



PIABC LEVEL 6 END POINT ASSESSMENT FOR MATERIALS SCIENCE TECHNOLOGIST (DEGREE)

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Specification

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1. PURPOSE

This specification has been written to provide information about the Level 6 Materials Science Technologist (Degree) apprenticeship end point assessment for all individuals involved: apprentices, training providers, and employers. Information is correct at the time of publication. However, the specification may be updated from time to time to reflect any legislative, policy and/or operational changes.

2. INTRODUCTION

PIABC Limited is the trading subsidiary of The Institute of Materials, Minerals and Mining (IOM3). IOM3 is a major UK engineering institution whose activities encompasses the whole materials cycle, from exploration and extraction, through characterisation, processing, forming, finishing and application, to product recycling and land reuse. It exists to promote and develop all aspects of materials science and engineering, geology, mining and associated technologies, mineral and petroleum engineering, and extraction metallurgy, as a leading authority in the worldwide materials and mining community.

PIABC Limited is an End Point Assessment Organisation (EPAO) approved by the Education & Skills Funding Agency (ESFA) and listed on *Register of End-Point Assessment Organisations* (RoEPAO) to administer a range of End Point Assessment (EPA) to apprentices as specified in the relevant assessment plans.

Apprenticeships are work-based training programmes which combines a mix of blended learning and block delivery at training provider. Apprentices will take their learning from the classroom into their employer and apply their learning through workplace practice.

The development of the Level 6 Materials Science Technologist (Degree) apprenticeship was undertaken by a Trailblazer Group who are a group of representatives from Industry. This group identified the specialist KSBs that they felt were needed to perform at this level in their sector and these were put together into a standard, which defines the syllabus for the apprenticeship programme.

In addition, all employer-led apprenticeship standards must demonstrate acquisition of transferable skills – such as self-management, communication and interpersonal skills, problem solving, innovation and creativity.

3. A MATERIALS SCIENCE TECHNOLOGIST

The occupation of a Materials Science Technologist 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.

A Materials Science Technologist 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, a Materials Science Technologist 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.

Typical job titles for a Materials Science Technologist will include Development Engineer, Graduate Material Scientist, Graduate Sales Executive, Materials Tester, Quality Assurance/Quality Control, R&D Technologist and Technical Service Specialist.

4. END POINT ASSESSMENT & GATEWAY

The Level 6 Materials Science Technologist (Degree) apprenticeship standard describes the KSBs that an apprentice should develop during the apprenticeship programme and the assessment plan identified how these KSBs will be assessed in the End Point Assessment (EPA).

The Level 6 Materials Science Technologist (Degree) assessment plan details how the apprentices will be assessed at the end of the programme. This final assessment is known as EPA. During the EPA, the apprentice will demonstrate their capability to perform their role to a consistent national standard and the methods used to test this vary from standard to standard.

An independent registered End Point Assessment Organisation (EPAO) will perform this perform the EPA and not the employer or training provider. PIABC Limited (EPA0685) is the only registered EPAO for the Level 6 Materials Science Technologist (Degree) (ST0675), but many other Standards have more than one EPAO.

The EPA period will only start, and the EPA be arranged, once the employer is satisfied that the apprentice is consistency working at or above the level set out in the occupational standard, all the pre-requisite gateway requirements for EPA have been met and that they can be evidenced to PIABC Limited. The employer may take advice from the apprentice's training provider(s) in making this decision on whether the apprentice is consistency working at or above the level set out in the occupational standard, but the decision must be made solely by the employer.

All the pre-requisite gateway requirements for EPA must be completed and evidenced to PIABC Limited and the independent assessor as necessary.

The gateway requirement and prior to taking the EPA, apprentices must complete all approved qualifications mandated in the Level 6 Materials Science Technologist (Degree) standard:

- apprentice must have completed the Level 6 Degree in Materials.

Also, for all Level 3 apprenticeships and above apprentices without English and mathematics at Level 2 an apprentice must achieve Level 2 prior to taking their EPA.

At gateway, PIABC Limited will also sign-off the apprentice's project title and scope (as a minimum) to confirm its suitability for Assessment Method 1 (AM1) – Work Based Project.

The EPA must be completed within an EPA period typically lasting a maximum of 9 month(s), beginning when the apprentice has passed the EPA gateway.

