Apprenticeship Standard for Technician Scientist, Level 5 End-point Assessment Plan

Foreword

This end-point assessment plan for the apprenticeship standard for *Technician Scientist level 5* has been the subject of extensive consultation and designed with input from industry experts who have many years of experience working in the sector and form the Life Sciences & Industrial Science (LS&IS) Trailblazer group. The group includes employers from chemical, primary and secondary pharmaceutical, biotechnology, formulated products, and NHS. Whatever the nature of the organisation, the competence of its people is critical to achieving business aims. This is why our apprenticeships must produce people who are able to work to the industry standard and contribute to their business from day one. This end-point assessment plan will ensure that successful technician scientist apprentices have demonstrated that they have the knowledge, understanding, skills and behaviours needed to work in this exciting industry.

Introduction

This plan describes mandatory end-point assessment for the **Technician Scientist Apprenticeship Standard, level 5.**

The document is for training providers, independent assessment organisations, apprentices and employers who need to understand how an apprentice who has been trained for this occupation must be assessed at the end of their apprenticeship.

This document does not cover the on-programme training/assessment and on-going competence evaluation carried out by the employer or their nominated training providers, which is not part of the mandatory end-point assessment.

Note for clarification:

The term assessment is used in this document to describe activities associated with end-point assessment for the apprenticeship award.

The term competence evaluation is used to describe activities associated with review of an apprentice's competence by an employer or their nominated training provider.

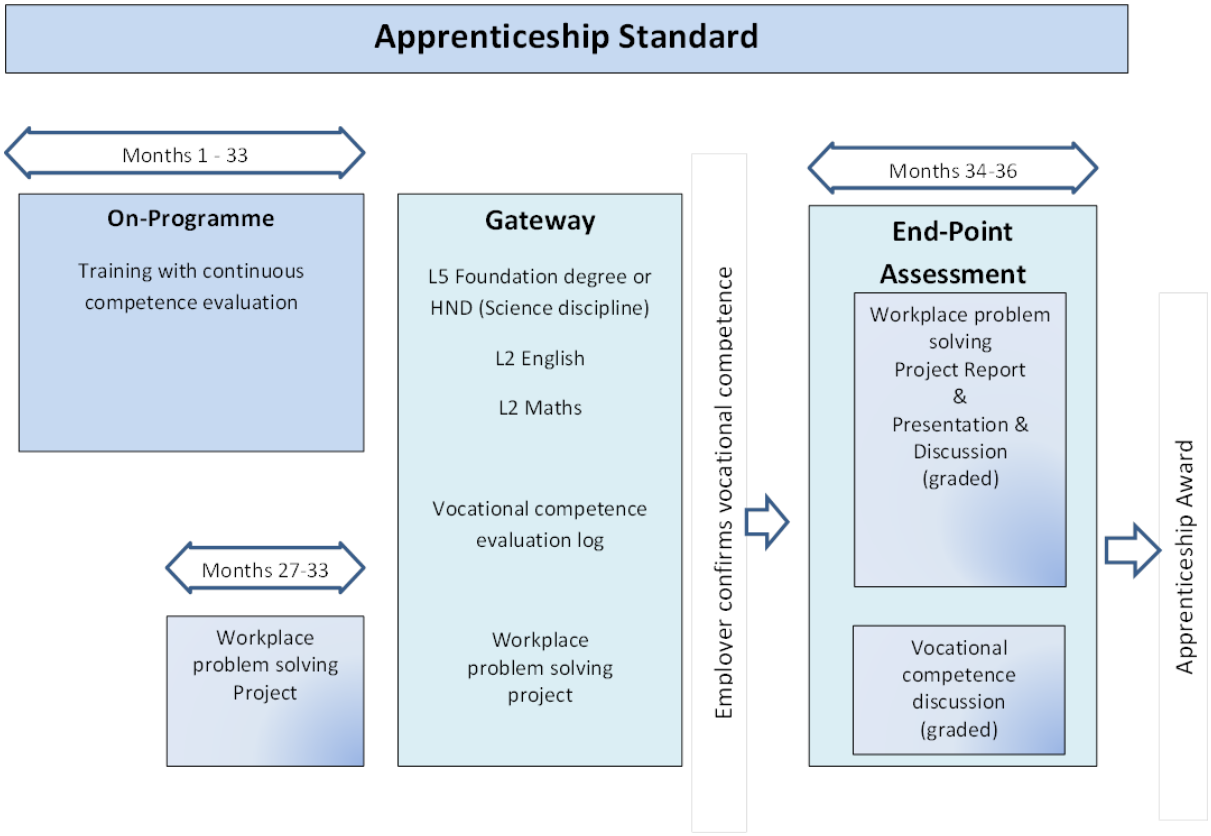
The term employer is used to refer to the host employer or direct employer, which is the company where the apprentice gains their competency experience. It does not refer to the organisation such as an ATA that has the employment contract with the apprentice.

