

End-point assessment plan for Railway Engineering Design Technician apprenticeship standard

Apprenticeship standard number	Level of this end-point assessment (EPA)	Integrated
ST0315	3	N/A

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Introduction and overview

This document sets out the requirements for end-point assessment (EPA) for the Railway Engineering Design Technician apprenticeship standard. It is for end-point assessment organisations (EPAOs) who need to know how EPA for this apprenticeship must operate. It will also be of interest to Railway Engineering Design Technician apprentices, their employers and training providers.

Full time apprentices will typically spend 30 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 an EPAO.

All pre-requisites for EPA assessment methods must also be complete and available for the independent assessors as necessary.

For level 3 apprenticeships and above, apprentices without English and Mathematics at level 2 must achieve level 2 prior to taking their EPA¹.

The EPA must be completed within an EPA period lasting typically 4 months, beginning when the apprentice has met the EPA gateway requirements.

The EPA consists of 2 distinct assessment methods.

The individual assessment methods will have the following grades:

Assessment Method 1: Technical project with report and presentation

- Distinction
- Pass
- Fail

Assessment Method 2: Professional discussion (underpinned by a portfolio)

- Distinction
- Pass
- Fail

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

- Distinction
- Pass
- Fail

¹ For those with an education, health and care plan or a legacy statement, the apprenticeship's English and mathematics minimum requirement is Entry Level 3. British Sign Language (BSL) qualifications are an alternative to English qualifications for those who have BSL as their primary language.

EPA summary table

<p>On-programme (typically 30 months)</p>	<p>Training to develop and demonstrate the occupational standard's knowledge, skills and behaviours.</p> <p>Apprentices must work towards one of the following approved qualifications mandated in the standard prior to gateway application:</p> <ol style="list-style-type: none"> 1. Pearson Level 3 BTEC National Diploma in Engineering (500/8154/8) or 2. Pearson Edexcel Level 3 Diploma in Civil Engineering for Technicians (Institution of Civil Engineers) (501/1115/2) or 3. Pearson BTEC Level 3 Diploma in Civil Engineering (603/1217/8) or 4. Pearson BTEC Level 3 Diploma in Construction and the Built Environment (500/7137/3) or 5. Pearson BTEC Level 3 Diploma in Advanced Manufacturing Engineering (Development Technical Knowledge) (601/9054/1) or 6. Pearson BTEC Level 3 Diploma in Rail Engineering Technician Knowledge (603/2537/9) <p>Training towards English and mathematics Level 2, if required.</p> <p>Compiling a portfolio of evidence.</p>
<p>End-point Assessment Gateway</p>	<ul style="list-style-type: none"> • Employer is satisfied the apprentice is consistently working at, or above, the level of the occupational standard. • English and mathematics Level 2 achieved <p>Apprentices must demonstrate successful completion of one of the following mandatory qualifications:</p> <ol style="list-style-type: none"> 1. Pearson Level 3 BTEC National Diploma in Engineering (500/8154/8) or 2. Pearson Edexcel Level 3 Diploma in Civil Engineering for Technicians (Institution of Civil Engineers) (501/1115/2) or 3. Pearson BTEC Level 3 Diploma in Civil Engineering (603/1217/8) or 4. Pearson BTEC Level 3 Diploma in Construction and the Built Environment (500/7137/3) or 5. Pearson BTEC Level 3 Diploma in Advanced Manufacturing Engineering (Development Technical Knowledge) (601/9054/1) or 6. Pearson BTEC Level 3 Diploma in Rail Engineering Technician Knowledge (603/2537/9)

	<p>For assessment method 1: Apprentices must indicate their preferred railway engineering design project focus (e.g. signaling, civil engineering, etc) which allows the EPAO to provide the most appropriate technical project brief to be issued at gateway.</p> <p>For assessment method 2: Apprentices must submit the portfolio</p>
<p>End Point Assessment (which would typically take 4 months)</p>	<p>Assessment method 1: Technical project with report and presentation</p> <p>With the following grades:</p> <ul style="list-style-type: none"> • Distinction • Pass • Fail <p>Assessment Method 2: Professional Discussion (underpinned by a portfolio)</p> <p>With the following grades:</p> <ul style="list-style-type: none"> • Distinction • Pass • Fail <p>Performance in these assessment methods will determine the overall apprenticeship standard grade of:</p> <ul style="list-style-type: none"> • Distinction • Pass • Fail
<p>Professional recognition</p>	<p>On completion of the apprenticeship, the apprentice will be eligible for registration as an Engineering Technician by the relevant professional engineering institution.</p> <ul style="list-style-type: none"> • Institution of Civil Engineers (ICE) • The Institution of Engineering and Technology (IET) • Permanent Way Institution (PWI)

Length of end-point assessment period

The EPA (including all assessment methods) must be completed typically within 4 months of the apprentice passing the gateway.

