

Materials Science Technologist (Degree) Level 6 Apprenticeship Standard (ST0675) Specification



This guide describes the different types of End-Point Assessment tests, the test rules and who should be involved. Preparing for End-Point Assessment and working with SIAS 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.

Version History

Version	Updates
1.0	This specification refers to Assessment Plan version 1.0.

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Objective

The aim of this End-Point Assessment (EPA) is to ensure that the apprentice is occupationally competent against the knowledge, skills and behaviours outlined in the assessment plan for this standard.

The Materials Science Technologist occupation is at the forefront materials innovation in the Petrochemical, Pharmaceutical, Engineering, Construction, and Manufacturing industries across numerous sectors including automotive, aerospace, healthcare, defence, and energy, mechanical, civil and chemical engineering, material failure, rheology, adhesives, polymers, traditional and advanced ceramics.

The broad purpose of the occupation is to ensure materials used in those industries are fit for purpose in terms of product innovation, performance, failure diagnosis, operational management, process and manufacturing, and the positive advancement of materials science, thus enhancing economic and social value today and in the future.

In their daily work, materials technologists will engage in high level activities such as materials testing, novel product development, solving manufacturing issues, laboratory management, team leadership, technological sales, and client management, depending on which of the variety of related businesses their employer is in.

Work involves testing materials used by clients through activities such as investigation, gathering physical evidence, critical analyses, drawing conclusions, and recommending courses of action. Depending on context, technologists may be involved in designing new materials or production processes, combining materials, or additive manufacturing. In addition, they may need to provide technical leadership in the design and development of new material products by choosing correct materials and applications through data derived from analysis in the field or lab for: e.g. body armour for defence, materials for engine parts for aerospace, commercial vehicles or high performance cars, materials for new developments in battery design/manufacture, or coatings and additives for healthcare applications such as dental work, or materials for replacement bones or prosthetics.

This employee will participate in internal/external project teams, provide management and leadership of direct report personnel as well as cross-functional teams in addition to liaising with clients in a sales role or providing technical consultancy, proof of concept, or scale-up initiatives. Work will be on projects in the lab, office, onsite, or in the field in local, regional, national or global contexts.

In addition, they may be expected to acquire and develop new business and manage an existing client base comprising of individuals, SMEs, larger national companies, government agencies, and multinational organisations.

Prior Learning and Qualifications

There are no statutory/regulatory or other typical entry requirements for this apprenticeship standard.

Overview

Full time apprentices will typically spend 48 months on-programme (before the gateway) working towards the occupational standard, with a minimum of 20% off-the-job training. All apprentices will spend a minimum of 12 months on-programme.

The EPA period should only start, and the EPA be arranged, once the employer is satisfied that the apprentice is consistently working at or above the level set out in the occupational standard, all of the pre-requisite gateway requirements for EPA have been met and that they can be evidenced to SIAS.

All pre-requisites for EPA assessment methods must also be complete and available for the end-point assessor as necessary.

The EPA must be completed within an EPA period typically lasting 9 months, beginning when the apprentice has passed the EPA gateway.

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 EPA. Confirmation from the employer that the apprentice is fully competent is needed before EPA 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.

Gateway Requirements

Apprentices must complete the gateway requirements and provide evidence to SIAS as detailed below before taking the EPA.

The EPA period should only start once the employer is satisfied that the apprentice is consistently working at or above the level set out in the occupational standard, that is to say they are deemed to have achieved occupational competence. In making this decision, the employer may take advice from the apprentice's training provider(s), but the decision must ultimately be made solely by the employer.

In addition to the employer's confirmation that the apprentice is working at or above the level in the occupational standard, the apprentice must have completed the following gateway requirements prior to beginning EPA:

- English and mathematics at level 2. For those with an education, health and care plan or a legacy statement the apprenticeships English and mathematics minimum requirement is Entry Level 3 and British Sign Language qualification are an alternative to English qualifications for whom this is their primary language.
- Apprentices must complete the following approved qualifications as mandated in the standard:
 - Level 6 degree in Materials
- For the Work Based Project comprising of Project Report, Presentation and Questioning:

- Apprentices must agree a project outline and scope with their employer and SIAS.

Assessment Methods

This EPA consists of 3 discrete assessment methods. The grades available for each assessment method are below.

Assessment method 1 – Work Based Project comprising of Project Report, Presentation and Questioning:

- Fail
- Pass
- Distinction

Assessment method 2 – Professional Discussion

- Fail
- Pass
- Distinction

Assessment method 3 – Knowledge Test

- Fail
- Pass

Performance in the EPA will determine the overall apprenticeship standard and grade of:

- Fail
- Pass
- Distinction

The assessment methods can be delivered in any order. The result of one assessment method does not need to be known before taking the other.