5. SUMMARY OF ASSESSMENT

Apprentices on the Level 6 Materials Science Technologist (Degree) Standard are assessed throughout apprenticeship programme to ensure that the apprentices become competent materials science technologist. Apprentices will take their learning from the classroom into their employer and apply their learning through workplace practice.

The EPA consists of three discrete assessments, which can be summarised as:

ASSESSMENT METHOD 1 (AM1) – WORK BASED PROJECT comprising of Project Report, Presentation and Questioning. The Project Report is 2,000 words (plus a separate Project Plan of 1,000 words) and Presentation will last 90 minutes (50 minutes for presentation delivery and 40 minutes for questioning).

The work-based project will 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 PIABC Limited. The employer will ensure it has a real business application and PIABC Limited will ensure it meets the requirements of the EPA (including suitable coverage of the KSBs assigned to this assessment method). PIABC Limited will sign-off the project title and scope, as a minimum, to confirm its suitability at the gateway.

The rationale for the work-based project is to allow the apprentice the opportunity to utilise their competences and hard work in a real-world environment, contributing to their employer's operational objectives. Both the preparation of a project plan, project report and presentation reflect typical tasks undertaken in this occupation. It allows a wide range of KSBs to be demonstrated holistically, including technical knowledge, judgement, and communication skills. 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 or an idea/opportunity. The apprentice must complete a project plan and submit this to PIABC Limited by week 4 (after agreeing the project title and scope with the employer and PIABC Limited). 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 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 will make reference to the project plan and how this was delivered in order to demonstrate the KSBs assigned to AM1.

The project report will 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 an electronic report.

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 PIABC Limited in week 4 of the EPA period to confirm completion of this milestone in the assessment method.

The project plan must include as a minimum the purpose of this project (what problem is it going to solve?), methodology, the planned main deliverables and anticipated risks and issues. It must not exceed 1,000 words (+/-10%) or two sides of A4 paper using font 12. The timeline, including deadlines, resources that are required to complete this project, cost benefits and stakeholder information may be included in an annex to add clarity to the list above and will not be included in the word count.

The project report must be completed and submitted to PIABC Limited 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 AM1.

The project summary report and project plan will be reviewed by PIABC Limited prior to the presentation taking place. PIABC Limited may use the project plan and project report alongside the electronic copy of the presentation as the basis for questions asked during the questioning of AM1. The KSBs can be assessed from the project report, presentation and questions as AM1 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. Evidence¹ 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

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.

Apprentices will prepare and deliver a presentation that appropriately covers the KSBs assigned to this method of assessment. The presentation will be based on the project carried out and should reference to both the project plan and the project report. The presentation requires the apprentice to fully illustrate the KSBs that are mapped to AM1.

The presentation must include:

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

The presentation will take place on a one-to-one basis between the independent assessor and the apprentice, either face-to-face or via online video conferencing. If using an online platform, PIABC Limited will ensure appropriate measures are in place to prevent misrepresentation. There may be a requirement for a second independent assessor/invigilator may be present to take notes in order to counter any technical breakdown in recording (or if the apprentice does not wish it to be recorded) and to increase confidence in, and validity of, the objectivity of the independent assessor in the event of any dispute or disagreement.

The apprentice will typically have 24 weeks to prepare, complete and submit the presentation. The rationale is that in this occupation it is standard practice for fully occupationally competent employees to deliver presentations, therefore, this is a valid form of assessment. The project report contextualises the design, production environment, stakeholders and proposed outcomes of the project. The presentation and questioning complements this as it includes an analytical dimension.

The presentation method will last for 90 minutes (50 minutes for delivery and 40 minutes for questioning). The 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.

The independent 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. PIABC Limited will have a question bank of sample questions for the independent assessor to draw from and adapt to individual circumstances.

An electronic copy of the presentation will be sent to PIABC Limited at least 10 days in advance of the presentation and questioning. The presentation submission will be electronic slide deck comprising of no more than 15 slides and include details of any visual aids to be used and equipment required. PIABC Limited will ensure these are available on the day of assessment.

The independent assessor will review and mark the project in a timely manner, as determined by PIABC Limited, and without extending the EPA unnecessarily. Similarly, all quality control processes will also be conducted in a timely manner, as determined by PIABC Limited.

The independent assessor will make all grading decisions.

ASSESSMENT METHOD 2 (AM2) - PROFESSIONAL DISCUSSION (60 minutes)

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.