Order of assessment methods

The assessment methods can be delivered in any order.

Gateway

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 2¹
- One of the following mandatory qualifications:
 - Pearson Level 3 BTEC National Diploma in Engineering (500/8154/8), or
 - Pearson Edexcel Level 3 Diploma in Civil Engineering for Technicians (Institution of Civil Engineers) (501/1115/2), or
 - Pearson BTEC Level 3 Diploma in Civil Engineering (603/1217/8), or
 - Pearson BTEC Level 3 Diploma in Construction and the Built Environment (500/7137/3), or
 - Pearson BTEC Level 3 Diploma in Advanced Manufacturing Engineering (Development Technical Knowledge) (601/9054/1), or
 - Pearson BTEC Level 3 Diploma in Rail Engineering Technician Knowledge (603/2537/9)
- Submitted a portfolio based on KSBs assigned to assessment method two

¹ 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.

For the technical project with report and presentation:

A technical project brief will be designed and agreed by the EPAO in consultation with the employer, to ensure that the apprentice's work will meet the real railway engineering design challenges that readily occur in business. The technical project should be relevant to the apprentice's role and allow the relevant KSBs to be assessed for the EPA. The EPAO will ensure it meets the requirements of the EPA, including suitable coverage of the KSBs assigned to this assessment method as shown in the mapping of assessment methods. The EPAO must refer to the grading descriptors to ensure that technical projects are pitched appropriately.

For the professional discussion, the apprentice will be required to submit a portfolio. This should include:

- Typically, ten to twelve individual pieces of evidence to demonstrate competence against one or more of the KSBs mapped to this assessment method (assessment method 2: professional discussion). The collated evidence when combined should provide full coverage of and be mapped to the KSBs assigned to this method. Evidence may be used to demonstrate more than one KSB; a qualitative as opposed to quantitative approach is suggested.
- Evidence must cover the following areas:

- Contributing to railway engineering design solutions by preparing and producing engineering drawings or models, with consideration for health, safety and risk assessment.
- Utilising quality management systems within their work
- Personal and professional practice and development
- Evidence sources may include evidence of work undertaken which may be supported by: Rail or rail system designs, technical drawings, CAD/BIM models, client feedback, witness testimonies, employer/trainer feedback, training records, appraisal records, training course completion.
- This list is not definitive, other evidence sources are permissible however reflective accounts and self-evaluations are not allowed.
- Any employer contributions should focus on direct observation of performance (for example witness statements) rather than opinions.
- The evidence provided must be valid and attributable to the apprentice; the portfolio of evidence must contain a statement from the employer and apprentice confirming this.
- The portfolio will not be assessed, it will be used to inform the questioning for professional discussion, and the apprentice may refer to it to support their responses.

Assessment Methods

Assessment Method 1: Technical project with report and presentation

This method has 2 components (both components are assessed holistically and must be passed)

Overview

A technical project involves the apprentice completing a significant and defined piece of work, designed by the EPAO, in consultation with the employer to ensure that the apprentice's work meets the real railway engineering design challenges that readily occur in business. The technical project should be relevant to the apprentice's role and allow the relevant KSBs to be assessed for the EPA. The EPAO will ensure it meets the requirements of the EPA, including suitable coverage of the KSBs assigned to this assessment method as shown in the mapping of assessment methods. The EPAO must refer to the grading descriptors to ensure that technical projects are pitched appropriately.

This assessment method includes two components:

- a technical project with report
- a presentation with questioning

The rationale for this assessment method is:

The technical project is the most valid method as it allows a practical demonstration of occupational competence. It reflects employer's design challenges and is typical of the apprentice's everyday work, ensuring that they can demonstrate KSBs in practice. As part of a Railway Engineering Design Technicians' role they will be expected to carry out technical projects before relating the findings back

to various audiences through reports, presentations and discussions. Therefore, this method of assessment is deemed as the most appropriate for this occupation as it accurately reflects the environments and future tasks of the apprentice. The technical project report, presentation and questioning allow for effective assessment of the KSBs assigned to this assessment method.

The technical project report, presentation and questioning will be assessed holistically.

Method 1 component 1: Technical project with report

Apprentices will undertake a technical project after they have passed the gateway, which would typically take 25 to 30 hours over a period of 6 working weeks, and produce a report that appropriately covers all of the KSBs assigned to this method of assessment.

