter
	Risk assessment for the procedure
	Copies of completed documents, i.e., test results, inspection report, work log, etc
	Photographs of the apprentice installing the filter
Positioning, assembling, and aligning a centrifugal pump	Pump alignment report
	Risk assessment
	Manufacturers guide for the pump
Dismantling a gearbox	Work log
	Risk assessment for the procedure
	Photographs of the apprentice dismantling the gearbox.

Fig 4

Whilst the evidence will vary across apprentices, employers, locations and activities, the evidence should be used to support the apprentices when questioned on the completed activities by the Technical Experts.

Employers/training providers will take responsibility to support the apprentice during the development of their Evidence Portfolio. The evidence should allow the apprentice to showcase their highest and broadest level of knowledge, skills, and behaviours. The Technical Experts will test the sufficiency, currency and validity of the evidence and judge it against the assessment criteria of elements of the standard detailed in the Assessment Plan.

Employers are encouraged to facilitate "Mock Technical Interviews" in order to prepare the apprentice for the actual interview.

During the technical interview the apprentice will be asked standardised questions relating to the activities they completed. The breadth of knowledge given by the apprentice will be judged by the Technical Experts against the assessment criteria of the identified elements of the Standard.

The technical interview will be marked 0-100% in accordance with the marking mechanism detailed below and against the elements of the standard detailed in the Assessment Plan.

Marks of achievement will be awarded for each element being assessed. All Pass assessment criteria must be achieved for the apprentice to be awarded a Pass. Apprentices that do not achieve all pass assessment criteria will be graded Fail.

A Pass will be achieved should the apprentice demonstrate compliance to all the Pass assessment criteria. Additional marks can be awarded, when and only when, a minimum of a Pass for the Element has been achieved.

Where the Technical Expert judges that the apprentices KSB's have exceeded a Pass and meets the assessment criteria for Merit additional marks for the element will be awarded.

In cases where a Merit has been awarded and the Technical Expert judges that the apprentices KSB's have exceeded a Merit and meets the assessment criteria for a Distinction, additional marks for the element will be awarded. Figure 5 identifies the marks awarded for each element.

Pass Criteria	Merit criteria	Distinction Criteria
• Provides correct information to describe their understanding of skills, knowledge and behaviours required to undertake their respective role competently, meeting technical experts' requirements, with particular emphasis on: • Understands and can describe the impact of their actions on plant, equipment, and others. • Demonstrates compliance with all company health, safety and environmental processes and policies as well as regulatory requirements • Describes why policies and procedures are required	• Explains in detail, with supporting evidence, the range of required skills, knowledge, and behaviours with particular emphasis on: - Inclusion of the relevant engineering theories and principles relative to their occupation - Demonstration of review and applicability of industry health, safety and environmental working practices and regulations	• Justification of: - maintenance and operational practices, processes and procedures covering a range of plant and equipment - a range of methods to locate, and rectify faults on plant and equipment, with explanation of their recommended choice • Demonstration of excellent and thorough understanding of the relevant engineering theories and principles relative to their occupation • Excellent knowledge and understanding of the impact of relevant industry health, safety and environmental working practices and regulations on their activities
All Pass criteria must be achieved to receive a Pass for this element	All Pass criteria plus all merit criteria must be achieved to receive a merit for this element	All Pass criteria and all merit criteria plus at least 3 distinction criteria must be achieved to receive a distinction for this element

Fig 5

On completion of the assessment, the accumulated marks will be added up and points awarded in accordance with the information in Figure 6.

Technical Interview Grade	Points

Fail	0
Pass	3.5
Merit	7
Distinction	10.5

Fig 6

Moderation

Assessment organisations will undertake moderation of independent examiner and technical experts' decisions through observations and examination of documentation on a risk sampling basis, i.e., a minimum of 20% for experienced examiners/technical experts and 100% for new examiners/experts or where inconsistencies have been identified or where the technical expert has been recruited from the employer due to site requirements. Results cannot be confirmed until moderation has been completed.