This assessment methods allows the apprentice to be assessed against KSBs that do not naturally occur in the project. it allows for testing of responses where there are a number of potential answers that couldn't be tested through the multiple-choice test. It is a cost effective for employers, as apart from a venue, it does not require additional resources. It replicates the sort of discussion occupationally competent employees regularly undertake

The independent assessor will conduct and assess the professional discussion.

The professional discussion will last for 60 minutes. The independent 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 PIABC Limited's "*Reasonable Adjustments Policy*".

The professional discussion will be conducted as a 1:1 conversation in an appropriate environment (a quiet room free from distraction and influence).

The professional discussion will be appropriately structure to draw out the best of the apprentice's competence. Apprentices must be assessed against the KSBs assigned to this assignment method (see Assessment Descriptors below).

The independent assessor will ask a minimum of 9 open questions from PIABC Limited's question bank to ensure consistency in approach. Follow up questions will then be used to draw out further probe the responses.

The set of questions can have an order decided at the discretion of the independent assessor, but will cover three main areas:

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

There will be three questions in each of these areas.

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 KSBs mapped to this assessment method.

The evidence will be captured using documentation produced by PIABC Limited by the independent assessor and the professional discussion will be recorded.

The independent assessor will make all grading decisions.

ASSESSMENT METHOD 3 (AM3) - KNOWLEDGE TEST (60 minutes)

The rationale for this assessment method is that key knowledge elements assigned to this component can be accurately assessed using a test. It complements the other assessment methods as it efficiently tests underpinning knowledge in a systematic way.

Apprentices will have 60 minutes to complete the test.

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.

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

The questions will consist of data-handling questions, graphical or diagrammatic questions and closed response questions (e.g. multiple-choice questions).

Apprentices will 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 test will be carried out as per PIABC Limited's *Invigilation Policy*.

The tests will be marked by markers employed by PIABC Limited.

Questions will be written PIABC Limited and must be relevant to the occupation and employer setting, so it is PIABC Limited will consult employers of this occupation.

6. KNOWLEDGE, SKILLS AND BEHAVIOURS (KSBs)

The Level 6 Materials Science Technologist (Degree) apprenticeship standard states that all apprentices will need to develop specialist KSBs. These KSBs will provide the foundation for an apprentice development in materials science.

The EPA provides apprentice with a showcase opportunity to provide oral and documentary evidence of their KSBs developed throughout the apprenticeship in a synoptic way. It enables the EPA panel to test the KSBs acquired by the apprentice throughout the apprenticeship.

The KSBs of the of the Level 6 Materials Science Technologist (Degree) apprenticeship standard are set out below:

ASSESSMENT METHOD 1 (AM1) – WORK BASED PROJECT comprising of Project Report, Presentation and Questioning.

Knowledge

A Material Science Technologist will require a thorough understanding of the industry in which they are employed. They will be able to understand and apply the following areas:

- 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

A Material Science Technologist will be asked to demonstrate skills in the following:

- 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

A Material Science Technologist will be asked to demonstrate the following 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.

AM2: PROFESSIONAL DISCUSSION

Knowledge

A Materials Science Technologist will require a thorough understanding of the industry in which they are employed. They will be able to understand and apply the following areas:

- 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

A Materials Science Technologist will be asked to demonstrate skills in the following:

- 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

A Materials Science Technologist will be asked to demonstrate the following 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.

AM3: KNOWLEDGE TEST

Knowledge

A Material Science Technologist will require a thorough understanding of the industry in which they are employed. They will be able to understand and apply the following areas:

- 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; microstructures; 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

7. ORDER OF ASSESSMENT METHODS

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.

Although PIABC Limited will recommend that AM3 should be completed first as it is the most cost-effective method to confirm competency of the apprentice. For this reason, PIABC Limited recommends that it should be passed first as this mitigates the risk of launching a project if the apprentice does not possess the complementary underpinning knowledge that supports the other assessment methods.

8. WEIGHTING OF ASSESSMENT METHODS

All assessment methods (AM1, AM2 and AM3) are equally weighted.

9. GRADING CRITERIA

Apprentices will only be assessed on KSBs mapped to each assessment method. The full grading descriptors for each assessment method are on the following pages.

ASSESSMENT METHOD 1 (AM1) – WORK BASED PROJECT comprising of Project Report, Presentation and Questioning.

PIABC Limited will assess the apprentice against the higher order descriptors outlined in the Pass and Distinction columns rather than the lower order KSBs references in the second column. By showing competence against the higher order descriptors, then it will be assumed that the apprentice is working at or above the level outlined in the standard. The apprentice will be considered to have failed if they do not meet the criteria outlined in the pass descriptor. Fail - The apprentice will be deemed to have failed if they do not meet the criteria outlined in the pass descriptor.