The term technical expert is used to describe an individual nominated by the employer that meets the standards set by the Trailblazer group.

The term independent assessor is used to describe an individual working for the assessment organisation that meets the assessor criteria set by the Trailblazer group.

A Summary of the Technician Scientist Apprenticeship

Typical apprentice journey



Technician Scientist apprenticeship will typically require 33 months **on-programme training/assessment** to meet the requirements of the standard. The on-programme phase will generate the pre-requisite **gateway** requirements for the **end-point assessment** (EPA).

The on-programme phase should focus on developing the apprentice's knowledge, skills and behaviours (KSB), specifically around working safely, complying with internal and external regulations and following quality procedures. The latter period of the phase should focus on developing further skills capability supported by further guided learning, enabling the apprentice to eventually work effectively and independently with minimum supervision. The apprentice will work towards a Foundation degree or a Higher National Diploma in a science or technology discipline relevant to the job role.

Achievement of this Foundation degree or Higher National Diploma is a gateway requirement for starting the EPA, along with English and maths at level 2, achieved either before or during the apprenticeship, an approved plan for a workplace problem solving project and a vocational competence evaluation log (log). The employer must confirm that the apprentice has completed the gateway requirements and is ready for the EPA.

The EPA must be completed within a 3-month period. It must be conducted by an end point assessment organisation (EPAO) on the Register of Apprentice Assessment Organisations, which is approved to deliver EPA for this apprenticeship standard. It comprises assessment of:

- workplace problem solving project report with presentation & discussion to an EPA panel
- vocational competence discussion (VCD).

Performance in the EPA will determine the apprenticeship grade – fail, pass or distinction. The apprentice must pass all EPA methods to successfully complete the apprenticeship.

Technician Scientist work-based learning guide

The LS&IS Trailblazer employers have developed a Technician Scientist work based learning guide. It provides a detailed specification of the KSBs required to achieve occupational competence. It is recommended that an apprenticeship on-programme training plan is mapped to the work based learning guide. It is freely available at www.siasuk.com.

End-point Assessment Gateway

Apprentices must complete the gateway requirements and provide evidence to the EPAO as detailed below before taking the EPA. On completion of the gateway requirements, the employer must confirm the apprentice as ready for the EPA.

Foundation Degree (FdSc) or Higher National Diploma (HND)

Apprentices must complete a Foundation Degree or Higher National Diploma in a science or technology discipline relevant to the job role. For example:

- FdSc Chemical Science
- FdSc Applied Bioscience
- HND Applied Chemistry
- HND Applied Biology

The range of qualifications may be used allowing employers/apprentices the flexibility to tailor the apprenticeship to meet their needs, whilst meeting the minimum requirements of the apprenticeship standard**.**

Workplace Problem Solving Project

The apprentice in discussion with their employer will develop and implement a plan for a workplace problem solving project that demonstrates the practical application of science, which they will conduct over a maximum 6 month period prior to the end-point assessment period. The project will involve the apprentice identifying a problem with a laboratory technique, laboratory workflow process or other laboratory problem that, once addressed, will deliver benefit to the business. The project must be sufficiently comprehensive to cover

the whole project cycle from problem identification and planning through laboratory practice and data review to solution identification and recommendations.

The project is expected to draw together the learning from across the standard and the learner is expected to undertake this project demonstrating the ability to select and apply knowledge and principles to the solution of well-defined problems, manipulating and interpreting complex sets of data, assessing their reliability and presenting them in an appropriate format.

All project topics must be approved by the employer and the project plan must be signed off by the employer as complete and submitted to the EPAO at Gateway. Where the apprentice is contributing to the project work of a wider team the project plan should be limited to the area of responsibility and defined tasks that have been allocated to the apprentice. The EPAO will review the project plan to ensure that the scope of the completed tasks is sufficient to meet the EPA requirements. If these are found to be insufficient the apprentice will not meet the gateway requirements and will not proceed to EPA.

The project plan must cover:

Project scope, planning & resources

a. Problem definition including the scientific business context to the project and perceived advantages & limitations of the proposal
b. Clear project plan and predicted timescales
c. Resources with consideration of regulations with particular attention to relevant process safety requirements, product quality and assessment of risk.

Good planning and adherence to the plan will be tested as part of the EPA.
The following are examples of project areas.