Assessment Method 1 – Work Based Project comprising of Project Report, Presentation and Questioning

This method has 2 components.

Component 1: Summary Report

Overview

The project is compiled after the apprentice has gone through the Gateway process.

The work-based project should be designed to ensure that the apprentice's work meets the needs of the business, is relevant to their role and allows the relevant KSBs to be demonstrated for the EPA. Therefore, the project's subject, title and scope will be agreed between the employer and SIAS.

The employer will ensure it has a real business application and SIAS will ensure it meets the requirements of the EPA (including suitable coverage of the KSBs assigned to this assessment

method). SIAS will sign-off the project title and scope, as a minimum, to confirm its suitability at the gateway.

Delivery

Apprentices will conduct a project which has two distinct milestones. This includes submission of a project plan at the beginning of the project and submission of the project report following project implementation. This will then be followed by a presentation with questioning.

The apprentice will conduct their project typically over a period of 24 weeks. The project may be based on any of the following:

- A specific problem
- A recurring issue
- An idea/opportunity

The apprentice must complete a project plan and submit this to SIAS by week 4 (after agreeing the project title and scope with the employer and SIAS). This is because planning is a vital part of this occupation. The project plan itself is not assessed but needs to be submitted to confirm that this planning activity has taken place, and the deadline has been met. This work feeds into component 2 (the presentation) where the apprentice can reflect on how the project developed from the planning stage and explore/explain any variation and developments from the original plan. A project report about the project must be produced and submitted by week 24. This must make reference to the project plan and how this was delivered in order to demonstrate the knowledge, skills and behaviours assigned to this assessment method.

The project report should summarise the project and be 2,500 words +/- 10% (excluding any Annexes and Appendices).

The employer will ensure the apprentice has reasonable and sufficient time and the necessary resources, within this period, to plan and undertake the project.

The project summary should be in the form of paper based or an electronic report.

Project Plan

Once commenced, the apprentice must plan their delivery of the project and carry out initial research.

They must prepare a project plan and submit this to SIAS in week 4 of the EPA period to confirm completion of this milestone in the assessment method.

As a minimum the project plan must include:

- The purpose of this project (what problem is it going to solve?)
- Methodology
- The planned main deliverables
- Anticipated risks and issues

It must not exceed 1,000 words (+/-10%) or two sides of A4 paper using font 12.

The following information may be included in an annex to add clarity to the list above, and will not be included in the word count.

- The timeline, including deadlines
- Resources that are required to complete this project
- Cost Benefits
- Stakeholders

Project Report

This report must be completed and submitted to SIAS by week 24.

The report should comprise of 2,500 words (+/-10%) and must make reference to the project plan and whether the plan was achieved, although actual delivery of the project is not a determining factor when grading the assessment method.

The project summary report and project plan will be reviewed by SIAS prior to component 2, the presentation, taking place.

SIAS may use the project plan and project report alongside the electronic or hard copy of the presentation as the basis for questions asked during the questioning component of this assessment method. The Knowledge, Skills and Behaviours can be assessed from the project report, presentation and questions as this is a holistic assessment method.

As a minimum, all project summary reports must include:

- Introduction
- Scope of the project (including key performance indicators)
- Methods (how the outcomes were achieved)
- Reference to the project plan and any deviations from the original timelines and planned methods
- How anticipated risks and issues developed and were mitigated
- Research
- Outcomes and Results
- Recommendations and conclusions
- Annex providing evidence relating to the technical project activity, which must be referenced in the report. Evidence could include:
 - the final project plan
 - work records
 - video clips (maximum 15 minutes in total)
 - annotated photographs of completed work or work in progress
 - diagrams
 - job write up
 - calculations
 - data reports
 - quality/compliance records

Note, this list is not exhaustive and other evidence sources are permissible. Typically, there may be between 5-10 pieces of supporting evidence.

They must also include an appendix containing:

- Mapping of the report and supporting evidence against the KSBs being assessed by this assessment method.
- A statement from the employer confirming that the report and evidence is the apprentice's own work and authenticating the project outcomes.

The annex and appendix do not form part of the overall word count.

Self-reflective accounts and witness testimonies are not valid evidence sources except in relation to S3 and B5. This is because for these areas only the apprentice must reflect and evaluate the actions they have taken to act on results and feedback with regards to the project plan.