The full grading descriptors are:

GROUPING	PASS CRITERIA	DISTINCTION CRITERIA
<p>Systems and processes</p> <p>K3, S1, B5</p>	<p>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.</p>	<p>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.</p>
<p>Research</p> <p>K9, S6</p>	<p>Demonstrates evidence that the correct selection of the available research is aligned with the problem being addressed within the 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.</p>	<p>Critiques the various research options as well as consider and justify their preferred selection.</p>

GROUPING	PASS CRITERIA	DISTINCTION CRITERIA
Application of materials science K0, S3	Applies appropriate theories, techniques and calculations to materials problems and solutions in more than one materials context.	Appraises solutions and explains the risks and implications of the process, alternative approaches and ways to address them
Cost benefits K13	Demonstrates a systematic approach to planning, analysing and achieving cost benefits for the business.	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	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.	
Management and leadership B4, B7, B9	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 help them achieve their goals, treating them with respect and valuing their views.	Applies theory with insight and awareness of risks and rewards, describing how theory/technique was applied with clear analysis of the impact and risks.
Digital and data S2	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.	Justifies their choice of technology and tools, explaining the benefits and risks associated with them in comparison to at least one alternative approach.

GROUPING	PASS CRITERIA	DISTINCTION CRITERIA
Health and safety B10	To achieve a pass all of the pass criteria must be met: 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.	To achieve a distinction, all of the pass criteria must be met, plus at least 6 of the 8 distinction boxes must be fully achieved: Extends answers to include in-depth examples of applications of legislation in real-world situations and implications of implementation.
Project and financial management S8	Articulates a clear understanding of the financial methodological implications of their work and can show examples of how this can affect project completion.	Fluently describes the use of a comprehensive suite of methods and can assess the relative benefits of same.

AM2: PROFESSIONAL DISCUSSION

PIABC Limited will assess the apprentice against the higher order descriptors outlined in the Pass and Distinction columns rather than the lower order KSBs references in the second column. By showing competence against the higher order descriptors, then it will be assumed that the apprentice is working at or above the level outlined in the standard. The apprentice will be considered to have failed if they do not meet the criteria outlined in the pass descriptor. Fail - The apprentice will be deemed to have failed if they do not meet the criteria outlined in the pass descriptor.

The full grading descriptors are:

GROUPING	PASS CRITERIA	DISTINCTION CRITERIA
Design and production K4, K11, S7	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 2 examples.	Compares and evaluates alternative approaches, describing their relative merits and limitations.
Bonding technology K5	Explains the positive and negative reactions that can occur during bonding, using two examples.	Explains ways to mitigate or rectify negative reactions.

GROUPING	PASS CRITERIA	DISTINCTION CRITERIA
Material components K6, K18, B6, B8	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.	Articulates a range of impacts of component forming regimens and real and likely impact of choices made in their own experience and practice.
Digital technology K14	Demonstrates an understanding of how new and emerging IT technologies are being applied to materials science work.	Compares and contrasts the traditional method of work with the new technological approach, highlighting benefits, drawbacks and risks
Failure analysis S4	Demonstrates that they can conduct and interpret failure analysis of an engineering component using relevant methodologies.	Interprets and incorporates results into forward-thinking and articulates tangible examples of how their analyses have affected production procedures.

GROUPING	PASS CRITERIA	DISTINCTION CRITERIA
Working with others S9, B3	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.	Justifies their approach and explains alternative solutions and their reasons for disregarding them.
Continuous Professional Development B1	Projects self-confidence in their ability to articulate how CPD has been and will continue to inform their working practices.	Projects a dynamic demeanor 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	Clearly articulates the importance of safe working practices, with reference to appropriate regulation.	Verbalises the efficacy of H&S regulation via direct experiences in testing, production, and innovation.

GROUPING	PASS CRITERIA	DISTINCTION CRITERIA
Data Control B11	Describes the importance of handling employer and client data sensitively, with reference to legislation and an explanation of the risks and implications of getting this wrong.	

10. OVERALL GRADING

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

To achieve a pass, all assessment methods must be passed.

To achieve a distinction, all assessment methods must be passed, and the apprentice must have achieved a distinction in both AM1 and AM2.