Project Area	**Focus and Coverage**
Improved efficiency in the laboratory environment through better utilisation of assets.	The key focus of this type of project is to improve the design and utilisation of equipment or workflow processes used in laboratories.
A cost saving project such as reducing the use of chemicals or cleaning products	The key focus of this type of project is a continuous improvement project to reduce cost without compromising product quality.
Improving quality through enhanced compliance with systems	The key focus of this project is the development or redevelopment of a quality system with reference to impact on cost, quality and safety.

The project, which will be completed pre-gateway, may be the apprentice's alone or the apprentice may contribute to the project work of a wider team. The apprentice's contribution, which must be of sufficient depth and complexity to require a minimum of 70

hours of work with an additional 30 hours for project reporting. However, the apprentice should not limit the scope of their project to meet this requirement. Because of the significance of the project, the employer and the training provider may work together with the apprentice to agree a project that is achievable within the employer's business constraints, meets the employer's expectations and has a level of challenge appropriate to an FdSc or HND, so long as it meets the project criteria described in this end-point assessment plan. The project should be conducted as part of an apprentice's normal work. The apprentice may choose to use a project completed as partial fulfilment of the FdSc or HND. Collaboration between the employer and the training provider is encouraged with mentoring support for the apprentice from both the employer and the training provider.

Vocational competence evaluation log (log)

A summary record of on-programme vocational competence evaluation, signed off by a technical expert nominated by the apprentice's employer, must be recorded in a log. This reflects the industry practice of competence management through on-going employer competence evaluation.

A log must list what evidence was used to confirm the apprentice demonstrated competence, where it is recorded, how it was evaluated and by whom against all KSBs on the apprenticeship standard. There is no need to capture the evidence itself in the log. However, the log must provide a reference to where the evidence is held. Typical evidence may include, for example, a course assessments portfolio, a company workbook, performance review record, or certificate of training. During the vocational competence discussion, the apprentice must have the opportunity to refer to the log and evidence referenced within it to evidence their answers.

This signed log will be used as the evidence that the employer has confirmed the apprentice has developed all the KSBs defined in the apprenticeship standard. This must be provided to the EPAO at gateway in order for EPA to go ahead.

The EPAO must provide guidance on what format the log must take and the signatory process.

English and Maths Level 2

Apprentices must hold a minimum of level 2 English and maths, achieved either before or during the apprenticeship, before completing the EPA.

The End-point Assessment Roles & Responsibilities

An apprentice's employer must select an EPAO from the Education & Skills Funding Agency (E&SFA) register of apprentice assessment organisations (RoAO), which is approved to deliver EPA for this apprenticeship standard.

The EPAO must appoint independent assessors to conduct EPAs, who must meet the requirements as detailed in page 15

The EPAO, in discussion with the apprentice's employer, must draw up an EPA schedule. It must detail the date when the workplace report must be submitted, the date(s) and location(s) for the presentation & discussion and VCD and the members of the assessment panel.

The EPAO must ensure that the independent assessor conducts the assessments in accordance with this EPA plan.

Independent assessors have responsibility for making assessment decisions for both of the assessment methods.

The presentation and discussion will be conducted in the presence of a panel - comprising of 2 members: a technical expert nominated by the apprentice's employer and an independent assessor; independent assessors are responsible for making the assessment decisions, following discussion with technical expert. The technical expert is present to confirm the authenticity of the apprentice's work, provide guidance to the assessor on workplace policy and practice and provide a realistic environment for a presentation. The technical expert may participate in the discussion and question and answers, but does not participate in the final assessment decision. Quality assurance personnel may also be present as observers at some presentations.

Technical experts will generally be employed by the apprentice's employer. In some instances, the employer, for example an SME, may wish to contract a technical expert from outside their company if they do not have the capacity or capability to provide one.

The VCD will be conducted by the independent assessor only. Quality assurance personnel may also be present to observe at some VCDs.

End-point Assessment Methods

EPA methods must be successfully completed during a maximum 3-month period. The EPA comprises assessment of:

- Workplace Problem Solving Project Report & Presentation with questioning
- vocational competence discussion (VCD)

The table in appendix 1 shows the KSBs that will be assessed by each assessment method. The assessment criteria for project report, presentation & questioning and VCD are detailed in appendix's 2 and3.

Requirements for each assessment method are detailed below.

Workplace Problem Solving Project Report & Presentation with questioning

As part of EPA the apprentice must produce a report on the workplace problem solving project and conduct a presentation of the report to an EPA panel followed by questioning. Where the apprentice was contributing to the project work of a wider team the report must focus on the apprentice's contribution, which will then be tested in the EPA through the presentation with questioning. The employer must confirm the project report is the apprentice's own work.