Component 2: Presentation and questioning

Overview

Apprentices will prepare and deliver a presentation that appropriately covers the Knowledge, Skills and Behaviours assigned to this method of assessment.

The presentation will be based on the project carried out in component 1 and will make reference to the project plan and the project report. The presentation and questioning will last for 90 minutes, which will include 50 minutes for delivery of the presentation, then 40 minutes of questioning. The end-point assessor has the discretion to increase the time of the presentation and questioning by up to 10% to allow the apprentice to complete their last point.

This presentation requires the apprentice to fully illustrate the Knowledge, Skills and Behaviours that are mapped to this assessment method. The presentation must include:

1. Description of the scope of the presentation – which project is being presented
2. Description of the role of the apprentice in these activities
3. Summary of actions undertaken by the apprentice, including the project plan and outcomes of these activities
4. Production processes used
5. Use of resources, including personnel
6. Variations/deviations from the initial planning stage
7. Achievements, difficulties faced and lessons learned

The presentation will be completed and submitted after the gateway and will be presented to an end-point assessor, either face-to-face or via online video conferencing. If using an online platform, SIAS will ensure appropriate measures are in place to prevent misrepresentation.

The apprentice will typically have 24 weeks to prepare, complete and submit the presentation.

The end-point assessor will ask a minimum of 8 questions at the end of the presentation. The questions will be based on the content of the summary report and presentation, but SIAS will prepare a question bank of sample questions for the end-point assessor to draw from and adapt to individual circumstances.

To deliver the presentation, the apprentice will have access to:

- PowerPoint
- Flip chart
- Videos
- Interactive demonstrations
- Notes
- Computer
- Artefacts

The presentation will take place on a one-to-one basis between the end-point assessor and the apprentice. A second assessor/invigilator may be present to take notes in order to counter any technical breakdown in recording (or the candidate not wishing to be recorded) and to increase confidence in, and validity of, the objectivity of the end-point assessor in the event of any dispute or disagreement.

The way in which the content of the presentation is made is not prescriptive.

A copy of the project plan must have already been submitted by week 4 of the EPA and a hard copy or electronic copy of the presentation must be sent to SIAS at least 10 days in advance of the assessment. The presentation submission must be a hard copy and/or electronic slide deck comprising of no more than 15 slides. When submitted, this must outline details of any visual aids to be used and specify any equipment required. SIAS must ensure these are available on the day of assessment.

The presentation must be formal in tone and be well-balanced in its use of visuals, text, and other supporting elements e.g. audio, artefacts, documents, small scale demonstrations etc.

The end-point assessor will make all grading decisions.

SIAS will ensure that the presentation and questioning elements are conducted in a suitable controlled environment in any of the following:

- Employer's premises
- Other suitable venue selected by SIAS (e.g. a training provider)

The venue should be a quiet room, free from distraction and external influence and utilise suitable signage inside and outside of the venue. The venue will also have facilities for digital presentations e.g. a PC, projector and screen, if the apprentice is using presentation aids. Steps must be in place to ensure the apprentice is not being aided in any way e.g. an

independent witness statement or use of a 360-degree camera to allow the end-point assessor to look around the room during the presentation if it is to be conducted remotely through electronic means. It is SIAS’ responsibility to ensure these are in place.

SIAS will produce the following material to support this assessment method:

- Outline of the assessment method’s requirements
- Assessment materials and bank of questions (for component 2)
- Examples of projects
- Data capture forms for results and evidence including gaps, mapped against the KSBs
- Guidance document on how employers can assist in determining suitable project/activity
- Guidance document for both apprentices and employers as to how the assessment method will be administered, including timescales and deadlines

Work Based Project comprising of Project Report, Presentation and Questioning – Grading Descriptors

Grouping	Pass Descriptors In order to achieve a pass, apprentices must demonstrate all of the pass criteria	Distinction Descriptors In order to achieve a distinction, all of the pass criteria must be met, plus at least 6 of the 8 distinction criteria must be fully achieved
Systems and processes K3, S1, B5	P1 Manages planning and delivery with regard to systems and processes in place, taking account of governance, implementation and relevant risk management procedures. Makes use of appropriate project management tools. Analyses and explains what they have learned during the project with specific reference to the project plan and whether this was implemented and how this learning can be applied in future projects.	D1 Investigates innovative systems and processes and evaluates their suitability for use within the context of the project. Justifies the use of the tools and techniques, explaining how they support the organisation’s aims.
Research K9, S6	P2 Demonstrates evidence that the correct selection of the available research is aligned with the problem being addressed within the	D2 Critiques the various research options as well as consider and justify their preferred selection.