Re-takes/re-sits

Re-takes/re-sits will only be available to apprentices who fail an end-point assessment element(s) i.e., they are not offered to apprentices wishing to move from Pass to Distinction. Apprentices may re-take/re-sit one or more elements within the six-month end-point assessment period. Re-take/re-sits outside of the six-month end-point assessment period would require all elements to be re-assessed. Re-sits/re-takes will not be awarded a grade higher than Pass. Apprentices must have a supportive action plan to prepare for the re-take/re-sit. Further re-takes/re-sits would be at the discretion of the employer following a 1:1 review with the apprentice to determine the suitability of the apprentice for further testing.

Final Grade

The apprenticeship will be graded Distinction, Merit, Pass or Fail. The final grade will be determined by collective performance in the three assessment tools in the end-point assessment. The weighting of the assessment methods is: 40% on the technical interview, 40% practical observation and 20% on the knowledge assessment. A points system relating to the mark achieved in each assessment tool, will determine if the apprentice has achieved a Distinction, Merit, Pass or Fail and is described below:

Distinction – minimum of 24 Points (10.5 Points in Technical Interview + 10.5 points in practical observation + 3 Points Knowledge Assessment). An apprentice will only achieve a Distinction if they have performed at Distinction level in both the technical interview and practical observation

Merit – minimum of 15.5 Points (7.0 Points the Technical Interview + 7 points in the practical observation + 1.5 Points Knowledge Assessment). An apprentice will only achieve a Merit if they have performed at Merit level in both the Technical Interview and practical observation

Pass – minimum of 8.5 Points (e.g., a minimum of Pass in all 3 elements).

Knowledge Assessment %	Points	Grade	Practical Observation Grade	Points	Technical Interview Grade	Points
85-100	4.5	Distinction	Distinction	10.5	Distinction	10.5
75-84	3	Merit	Merit	7	Merit	7
60-74	1.5	Pass	Pass	3.5	Pass	3.5
≤ 59	0	Fail	Fail	0	Fail	0

Certification

The outcomes from the end-point assessment will be reviewed and a grade conferred by SIAS in accordance with SIAS QA procedures, which are available from SIAS. SIAS will notify the employer of the outcome of each of the assessments.

SIAS will apply for the apprentice's certificate, which will be sent to the employer. The certificate confirms that the apprentice has passed the end-point assessment, has demonstrated full competency across the standard and is job-ready.

Assessment Specification

The assessment specification can be found in the published assessment plan for the standard. Details of which elements of the apprenticeship standard will be tested by each test are given in the Assessment Method Matrix section of this document.

Assessment Method Matrix

The matrix in Figure 8 records the elements of the standard that are assessed during each of the three Stages.

Key:	
Knowledge Test	KT
Practical Observation	PO
Technical Interview	TI

Core Technical Knowledge

No	Standard Competency Statement	Assessment	
K1	First principles relating to the operation and maintenance of appropriate plant and equipment	TI	KT
K2	Relevant industry health and safety standards, regulations, and environmental and regulatory requirements	TI	KT
K3	Maintenance and operational practices, processes and procedures covering a range of plant and equipment	TI	KT
K4	The relevant engineering theories and principles relative to their occupation	TI	KT

Core Technical Skills

No	Standard Competency Statement	Assessment	
CS1	Comply with industry health, safety and environmental working practices and regulations		PO
CS2	Locate, and rectify faults on plant and equipment	TI	PO
CS3	Communicate with and provide information to stakeholders in line with personal role and responsibilities		PO
CS4	Read, understand, and interpret information and work in compliance with technical specifications and supporting documentation	TI	PO
CS5	Prepare work areas to undertake work related activities and reinstate those areas after the completion of the work-related activities		PO
CS6	Inspect and maintain appropriate plant and equipment to meet operational requirements	TI	PO
CS7	Assess and test the performance and condition of plant and equipment		PO
CS8	Communicate, handover and confirm that the appropriate engineering process has been completed to specification	TI	PO

Core Behaviours

No	Standard Competency Statement	Assessment

CB1	**Health and Safety** – follows health and safety policies and procedures and be prepared to challenge unsafe behaviour using appropriate techniques to ensure the protection of people and property when working alone and/or with appropriate supervision		PO
CB2	**Quality focused** – ensures that work achieves quality standard both occupationally and personally		PO
CB3	**Working with others** – has the ability to work well with people from different disciplines, backgrounds, and expertise to accomplish an activity safely and on time		PO
CB4	**Interpersonal skills** – gets along well with others and takes into account their needs and concerns		PO
CB5	**Critical reasoning** – uses resources, techniques and obtained facts to develop sound solutions while recognising and defining problems	TI	
CB6	**Sustainability and ethical behaviour** – behaves ethically and undertakes work in a way that contributes to sustainable development		PO
CB7	**Risk awareness** – demonstrates high concentration, the desire to reduce risks, ability to be compliant and awareness of change, through regular monitoring and checking of information		PO