The project report must cover, but need not be limited to:

1. Problem definition and data analysis
    a. Analysis of the problem using techniques such as root cause analysis
    b. Analysis of scientific information, workflow data and other relevant laboratory data pertinent to project.

2. Problem solving method
    a. laboratory techniques or/and scientific method selected
    b. analysis of data produced from application of the selected techniques, including the use of any company software packages
    c. selection criteria and justification for chosen techniques.

3. Problem solution
    a. Presentation of workplace problem solution with supporting data
    b. Reporting of the results (actual or predicted) of implementation of the workplace problem solution
    c. Description of resources involved, constraints and risks.

4. Business impact, results and conclusions
    a. Predicted or actual business impact data
    b. Conclusions drawn including personal reflection on the project scope and definition.

The project report must be submitted to the EPAO two weeks prior to the agreed panel assessment date. It should be a maximum of 3,000 words inclusive of main text, figures, tables and boxes but not including references. It should be submitted as a pdf document.

The report will be reviewed by the independent assessor. The independent assessor may seek clarification from the technical expert on any of the science, technology or business

contexts that are referenced in the report. The independent assessor will decide if the report meets the above criteria before the presentation to the EPA panel can be undertaken.

Presentation of Workplace Problem Solving Project Report to EPA Panel

The apprentice will be required to present their project report to the assessment panel. The presentation should focus on the practical application of the science that underpins the project and the conclusions of their work. Apprentices are free to select the format for the presentation. The apprentice may choose to use presentation aides, such as PowerPoint, multimedia and video. The formal presentation will then be followed immediately with a structured discussion. Each apprentice will be formally interviewed by the assessment panel regarding their project on these themes:

- Their understanding of the principles of laboratory techniques relevant to the project.
- The analysis, interpretation and presentation of their results.
- Their recommendations and how these might benefit the business.
- Their use of personal and professional skills to support delivery of the project plan.

The independent assessor will select and ask four questions from a bank of standardised competency based questions to ensure a consistent approach is adopted. The independent assessor or the technical expert may ask follow up questions to seek clarification where required. The presentation and structured discussion will be collectively assessed against the knowledge, skills and behaviours as outlined in Appendix 3.

The presentation will typically last 20 -30 minutes and the discussion 45-60 minutes; together they must be no longer than 90 minutes.

Assessment Panel Rules

The independent assessor must:

a. Plan the panel prior to it taking place.
b. Ensure that the location for the panel is appropriate; it may be conducted via video-conferencing.
c. Ensure the technical expert has been approved by the assessment organisation.
d. Ensure the presentation and discussion takes place in a room, free from distractions with no other people present except those with prior approval from the EPAO.
e. Ensure they and the technical expert has received the project report 2 weeks before the panel takes place.

f. Ensure the technical expert is fully briefed about the process and the assessment criteria before the panel commences.
g. Ensure any special needs of the apprentice are taken into consideration.
h. Chair the panel.
i. Ensure that the apprentice understands the panel process, the possible outcomes and how it is graded.
j. Ensure that the apprentice is at ease.
k. Ensure that the grading criteria and relevant documentation are to hand before commencing.
l. Capture an audio record of the presentation and questioning.
m. Document the outcomes using the EPAO's standard documentation.
n. Collect all presentation materials from the apprentice.
o. Ensure the apprentice is not informed of the outcome of the assessment at this stage.
p. Facilitate a review of the completed documentation and a discussion of the observations by the panel members.
q. Agree with the panel members that the test specification has been fully covered and the test rules have been followed.
r. Make the final decision about the outcome of the assessment and recommend the grade.
s. Send documentation to the EPAO within the agreed timescale.

Vocational Competence Discussion

Apprentices will take part in a vocational competence discussion with an independent assessor. The purpose is to determine the extent to which the apprentice understands the requirements of his/her role as defined by the standard.

There will be a question bank of eight categories of competence based questions. The categories are:

- Use of the appropriate scientific techniques, procedures and methods of relevance to the activities of the laboratory.
- Reporting results, considering the importance of accuracy, precision and recognising trends.
- Compliance with the quality standards, safe working practices, environment and risk management systems relevant to the workplace.
- Compliance with the internal and external regulatory environment pertinent to the science sector.
- Compliance with business rules pertaining to record keeping, traceability & confidentiality and quality systems.

- Contribution to the development of new processes and methodologies and support of their implementation as part of a wider team.
- Continuous performance improvement & handling change, adjusting to different conditions, technologies, situations and environments.
- Impact of work on others.

The independent assessor will select one question for each of the categories from the EPAO's question bank. The apprentice must answer each question with examples from their own practice. Examples of these questions are as follows:

- Describe what constitutes the quality management system in which your organisation operates and the role you play within it.