Grouping	Pass Descriptors In order to achieve a pass, apprentices must demonstrate all of the pass criteria	Distinction Descriptors In order to achieve a distinction, all of the pass criteria must be met, plus at least 6 of the 8 distinction criteria must be fully achieved
	work-based project, with reference to the initial project plan. Well-structured approach to carrying out research and how this is integrated into the project, including evidence of adapting and testing new technologies.	
Application of materials science K10, S3	P3 Applies appropriate theories, techniques and calculations to materials problems and solutions in more than one materials context.	D3 Appraises solutions and explains the risks and implications of the process, alternative approaches and ways to address them.
Cost Benefits K13	P4 Demonstrates a systematic approach to planning, analysing and achieving cost benefits for the business.	D4 Justifies their analysis of the projects cost benefits for the business by comparing the costs benefits of their choice with alternative solutions that they considered, but disregarded.
Communication K15, S5, S10, B2	P5 Presents and communicates the key content and messages clearly. Defends plan and methods selected. Report and verbal communication takes account of the target audience, is grammatically correct and cohesive.	N/A
Management and Leadership K16, B4, B7, B9	P6 Demonstrates understanding of management techniques and theories and describes how they have applied this theory to interact with and lead individuals, stakeholders and teams to	D5 Applies theory with insight and awareness of risks and rewards, describing how theory/technique was applied with clear analysis of the impact and risks.

Grouping	Pass Descriptors In order to achieve a pass, apprentices must demonstrate all of the pass criteria	Distinction Descriptors In order to achieve a distinction, all of the pass criteria must be met, plus at least 6 of the 8 distinction criteria must be fully achieved
	help them achieve their goals, treating them with respect and valuing their views.	
Digital and Data S2	P7 Demonstrates evidence that the correct selection of industry standard and emerging digital technologies and data analysis tools have been applied to address ill-defined problems.	D6 Justifies their choice of technology and tools, explaining the benefits and risks associated with them in comparison to at least one alternative approach.
Health and safety B10	P8 Clearly articulates the importance of safe working practices, with reference to appropriate regulation. Project outputs and initial planning make clear reference to health and safety factors.	D7 Extends answers to include in-depth examples of applications of legislation in real-world situations and implications of implementation.
Project and financial management S8	P9 Articulates a clear understanding of the financial methodological implications of their work and can show examples of how this can affect project completion.	D8 Fluently describes the use of a comprehensive suite of methods and can assess the relative benefits of same.

Fail – An apprentice will fail where they do not demonstrate all the pass descriptors.

Work Based Project comprising of Project Report, Presentation and Questioning – Knowledge, Skills and Behaviours

Ref	KSB Statement
Knowledge	
K3	Systems and processes such as, but not limited to, CRM systems, client handling, profit and loss, and planning, in project management, business improvement, proof of concept, and scale up.
K9	Contemporary research and developments in the materials science community in terms of understanding different perspectives, methodologies, and schools of thought as well as the theoretical stances that underpin them.

K10	Materials applications including theories, techniques and relevant calculations to understand related disciplines and be able to work in a collaborative or cross-functional environment in more than one materials context.
K13	Systematic approaches to cost benefit analysis, including contextual financial understanding using industry standard metrics. Awareness of marketplace dynamics.
K15	Report writing techniques, including how to synthesise information and write concisely using a formal or neutral language register and vocabulary appropriate to the target reader.
K16	Management techniques and theories, including problem solving methodologies, effective decision making, delegation and planning methods, time management, organisational awareness, motivational techniques, and conflict resolution.
Skills	
S1	Utilise cognitive and practical skills in conjunction with adaptability and versatility in technical support both in-house and to clients to improve manufacturing processes, problem solving, innovation, and scale up formulations.
S2	Determine and use industry standard and emerging digital technologies and data analysis tools to complete work activities and address problems that are ill defined or involve numerous interacting factors.
S3	Critically evaluate actions, methodologies, and results and their implications in analysing materials against parameters in product specifications.
S5	Write clear and succinct technical and analytical reports.
S6	Research, adapt and test new technologies through materials characterisation feedback.
S8	Maintain a working knowledge of a range of project management and financial management techniques to complete projects relevant to their discipline.
S10	Communicate effectively with colleagues and stakeholders using the appropriate language register both verbally and in writing
Behaviours	
B2	Clear and concise communicator – influence with integrity and exercise judgement.
B4	Demonstrate personal and professional commitment to enhance the reputation of employer and the profession through interaction with internal and external customers alike.
B5	Results orientated – thoughtful and methodical planner, delivering successful outcomes utilising results and feedback in future activities.
B7	Collaborative – team player, and leader when appropriate, who works with a range of stakeholders to achieve goals.
B9	Take personal responsibility to initiate and lead tasks, manage time and resources.
B10	Health and safety conscious at all times – strict adherence to regulations, incorporating up-to-date knowledge into planning.