Specific Skills – Electrical Technicians

No	Standard Competency Statement	Assessment	
SS1	Position, assemble, install, and dismantle electrical plant and equipment to agreed specifications	TI	PO
SS2	Carry out planned, unplanned and preventative maintenance procedures on electrical plant and equipment	TI	PO
SS3	Replace, repair and/or remove components in electrical plant and equipment and ensure its return to operational condition.	TI	PO
SS4	Diagnose and determine the cause of faults in electrical plant and equipment	TI	PO

Specific Skills – Mechanical Technicians

No	Standard Competency Statement	Assessment	
SS1	Position, assemble, install, and dismantle mechanical plant and equipment to agreed specifications	TI	PO
SS2	Carry out planned, unplanned and preventative maintenance procedures on mechanical plant and equipment	TI	PO
SS3	Replace, repair and/or remove components in mechanical plant and equipment and ensure its return to operational condition.	TI	PO
SS4	Diagnose and determine the cause of faults in mechanical plant and equipment	TI	PO

Specific Skills – Control and Instrumentation Technicians

No	Standard Competency Statement	Assessment

SS1	Position, assemble, install, and dismantle plant and equipment to agreed specifications	TI	PO
SS2	Carry out planned, unplanned and preventative maintenance procedures on plant and equipment	TI	PO
SS3	Replace, repair and/or remove components in plant and equipment and ensure its return to operational condition	TI	PO
SS4	Diagnose and determine the cause of faults in plant and equipment	TI	PO
SS5	Calibrate and configure instrument and control systems	TI	PO

Specific Skills – Wind Turbines

No	Standard Competency Statement	Assessment	
SS1	Install, assemble, commission, and dismantle wind turbine plant and equipment, which will include pitch systems, yaw systems, switchgear, control systems to agreed specifications	TI	PO
SS2	Carry out planned, unplanned and preventative maintenance procedures on wind turbine plant and equipment including mechanical drive systems	TI	PO
SS3	Replace, repair and/or remove components in wind turbine plant and equipment and ensure its return to operational condition.	TI	PO
SS4	Diagnose and determine the cause of faults in wind turbine plant and equipment	TI	PO

Specific Skills – Electrical System and Process Control Technicians

No	Standard Competency Statement	Assessment	
SS1	Position, assemble, install, and dismantle integrated electrical apparatus, systems, and process control equipment	TI	PO
SS2	Carry out planned, unplanned and preventative maintenance procedures on integrated plant and equipment	TI	PO
SS3	Replace, repair and/or remove components within integrated plant and equipment and ensure its return to operational condition	TI	PO
SS4	Diagnose and determine the cause of faults within integrated plant and equipment	TI	PO
SS5	Calibrate and configure integrated electrical apparatus, systems, and process control equipment	TI	PO

Specific Skills – Electromechanical Technicians

No	Standard Competency Statement	Assessment	
SS1	Position, assemble, install, and dismantle integrated electromechanical power and control systems	TI	PO
SS2	Carry out planned, unplanned and preventative maintenance procedures on integrated plant and equipment	TI	PO

SS3	Replace, repair and/or remove components within integrated plant and equipment and ensure its return to operational condition	TI	PO
SS4	Diagnose and determine the cause of faults within integrated plant and equipment	TI	PO

Specific Skills – Plant Operations Technicians

No	Standard Competency Statement	Assessment	
SS1	Carry out planned operating procedures on plant and equipment	TI	PO
SS2	Monitor the performance of the plant and equipment	TI	PO
SS3	Handover and accept responsibility for plant and equipment	TI	PO
SS4	Respond to contingencies	TI	PO

Further Information

For information about SIAS policies, quality assurance, re-sits, appeals, complaints and general enquiries please see our website: **www.siasuk.com**

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