- Describe your role and the tools you use to contribute to reporting of data and how the integrity of data is ensured within the laboratory.

- Describe what 'good practice' is applicable to your organisation in relation to compliance with business rules pertaining to record keeping, traceability & confidentiality and quality systems.

- Explain how you handle change and the steps you need to take to adjust to different conditions, technologies, situations and environments.

The VCD must:

a. be in the format of a 1:1 discussion with the independent assessor; this may be via video-conferencing
b. comprise 8 questions one from each of the 8 categories listed above
c. typically last 2 hours up to a maximum of 2 hours and 15 minutes.
d. take place in a room, free from distractions with no other people present except quality assurance personnel where required
a. be documented and recorded electronically. Where it is not possible to use electronic equipment because of site restrictions this must be agreed in advance with the EPAO and an alternative venue should be used.

The apprentice may bring along their vocational competence evaluation log and evidence referenced in it to refer to during the VCD.

The independent assessor must:

a. Select the VCD questions from the EPAO's question bank prior to it taking place.

b. Ensure that the location for the VCD is appropriate.
c. Ensure any special needs and safeguarding of the apprentice is taken into consideration.
d. Ensure that the apprentice understands the VCD process, the possible outcomes and how it is graded.
e. Ensure that the apprentice is at ease.
f. Provide a written copy of the question for the apprentice to read but not to retain.
g. Allow the apprentice sufficient time at least to consider the question and answer it before moving on to the next question.
h. Ensure that he/she has the grading criteria and relevant documentation to hand before commencing the VCD.
i. Ensure the apprentice is not informed of the outcome of the assessment at this stage.
j. Complete the relevant documentation, including notes of what is discussed, and send it to the EPAO within the agreed timescale.
k. Ensure that the EPAO is notified of the outcome of the VCD within the agreed timescale.

Grading

Performance in the EPA will determine the apprenticeship grade – fail, pass or distinction.

A fail will be awarded where the apprentice fails one or more assessment method. A pass will be awarded to individuals that achieve a pass or distinction in both assessment methods. A distinction will be awarded to individuals that achieve a distinction in both assessment methods.

The independent assessor will combine the results from each assessment method to determine the EPA/apprenticeship grade. Both assessment methods will have equal weighting in determining the final grade. Grades will not be confirmed until after moderation.

The assessment criteria for each assessment method are given in Appendices 1 - 3.

Re-takes/re-sits
Apprentices who fail an EPA method(s) will be offered the opportunity to take a re-sit/retake. The employer will need to agree that a re-sit/re-take is an appropriate course of action. Any EPA component re-sit/re-take must be taken during the maximum 3-month EPA period; otherwise the entire EPA must be retaken. They are not offered to apprentices wishing to move from pass to distinction. Re-sits/re-takes will not be awarded a grade higher than pass, unless the EPAO determines there were exceptional circumstances

accounting for the fail. Apprentices should have a supportive action plan to prepare for the re-sit/re-take.

Professional Body Recognition

The Trailblazer employers have worked in partnership with professional bodies to define the apprenticeship standard and the EPA plan to ensure that it maps to the requirements for Registered Scientist set by the Science Council. The scope of the standard and the associated EPA plan means that the individual should not require any further training on completion of their apprenticeship to allow them to apply for professional recognition as Registered Scientist (RSci) with a professional body. The process for application for professional recognition is available from the Science Council.

Assessment Organisations

The EPAO must be on the Education & Skills Funding Agency register of apprentice assessment organisations approved to deliver EPA for this apprenticeship standard. EPAOs must be able to demonstrate the occupational and assessment capacity and capability.

Assessment Instrument Criteria

EPAOs should develop their assessment instruments and supporting materials to reflect the apprenticeship standard and the assessment plan. It is recommended that the work based learning guide is also used as a reference. An assessment organisation must produce the full suite of assessment instruments. The assessment organisation must produce full guidance on the use of each assessment instrument with details of performance standards and assessment criteria.

Technical Expert and Independent Assessor Criteria

Technical Expert Criteria

The assessment organisation must confirm technical experts meet the following criteria.

Technical Expert Criteria

✓ Vocationally competent with recent continuing professional development
and/or
Professionally registered

Plus

✓ experience of current working practices

Plus

✓ Assessment organisation induction

Technical experts must be competent in the occupation that is being assessed. This is shown through the individual having at least 5 years recent work experience in the occupational area or by having achieved a qualification at a level equivalent to or higher than the level of the apprenticeship standard being assessed; or by holding professional recognition at a level equivalent to or higher than the registration level of the apprenticeship standard being assessed.