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

AM1	AM2	AM3	Overall Grade
Pass	Pass	Fail	Fail
Pass	Fail	Pass	Fail
Fail	Pass	Pass	Fail
Pass	Pass	Pass	Pass
Pass	Distinction	Pass	Pass
Distinction	Pass	Pass	Pass
Pass	Distinction	Pass	Pass
Distinction	Distinction	Pass	Distinction
Distinction	Pass	Pass	Pass
Distinction	Distinction	Pass	Distinction
Pass	Pass	Pass	Pass
Fail	Fail	Pass	Fail
Fail	Pass	Fail	Fail
Pass	Fail	Fail	Fail
Distinction	Fail	Fail	Fail
Fail	Fail	Pass	Fail
Fail	Distinction	Fail	Fail

This apprenticeship is designed to prepare successful apprentices to meet the requirements for registration as Materials Science Technologist with Institute of Materials, Minerals and Mining (IOM3).

11. ASSESSMENT CONTROLS

An overview of the assessment controls which apply to the EPA detailed in the table below:

Control Description	Conditions
Work-based project outline and scope (AM1)	Apprentices must agree a project outline and scope with their employer and PIABC Limited at gateway.
Submission of work-based project plan (AM1)	Apprentices need to submit a project plan and submit this to PIABC Limited by week 4 of the EPA.
Order of Assessment Methods	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. Although PIABC Limited recommends that AM3 should be completed first as it is the most cost-effective method to confirm competency of the apprentice.
Submission of work-based project report (AM1)	The apprentice must submit their work-based project report to PIABC Limited in PDF format by week 24 of the EPA.
Submission of presentation (AM1)	The apprentice must submit their presentation and outline details of any visual aids to be used and specify any equipment typically in week 24 of the EPA or at least 10 days in advance of the assessment date.
Punctuality and timing	All apprentices must be on time for the start of their knowledge test, presentation, and professional discussion elements of their EPA. It is recommended that apprentices arrive at least 30 minutes before its scheduled start. In instances where the apprentice may arrive late, the apprentice must inform their employer or training provider as soon as possible so the Independent Assessor/Invigilator is aware. The Independent Assessor will aim to accommodate the apprentice for the presentation and professional discussion elements of their EPA, but not at the cost of disrupting other scheduled apprentices. If the apprentice is late for the start of the knowledge test, then the invigilator will not allow the apprentice to enter the test room as this will cause disruption to other apprentices.
Venue environment	The presentation and professional discussion must take place in suitable room that should be well lit, noise free and without visible distractions. If on arrival the Independent Assessor deems the room environment unsuitable, then the presentation or professional review maybe delayed or cancelled. Ensure appropriate environment meets health & safety requirements.
Mobile phones and tablets	The use of mobile phones and other electronic devices at any of the assessment methods by the apprentice is prohibited. All panel devices must also be switched off, exception to this rule is when a device is being used by the apprentice during their assessment.
Identification confirmation	Apprentices must bring personal photographic identification (e.g. passport or driving licence), which will be checked before the assessment proceeds.
Collaboration	Whilst apprentices can work with their training providers in groups as part of the on-programme stage of the apprenticeship; the EPA itself is an assessment of individual apprentice and does not allow collaboration between apprentices.
Dress code	Apprentices are expected to look smart on the days of their presentation and professional discussion. This must be in accordance with health and safety requirements of the venue.
Equipment & technology	Any equipment and technology that required is available and in full working order, to demonstrate the apprentice's KSBs.

12. ASSESSMENT/MARKING FORMS

AM1: WORK BASED PROJECT (comprising of Project Report, Presentation and Questioning) ASSESSMENT FORM

Apprentice's Full Name				
Apprentice's ULN				
Date of Project Submitted				
Date of Presentation & Questioning				
Location of Presentation & Questioning				
Please use this assessment form to establish that the apprentice has demonstrated and evidenced each area of assessment within AM1: Work-Based Project using the knowledge, skills, and behaviour (KSBs). For more information on which KSBs are mapped to the areas of assessment, please refer to "AM1: Work-Based Project Grading Descriptors".				
Area of Assessment	Fail	Pass	Dist.	Comments
Systems and processes K3, S1, B5				
Research K9, S6				
Application of materials science K0, S3				
Cost benefits K13				
Communication K15, S5, S10, B2				
Management and leadership B4, B7, B9				
Digital and data S2				
Health and safety B10				
Project and financial management S8				
Overall Comments				
EPAO Independent Assessor				
Full Name:				
Signature:				
Date:				