Assessment Method 2 – Professional Discussion

This assessment will take the form of a professional discussion, which must be appropriately structured to draw out the best of the apprentice's competence and excellence and cover the KSBs assigned to this assessment method. It will involve questions that will focus on analysis of given scenarios, coverage of prior learning or activity, problem solving.

The professional discussion should take place in a quiet room, free from distractions and influence. Video conferencing can be used to conduct the professional discussion, but SIAS must have processes in place to verify the identity of the apprentice and ensure the apprentice is not being aided in some way, and as outlined earlier in the plan. The professional discussion can take place in any of the following:

- Employer's premises
- A suitable venue selected by the EPAO (e.g. a training provider's premises)
- On-line using video conference facilities

If the discussion is to take place online via video conferencing system SIAS will ensure appropriate measures are in place to prevent misrepresentation, for example, screen share and 360-degree camera function with assessors when the assessments are undertaken remotely.

The end-point assessor will conduct and assess the professional discussion. The professional discussion must last for 60 minutes. The end-point assessor has the discretion to increase the time of the professional discussion by up to 10% to allow the apprentice to complete their last answer. Further time may be granted for apprentices with appropriate needs, in-line with SIAS' Reasonable Adjustments Policy.

The professional discussion must be appropriately structured to draw out the best of the apprentice's competence. Apprentices must be assessed against the KSBs assigned to this assessment method – as shown in mapping of KSBs in the End-Point Assessment Plan.

End-point assessors must conduct and assess the professional discussion on a one-to-one basis. The end-point assessor must ask a minimum of nine open questions from a bank of questions created by SIAS; follow up questions are allowed to further probe the responses.

The set of questions can have an order decided at the discretion of the end-point assessor but should cover three main areas:

- Prior learning and/or work based questions.
- The posing of realistic hypothetical scenarios requiring a judgement, challenge, or assessment.
- Problem solving questions.

There must be three questions in each of these areas.

Apprentices are expected to understand and use relevant occupational language. Questions must cover the following topics:

1. The materials, engineering environment and current challenges within manufacturing and product development.
2. The impact of materials on operational delivery and manufacturing.
3. Leadership and working with others in materials science.
4. Developments and opportunities offered by materials innovation.

These topics must allow the apprentice opportunity to demonstrate the knowledge, skills and behaviours mapped to this assessment method. The end-point assessor must use the assessment tools and procedures that are set by SIAS to record the professional discussion. The end-point assessor will make all grading decisions.

Professional Discussion – Grading Descriptors

Grouping	Pass Criteria In order to achieve a pass all of the pass criteria must be met	Distinction Criteria In order to achieve a distinction, all of the pass criteria must be met, plus at least 6 of the 8 distinction criteria must be fully achieved
Design and Production K4, K11, S7	P1 Describes current design and production processes which underpin production and manufacture of composite material and additive manufacturing, including the UK and international standards and procedures that apply to each. Illustrates with two examples.	D1 Compares and evaluates alternative approaches, describing their relative merits and limitations.
Bonding Technology K5	P2 Explains the positive and negative reactions that can occur during bonding, using two examples.	D2 Explains ways to mitigate or rectify negative reactions.
Material Components K6, K18, B6, B8	P3 Demonstrates an understanding of material component forming methods and explains how these contribute to effective production methods, problem solving innovations and novel production development, with an example for each. Describes the ethical and environmental impact of their solutions.	D3 Articulates a range of impacts of component forming regimens and real and likely impact of choices made in their own experience and practice.

Grouping	Pass Criteria In order to achieve a pass all of the pass criteria must be met	Distinction Criteria In order to achieve a distinction, all of the pass criteria must be met, plus at least 6 of the 8 distinction criteria must be fully achieved
Digital Technology K14	P4 Demonstrates an understanding of how new and emerging IT technologies are being applied to materials science work.	D4 Compares and contrasts the traditional method of work with the new technological approach, highlighting benefits, drawbacks and risks.
Failure Analysis S4	P5 Demonstrates that they can conduct and interpret failure analysis of an engineering component using relevant methodologies.	D5 Interprets and incorporates results into forward-thinking and articulates tangible examples of how their analyses have affected production procedures.
Working With Others S9, B3	P6 Describes the range of supervisory, management and leadership skills they have deployed when mentoring or directing others. Provides a minimum of two examples. Provides an example of when they have responded to others' feelings with emotional intelligence.	D6 Justifies their approach and explains alternative solutions and their reasons for disregarding them.
Continuous Professional Development B1	P7 Projects self-confidence in their ability to articulate how CPD has been and will continue to inform their working practices.	D7 Projects a dynamic demeanour in terms of how CPD has been inextricably linked to their success and will continue to be vital in informing and underpinning their working practices.
Health and Safety B10	P8 Clearly articulates the importance of safe working practices, with reference to appropriate regulation.	D8 Verbalises the efficacy of H&S regulation via direct experiences in testing, production, and innovation.
Data Control B11	P8 Describes the importance of handling employer and client data sensitively, with reference	N/A