Technical experts must be either working in the appropriate sector itself or they must be able to demonstrate they possess practical and up-to-date knowledge and experience of current working practices appropriate to the sector and are able to provide evidence of five days CPD in the last year. There may be a requirement to hold additional specialist training or security clearance as required by the industry sector e.g. nuclear.

The technical experts must complete an assessment organisation induction to demonstrate working knowledge of the apprenticeship standard and assessment methodology.

Independent Assessor criteria

Assessment organisations must confirm that independent assessors meet the following criteria.

Independent Assessor Criteria

✓ Independent of the apprentice, their training provider and employer

✓ Any current UK qualifications for workplace vocational assessors
or
Workplace Competence Assessor Award

The EPA must clearly deliver an impartial result. For this reason independent assessors appointed by the EPAO must not be linked to the apprentice, or their training provider or employer.

Independent assessors must hold a current UK qualification for workplace vocational assessors or a Workplace Competence Assessor Award.

Independent Assessors must be competent in the occupation they are assessing. This is shown through the individual having achieved a qualification at a level equivalent to or higher than the level of the apprenticeship standard being assessed; or by holding professional recognition at a level equivalent to or higher than the registration level of the apprenticeship standard being assessed. Individuals must be able to demonstrate they possess practical and up-to-date knowledge of current working practices and process safety or product quality regulations such as The Medicines and Healthcare Products Regulatory Agency (MHRA) or HSE the Control of Major Accident Hazards (COMAH) regulations appropriate to the sector in which they are carrying out assessment practice.

Independent assessors should:

- Maintain a continuous, up-to-date and accurate record of their CPD activities this should equate to at least 5 days CPD in the last year
- Demonstrate that their CPD activities are of learning activities relevant to current or future practice
- Seek to ensure that their CPD has benefited the quality of their practice
- Seek to ensure that their CPD has benefited the users of their work
- Present a written profile containing evidence of their CPD on request

There may be a requirement to hold additional specialist training or security clearance as required by the industry sector e.g. nuclear.

Individuals must complete an assessment organisation induction to demonstrate working knowledge of the apprenticeship standard and assessment methodology.

Internal quality assurance

The EPAO must have internal quality assurance arrangements that meet the following minimum requirements.

They must moderate independent assessors' EPA decisions. The EPA grade must not be confirmed until after moderation. As a minimum, 20% of all independent assessors' assessment EPA decisions must be moderated, sampled across different apprentices and employers. Moderation sampling must be higher for inexperienced independent assessors, where moderation has identified inconsistent grading decisions or grading decisions have been disputed.

They must run induction training for technical experts and independent assessors covering the apprenticeship standard and assessment methodology. Other training should be provided to meet individual's identified training needs.

Annual standardisation events must be held for independent assessors to ensure consistency in the assessment practice and decisions.

EPAOs must ensure independent assessors and technical experts meet the qualification and experience requirements detailed above.

External quality assurance

External quality assurance for the technician scientist apprenticeship will be undertaken by the Institute for Apprenticeships.

Implementation

The EPA plan has been designed to provide a cost effective assessment approach that meets quality objectives. For this standard there are likely to be small cohorts of apprentices spread nationally, so the assessment model needs to be flexible for delivery in a number of varied settings and contexts. The use of video conferencing may reduce cost and ensure end-point assessment is available to learners regardless of location. Total annual starts are estimated to be approximately 100 once SASE frameworks are withdrawn. The on-programme qualifications that are required to be completed are already available.

It is anticipated that the EPA will cost between 15% -20% of the apprenticeship funding band for this apprenticeship, based on costings provided.

Appendix 1- Assessment Method by Element of the Standard – Technician Scientist

KEY:	
workplace problem solving project report & Presentation & Discussion	**WPR/PD**
Vocational Competence Discussion	**VCD**