AM2: PROFESSIONAL DISCUSSION ASSESSMENT FORM

Apprentice's Full Name				
Apprentice's ULN				
Date of Professional Discussion				
Location of Professional Discussion				
Please use this assessment form to establish that the apprentice has demonstrated and evidenced each area of assessment within AM2: Professional Discussion using the knowledge, skills, and behaviour (KSBs). For more information on which KSBs are mapped to the areas of assessment, please refer to "AM2: Professional Discussion Grading Criteria".				
Area of Assessment	Fail	Pass	Dist.	Comments
Design and production K4, K11, S7				
Bonding technology K5				
Material components K6, K18, B6, B8				
Digital technology K14				
Failure analysis S4				
Working with others S9, B3				
Continuous Professional Development B1				
Health and safety B10				
Data Control B11				
Overall Comments				
EPAO Independent Assessor				
Full Name:				
Signature:				
Date:				

AM3: KNOWLEDGE TEST MARKING FORM

Apprentice's Full Name				
Apprentice's ULN				
Date of Knowledge Test				
Please use this marking form for marking the AM3: Knowledge Test.				
Question No.	Question	KSB	Marks Available	Marks
1			1	
2			1	
3			1	
4			1	
5			1	
6			1	
7			1	
8			1	
9			1	
10			1	
11			1	
12			1	
13			1	
14			1	
15			1	
16			1	
Total			16	
EPAO Representative				
Full Name:				
Signature:				
Date:				
GRADE AWARDED				
FAIL (≤ 9)				
PASS (≥ 10)				

13. RE-SITS/RE-TAKES

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.

The apprentice 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.

The apprentice, who fails an assessment method, and therefore the EPA in the first instance, will be required to re-sit or re-take any failed assessment methods only.

The timescales for a resit/retake will be agreed between the employer and EPAO. A resit is typically taken within 2 months of the EPA outcome notification. The timescale for a retake 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 distinction.

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

14. ENQUIRIES & APPEALS ABOUT ASSESSMENT DECISIONS

There may be occasions where PIABC Limited make assessment decisions that the apprentice, employer or training provider do not agree with. Enquiries about assessment decisions can be submitted in relation to the following decisions made by the EPA team. This can be submitted once all EPAs have taken place and been given a final grade:

- decisions regarding special considerations
- quality assurance decisions

An enquiry about an assessment decision has two options:

- clerical check – a check that necessary information has been considered in the assessment decision
- re-assessment – a full review of the evidence and decision

Appeals

PIABC Limited's appeals process allows apprentice, employer or training provider to outline their views/grievances in relation to the results of an assessment, following the outcome of the enquiry about assessment decisions process, where apprentice, employer or training provider believe we did not apply our procedures consistently, properly or fairly.

The findings from the appeals process will enable an objective, factually based judgment to be reached.

For more information, please see "*End Point Assessment Service - The Appeals Process (for Appeals against PIABC Limited decisions)*", which is available on request from the EPA team.

15. PRIOR LEARNING

Recognised prior learning is not available for this end point assessment.

16. SUCCESSFUL COMPLETION OF THE END POINT ASSESSMENT

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

17. POLICIES & PROCEDURES

PIABC Limited policies and procedures are made available to employers, training providers and apprentices once the Service Level Agreement has been agreed.

List of End Point Assessment Service's policies and procedures:

- Anti-fraud Policy
- Complaints Handling Policy
- Conflict of Interest Policy
- English and Mathematics Policy and Guidance for End Point Assessment Gateway Evidence
- Enquiries and Appeals Policy
- Equality, Diversity, Inclusion and Discrimination Policy
- Fair Access Policy
- Fees and Cancellations Policy
- Internal Quality Assurance Policy
- Invigilation Policy
- Malpractice and Maladministration Policy
- Prevent Agenda Policy
- Reasonable Adjustments Policy
- Safeguarding and Disclosure and Barring Service (DBS) Policy
- Sanctions Policy
- The Appeals Process (for Appeals against PIABC Limited decisions)
- Whistleblowing Policy

Copies of these policies and procedures are available from the EPA Team.

18. CONTACT DETAILS

If you have any queries about the contents of the specification, then please contact the EPA team at:

Email: piabc@iom3.org

Telephone: +44 (0)1476 513884

Post:

PIABC Limited
The Boilerhouse
Caunt Road
Grantham
NG31 7FZ

Website: www.piabc.org.uk