Grouping	Pass Criteria	Distinction Criteria
	In order to achieve a pass all of the pass criteria must be met	In order to achieve a distinction, all of the pass criteria must be met, plus at least 6 of the 8 distinction criteria must be fully achieved
	to legislation and an explanation of the risks and implications of getting this wrong.	

Fail – An apprentice will fail where they do not demonstrate all the pass descriptors.

Professional Discussion – Knowledge, Skills and Behaviours

Ref	Grading descriptor
Knowledge	
K4	Current design and production of composite materials and additive manufacturing with the ability to engage with and evaluate complex theories and processes.
K5	Bonding technologies utilising, for example, metals, ceramics, polymers, rubbers and glasses and full understanding of positive and negative interactions between materials.
K6	Material component forming methods and how these contribute to effective production methods, problem solving innovations, and novel product development.
K11	How engineering materials are manufactured and processed including understanding of UK and international materials standards, procedures and specifications across a range of operations and contexts.
K14	How IT and emerging digital technologies such as 3D printing can be applied to enhance materials science work practices.
K18	Up-to-date ethical and environmental impact of materials science applications and innovations.
Skills	
S4	Conduct and interpret failure analysis of engineering components using relevant methodologies and systems such as but not limited to, for example, microscopy, macroscopy, and chemical analysis.
S7	Interpret, develop and implement UK and international materials standards, procedures and specifications across a range of operations and contexts.
S9	Utilise emotional intelligence and identify a range of supervisory, management, and leadership skills in developing the ability to mentor, direct or lead teams or individuals.
Behaviours	
B1	Self-starter committed to continuing professional and personal development, refreshing and expanding knowledge of materials science and technology through a variety of methods.
B3	Respond to others’ feelings with emotional intelligence and take responsibility for work areas, people, and resources within their remit.

B6	Anticipate situations and problems, finds appropriate contemporary solutions and grasps opportunities.
B8	Recognise interdependencies and combine commercial and technical sensibility to assist employer/client in capitalising on opportunities exercising broad autonomy and refined judgement.
B10	Health and safety conscious at all times – strict adherence to regulations, incorporating up-to-date knowledge into planning.
B11	Data hygienic and security sensitive when handling employer or client data.

Assessment Method 3 – Knowledge Test

The test can be:

- Computer based
- Paper based

It will consist of 16 questions. These questions will consist of:

- Data-handling questions
- Graphical or diagrammatic questions
- Closed response questions (e.g. multiple-choice questions)

Apprentices must have 60 minutes to complete the test.

The test is closed book which means that the apprentice cannot refer to reference books or materials.

The questions will consist of 16 closed response multiple choice questions. Apprentices must choose one correct answer from a choice of four. Each question answered correctly will be awarded one mark. Any incorrect or missing answers must be assigned zero marks.

Apprentices must take the test in a suitably controlled environment that is a quiet space, free of distractions and influence, in the presence of an invigilator. The invigilator may be the end-point assessor or another external person employed by SIAS or specialised (proctor) software, if the test can be taken on-line.

SIAS is required to have an invigilation policy that will set out how the test/examination is to be carried out. This will include specifying the most appropriate ratio of apprentices to invigilators to best take into account the setting and security required in administering the test/examination. SIAS is responsible for ensuring the security of testing they administer to ensure the test remains valid and reliable (this includes any arrangements made using online tools). SIAS is responsible for verifying the validity of the identity of the person taking the test.

SIAS will verify the suitability of the venue for taking the test and the identity of the person taking the test.

Tests will be marked by end-point assessors or markers employed by SIAS following a marking guide produced by SIAS. Alternatively, marking by computer is permissible where questions types allow this, to improve marking reliability.