Apprenticeship Standard KSB		**TEST**
Ref	**Knowledge:**	
1	The principles of non-complex laboratory techniques and scientific experimentation and how to contribute to the development of technical projects and implement new processes according to the literature.	WPR/PD
2	A theoretical knowledge of chemistry or life sciences plus specialised science and technology relevant to the job role.	WPR/PD
3	The requirements and significance of reporting results, considering the importance of accuracy, precision and recognising trends.	WPR/PD VCD
4	How to use mathematical concepts and techniques: units, dimensions, exponentials logarithms and elementary probability and basic statistical analysis relating to sampling and data to evaluate results.	WPR/PD
5	The basic principles and procedures of project management: project plan, project timeline & milestones, risk log, outcome reviews, product definitions and product owners, key performance measures, action logs, project documentation, project budgets and how to contribute to project plans with other team members.	WPR/PD
6	How to comply with business rules pertaining to record keeping, traceability & confidentiality and quality systems.	VCD
7	The internal and external regulatory environment pertinent to the science sector and how to comply with regulations.	VCD
8	The business environment in which the company operates including personal role within the organisation, ethical practice and codes of conduct.	VCD
	Skills:	
9	Perform laboratory based investigations and basic scientific experimentation using the appropriate scientific techniques, procedures and methods of relevance to the activities of the laboratory.	WPR/PD VCD
10	Comply with the quality standards, safe working practices, environment and risk management systems relevant to the workplace.	VCD
11	Explain the main concepts of the scientific principles according to the literature applicable to the laboratory based techniques and scientific experimentation used in the laboratory.	WPR/PD
12	Contribute to the development of new processes and methodologies and support their implementation as part of a wider team.	VCD
13	Work with minimal supervision to produce and analyse scientific data and present the results of laboratory work and problem solving clearly and concisely in written and oral form	WPR/PD

14	Use computer based data analysis tools including spreadsheets and relevant company software packages.	WPR/PD
15	Plan and prioritise own tasks, review and evaluate progress against objectives and project plans as part of a wider project team.	WPR/PD
16	Contribute to recommendations on the appropriate workflows, improvements or scientific solutions to meet the requirements of internal or external customers.	WPR/PD
17	Find solutions to routine and non-routine problems and contribute to developing solutions to complex problems using techniques such as root cause analysis.	WPR/PD
18	Contribute to continuous performance improvement within the scientific and technical environment.	VCD
19	Communicates effectively using a full range of skills: speaking to a scientific and non-scientific audience, active listening, professional writing, and scientific presentation.	WPR/PD
20	Works with minimal supervision and interacts effectively within a wide, scientific team.	WPR/PD
21	Manages time effectively, being able to plan and complete work to schedule with thoroughness with attention to detail.	WPR/PD
	Behaviours:	
22	Demonstrates reliability, integrity and respect for confidentiality on work related and personal matters, including appropriate use of social media and information systems.	VCD
23	Takes account of the impact of work on others, especially where related to diversity and equality.	VCD
24	Handles and responds positively to change, adjusting to different conditions, technologies, situations and environments.	VCD
25	Takes responsibility for personal development with ability to observe and communicate observations on own learning.	WPR/PD

Appendix 2 – Workplace Problem Solving Report & Presentation & Discussion

KSB	Assessment element	Fail	Pass	Distinction
5 15 21	**Project scope, planning, management & resources, linked to underpinning scientific theory**	Lack of clarity on project scope and boundary definition ill defined, little demonstration of effective planning, management and resource allocation. Scope shows limited evidence of links to underpinning scientific theory	Project scope and boundaries clearly defined to the workplace context of the project. Providing clear project plan and predicted timescales showing consideration of resources. Evidence of systematic evaluation of project progress. Scope shows evidence of links to underpinning scientific theory	The project scope and boundaries are defined to allow predicted and unforeseen benefits of the solution to be realised. Explanation of management of project risk and mitigating actions. Scope demonstrates high level of understanding of underpinning scientific theory
3 4 13 14	**Data analysis, use of information technology,**	Misinterprets data and uses inappropriate statistical tools to analyse data, results show data inaccuracies and lack of detail	Data analysis using at least one appropriate statistical tool or analytical technique. Use of calculations pertinent to project such as probability distributions, significance testing & confidence limits. Provides detailed results with few inaccuracies.	Well-structured and systematic data analysis using at least one appropriate advanced statistical tool or technique such as regression & correlation. Precise reporting of detailed results with trends clearly documented.
1 9 11 17	**Problem solving & selected scientific techniques**	Unstructured approach to problem solving and no evidence that selected scientific techniques link to desired outcome	Clear approach to problem solving with evidence of linking selected scientific techniques to desired outcome	Approach to problem solving uses root cause analysis in support of selected scientific techniques that is clearly linked to desired outcome.
16	**Drawing conclusions, impacts on business and application to wider science industry**	Inapposite conclusions based on misinterpretation of data, published reference materials and data and lack of consideration of business and wider science industry. Little	Reasoned conclusions based on appropriate data analysis and consideration of business and wider science industry with clear mapping to customer requirements.	Clearly defined conclusions leading to logical recommendations for future projects that reflect a comprehensive understanding of customer requirements. Conclusions drawn including personal reflection on the project scope and definition and