Knowledge Test – Grading Boundaries

Grade	Minimum score (out of 16 available marks)	Maximum score (out of 16 available marks)
Pass	10	16
Fail	0	9

Knowledge Test – Knowledge, Skills and Behaviours

Ref	KSB Statement
Knowledge	
K1	Contemporary chemical and physical properties of materials including: metals, ceramics, polymers, adhesives, glass, construction materials, composites, and new future materials and their key performance properties.
K2	Up-to-date conceptual and practical chemical and physical properties of materials and how these react to testing and synthesis including the chemical composition of a range of materials such as advanced ceramics, metals, glass, polymers, and their structural manipulation and transformation and problems and advances that may arise during change at a microstructural level.
K7	Practical, conceptual, and technological knowledge of thermodynamics; structural chemistry; solid state chemistry; rheology; micro structures; analytical chemistry; organic chemistry; inorganic chemistry.
K8	Intellectual property rights issues and the implications and importance of patent, non-disclosure issues, and GDPR regulations.
K12	How materials fail in terms of fatigue, wear, impairment, corrosion, stresses, cracking, embrittlement, abrasion and cavitation erosion, including risk and mitigation factors. Understanding and ability to conduct failure testing using, for example, microscopy, macroscopy, and chemical analysis.
K17	Relevant materials science Health & Safety legislative and regulatory requirements relating to employees and clients in an industrial, laboratory, and/or field setting.

Final Grade

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

In order to achieve a pass, all assessment methods must be passed.

In order to achieve a distinction, all assessment methods must be passed and the apprentice must have achieved a distinction in both AM1 (Project, Presentation and Questioning) and AM2 (Professional Discussion). Grades from individual assessment methods should be combined in the following way to determine the grade of the EPA as a whole:

Assessment Method 1	Assessment Method 2	Assessment Method 3	Overall Grading
Project, Presentation & Questioning	Professional Discussion	Knowledge Test	
Pass	Pass	Fail	Fail
Pass	Fail	Pass	Fail
Fail	Pass	Pass	Fail
Pass	Pass	Pass	Pass
Pass	Distinction	Pass	Pass

Distinction	Pass	Pass	Pass
Distinction	Distinction	Pass	Distinction
Fail	Fail	Pass	Fail
Fail	Pass	Fail	Fail
Pass	Fail	Fail	Fail
Distinction	Fail	Fail	Fail
Fail	Fail	Pass	Fail
Fail	Distinction	Fail	Fail

Moderation

Assessment organisations will undertake moderation of end-point assessor decisions through observations and examination of documentation on a risk sampling basis. Results cannot be confirmed until moderation has been completed.

Re-takes and re-sits

Apprentices who fail one or more assessment method will be offered the opportunity to take a re-sit or a re-take. A re-sit does not require further learning, whereas a re-take does.

Apprentices should have a supportive action plan to prepare for the re-sit or a re-take. The apprentice’s employer will need to agree that either a re-sit or re-take is an appropriate course of action. An apprentice who fails an assessment method, and therefore the EPA in the first instance, will be required to re-sit any failed assessment methods only. The timescales for a re-sit/retake is agreed between the employer and SIAS. 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 3 months of the EPA outcome notification.

Re-sits and re-takes are not offered to apprentices wishing to move from pass to merit/distinction or merit to distinction.

Where any assessment method has to be re-sat or re-taken, the apprentice will be awarded a maximum EPA grade of distinction, unless SIAS determines there are exceptional circumstances requiring a re-sit or re-take.

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 by ESFA. 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 Mapping Knowledge, Skills, and Behaviours section of this guide.

Mapping of Knowledge, Skills, and Behaviours

Key:	
Work Based Project comprising of Project Report, Presentation and Questioning	WBP
Professional Discussion	PD
Knowledge Test	KT

Ref	KSB to be assessed	Assessment Method
Knowledge		
K1	Contemporary chemical and physical properties of materials including: metals, ceramics, polymers, adhesives, glass, construction materials, composites, and new future materials and their key performance properties.	KT
K2	Up-to-date conceptual and practical chemical and physical properties of materials and how these react to testing and synthesis including the chemical composition of a range of materials such as advanced ceramics, metals, glass, polymers, and their structural manipulation and transformation and problems and advances that may arise during change at a microstructural level.	KT
K3	Systems and processes such as, but not limited to, CRM systems, client handling, profit and loss, and planning, in project management, business improvement, proof of concept, and scale up.	WBP
K4	Current design and production of composite materials and additive manufacturing with the ability to engage with and evaluate complex theories and processes.	PD
K5	Bonding technologies utilising, for example, metals, ceramics, polymers, rubbers and glasses and full understanding of positive and negative interactions between materials.	PD
K6	Material component forming methods and how these contribute to effective production methods, problem solving innovations, and novel product development.	PD
K7	Practical, conceptual, and technological knowledge of thermodynamics; structural chemistry; solid state chemistry; rheology; micro structures; analytical chemistry; organic chemistry; inorganic chemistry.	KT
K8	Intellectual property rights issues and the implications and importance of patent, non-disclosure issues, and GDPR regulations.	KT

Ref	KSB to be assessed	Assessment Method
K9	Contemporary research and developments in the materials science community in terms of understanding different perspectives, methodologies, and schools of thought as well as the theoretical stances that underpin them.	WBP
K10	Materials applications including theories, techniques and relevant calculations to understand related disciplines and be able to work in a collaborative or cross-functional environment in more than one materials context.	WBP
K11	How engineering materials are manufactured and processed including understanding of UK and international materials standards, procedures and specifications across a range of operations and contexts.	PD
K12	How materials fail in terms of fatigue, wear, impairment, corrosion, stresses, cracking, embrittlement, abrasion and cavitation erosion, including risk and mitigation factors. Understanding and ability to conduct failure testing using, for example, microscopy, macroscopy, and chemical analysis.	KT
K13	Systematic approaches to cost benefit analysis, including contextual financial understanding using industry standard metrics. Awareness of marketplace dynamics.	WBP
K14	How IT and emerging digital technologies such as 3D printing can be applied to enhance materials science work practices.	PD
K15	Report writing techniques, including how to synthesise information and write concisely using a formal or neutral language register and vocabulary appropriate to the target reader.	WBP
K16	Management techniques and theories, including problem solving methodologies, effective decision making, delegation and planning methods, time management, organisational awareness, motivational techniques, and conflict resolution.	WBP
K17	Relevant materials science Health & Safety legislative and regulatory requirements relating to employees and clients in an industrial, laboratory, and/or field setting.	KT
K18	Up-to-date ethical and environmental impact of materials science applications and innovations.	PD
Skills		
S1	Utilise cognitive and practical skills in conjunction with adaptability and versatility in technical support both in-house and to clients to improve manufacturing processes, problem solving, innovation, and scale up formulations.	WBP

Ref	KSB to be assessed	Assessment Method
S2	Determine and use industry standard and emerging digital technologies and data analysis tools to complete work activities and address problems that are ill defined or involve numerous interacting factors.	WBP
S3	Critically evaluate actions, methodologies, and results and their implications in analysing materials against parameters in product specifications.	WBP
S4	Conduct and interpret failure analysis of engineering components using relevant methodologies and systems such as but not limited to, for example, microscopy, macroscopy, and chemical analysis.	PD
S5	Write clear and succinct technical and analytical reports.	WBP
S6	Research, adapt and test new technologies through materials characterisation feedback.	WBP
S7	Interpret, develop and implement UK and international materials standards, procedures and specifications across a range of operations and contexts.	PD
S8	Maintain a working knowledge of a range of project management and financial management techniques to complete projects relevant to their discipline.	WBP
S9	Utilise emotional intelligence and identify a range of supervisory, management, and leadership skills in developing the ability to mentor, direct or lead teams or individuals.	PD
S10	Communicate effectively with colleagues and stakeholders using the appropriate language register both verbally and in writing.	WBP
Behaviours		
B1	Self-starter committed to continuing professional and personal development, refreshing and expanding knowledge of materials science and technology through a variety of methods.	PD
B2	Clear and concise communicator – influence with integrity and exercise judgement.	WBP
B3	Respond to others’ feelings with emotional intelligence and take responsibility for work areas, people, and resources within their remit.	PD
B4	Demonstrate personal and professional commitment to enhance the reputation of employer and the profession through interaction with internal and external customers alike.	WBP
B5	Results orientated – thoughtful and methodical planner, delivering successful outcomes utilising results and feedback in future activities.	WBP

Ref	KSB to be assessed	Assessment Method
B6	Anticipate situations and problems, finds appropriate contemporary solutions and grasps opportunities.	PD
B7	Collaborative – team player, and leader when appropriate, who works with a range of stakeholders to achieve goals.	WBP
B8	Recognise interdependencies and combine commercial and technical sensibility to assist employer/client in capitalising on opportunities exercising broad autonomy and refined judgement.	PD
B9	Take personal responsibility to initiate and lead tasks, manage time and resources.	WBP
B10	Health and safety conscious at all times – strict adherence to regulations, incorporating up-to-date knowledge into planning.	WBP/PD
B11	Data hygienic and security sensitive when handling employer or client data.	PD

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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