		evidence of links to customer requirements.		future longer term business, wider science industry benefits
1 2	**The scientific principles of the laboratory techniques**	Difficulty conveying the scientific principles of the laboratory techniques considered and selected	Clear communication of the scientific principles of the laboratory techniques considered and selected and their relevance to the laboratory activities.	Able to respond to challenge and critiques of the laboratory techniques considered and selected.
13 14	**Data analysis and interpretation of results**	Poor explanation of data analysis and interpretation of results	Clear explanation of data analysis and interpretation of results	In depth explanation of data analysis and interpretation of results clearly demonstrates understanding of the links to the scientific principles
17	**Project Recommendations**	Unable to explain recommendations based on conclusions	Recommendations for immediate next steps for project justified with reference to conclusions	Logical recommendations for future new projects or extensions to the project scope linked to project conclusions
19	**Presentation**	Unable to effectively present technical project elements and personal viewpoints	Confident, articulate presentation. Able to respond to technical questioning with ability to respect opinion of others	Proactively seeks feedback to improve analysis and personal performance
20 25	**Use of personal/professional skills**	Overall approach to project does not demonstrate use of personal/professional skills and good working practices within the context of the work-based project activity	Overall approach to project demonstrates use of personal/professional skills and good working practices within the context of the work-based project activity	Builds working relationships with team members and other group members. Demonstrates creative thinking to resolve obstacles and recommends improvements based on personal experience

A pass will be awarded where the apprentice meets pass expectations for all workplace problem solving report & presentation elements.

A distinction will be awarded where the apprentice meets distinction expectations for all Workplace Problem Solving Report & Presentation elements.

Appendix 3 - VCD Assessment Criteria

KSB	Assessment element	Fail	Pass	Distinction
9	**Use of the appropriate scientific techniques, procedures and methods**	Cannot explain how appropriate relevant scientific techniques, procedures and methods are selected	Can explain how appropriate relevant scientific techniques, procedures and methods are selected. Supports explanation with example from own practice	Can explain how selection of appropriate relevant scientific techniques, procedures and methods impacts on the business. Supports explanation with example of impact on the business
3	**Reporting results**	Cannot explain the organisation's requirements and the significance of reporting results	Can explain the organisation's requirements and the significance of reporting results and demonstrates understanding of the importance of accuracy, precision and recognising trends with example from own practice	Can explain the consequence on the business of not considering the importance of accuracy, precision and recognising trends in own practice
10	**Compliance with the quality standards**	Cannot explain the application of quality standards within own work	Can explain the impact on own role of applying quality standards in the workplace and linkages to safe working practices and compliance with risk management systems. Supports explanation with example from own practice	Can explain how the application of quality standards impacts on the wider business. Supports explanation with example of impact on the business
7	**Compliance with the internal and external regulatory environment**	Cannot explain impact of compliance with internal and external regulation on own role	Can explain impact of compliance with internal and external regulation on own role. Supports explanation with example from own practice	Can explain how compliance with internal and external regulation impacts on the wider business Supports explanation with example of impact on the business

6	**Compliance with business rules pertaining to record keeping, traceability & confidentiality and quality systems.**	Cannot explain good practice in record keeping and data integrity. Does not demonstrate understanding of rules pertaining to traceability & confidentiality.	Can explain good practice in record keeping and data integrity. Shows understanding and use of rules pertaining to traceability & confidentiality. Supports explanation with example from own practice	Can explain how good practice in record keeping and data integrity impacts on the wider business Supports explanation with example of impact on the business
12	**Development of new processes and methodologies**	Cannot provide an example of own contribution to the development of new processes and methodologies	Can provide an example of own contribution to the development of new processes and methodologies Supports explanation with example from own practice	Can explain how own contribution to the development of new processes and methodologies impacted on the business
18 **24**	**Continuous performance improvement & handling change**	Cannot provide an example of own contribution to continuous performance improvement Unable to explain the steps taken to adjust to different conditions, technologies, situations and environments.	Can provide an example of own contribution to continuous performance improvement and explain the steps taken to adjust to different conditions, technologies, situations and environments. Supports explanation with example from own practice	Can explain the consequence on the business of not taking the steps needed to adjust to different conditions, technologies, situations and environments.
22 **23** **8**	**Impact of work on others**	Cannot provide an example of demonstrating reliability, integrity & consideration of the impact of work on others and understanding of business environment, ethical practice and codes of conduct	Can provide an example of demonstrating reliability , integrity & consideration of the impact of work on others and understanding of business environment, ethical practice and codes of conduct	Can explain how reliability, integrity & consideration of the impact of work on others and understanding of business environment, ethical practice and codes of conduct impacts on the business

VCD Grading

Fail = fails to meet pass standard for any discussions area

Pass = achieves pass standard for all discussion areas

Distinction = achieves distinction in all discussion areas