The EPAO will issue the technical project brief to the apprentice at gateway.

The technical project brief will reflect a real work-based railway engineering design challenge in a subject area, providing a focus on an area such as:

- Rail specific civil engineering and structures
- Track systems and track alignment
- Rail signalling and control
- Rail systems and integration
- Traction power and rolling stock
- Rail electrical, mechanical and building services equipment or plant design, or
- Rail telecommunications, network and digital

This is not an exhaustive list, other projects that provide coverage of the KSBs are allowed.

The purpose of the technical project is to set the apprentice a project which will assess their ability to integrate the range of knowledge, skills and understanding (assigned to assessment method 1) they have acquired during their apprenticeship.

The technical project brief, designed and issued by the EPAO, will be typically 500 words in length. The EPAO will design and issue guidance with the technical project brief, stating that the completion of the technical project is designed to take between 25 and 30 hours for the apprentice to complete over a maximum period of 6 working weeks.

The technical project will involve research and preparing material to produce a report, and include a requirement for:

- Data collection, analysis and evaluation appropriate to the technical project and level of apprenticeship;
- Results, rationale and conclusions;
- Reference to:
 - relevant scientific and engineering principles,
 - relevant methods, and data and/or calculations used,
 - relevant industry standards, policies, regulations, and legislations,

- health and safety considerations,
- any environmental sustainability concerns
- An evaluation of the apprentice's performance to determine the challenges that the apprentice faced and how they overcame them.

The apprentice must prepare a project report with appendices of supporting evidence relating to the technical project. The report and all appendices of supporting evidence directly demonstrating performance of KSBs must be attributable to the apprentice in full. Evidence must be accompanied by a statement outlining the apprentice's contribution, signed by the apprentice and their employer thereby authenticating it. Example appendices of supporting evidence may include plans, diagrams, calculations, designs, feedback, video clips. This list is not definitive and other evidence sources apart from self-reflection are permissible.

Delivery

Apprentices must submit a technical project report to their EPAO within 40 working days of the technical project brief being issued by the EPAO at gateway.

The technical project report must be 2,500 words +/-10%, excluding appendices.

The technical project report will be reviewed and assessed by two independent assessors.

To allow the apprentice to apply for professional registration on completion of the apprenticeship, two independent assessors must holistically assess all components of the technical project, in-line with the independent assessor requirements set out in this plan. They will have equal responsibility in grading the assessment. The use of two independent assessors will enable the provision of balance to assessment, to bring in greater breadth and depth of technical expertise to questioning and discussion with the apprentice, elucidating more accurate grading decisions.

In the event that the two independent assessors cannot agree on whether to grade the technical project with presentation a pass, fail or distinction, the EPAO is required to moderate. The EPAO will then make the final decision on the grade to award.

No independent assessors can be from the employer in order to maintain independence and to ensure there is no conflict of interest.

If at any point the two independent assessors cannot agree on an assessment decision, then all assessment evidence must be submitted to the EPAO for a final decision. This process must adhere to all the parameters defined within the roles/responsibilities and IQA section of this assessment plan, particularly with regard to the independence and occupational competence requirements of anyone making assessment judgements. Outcomes from this process will inform future standardisation activity.

Following submission of the project report, the EPAO will inform and confirm with the candidate the date for the formal presentation with questioning. Independent assessors will be given a maximum of 3 working weeks to review the report and presentation. The formal presentation with questioning will be carried out within 6 working weeks from when the technical report is submitted to the EPAO.

Method 1 component 2: Presentation and questioning

Overview

Apprentices will prepare and deliver a presentation based on the technical project that appropriately covers the KSBs assigned to assessment method 1.

The presentation will be based on a summary of the technical project report and will cover the following as a minimum:

- a summary of the technical project report;
- explanation of how and why specific techniques and criteria have been selected;
- recommendations;
- reflective self-evaluation of the outcomes of the technical project.

The independent assessors will then draw out any further information using questions. EPAOs must develop 'question banks' of sufficient size to prevent predictability and review them regularly (at least once a year) to ensure the questions are fit for purpose. The questions relating to the underpinning KSBs must be varied yet allow assessment of the relevant KSBs.

The independent assessors may also generate their own questions if required but must use the question bank as a source for questioning and are expected to use their professional judgement to tailor those questions appropriately. Independent assessors are responsible for generating suitable questions in line with the EPAO's training and standardisation process.

The presentation will be created and submitted alongside the technical project report, and will be presented to the independent assessors, either face-to-face or via online video conferencing. If using an online platform, EPAOs must ensure appropriate measures are in place to prevent misrepresentation and ensure the apprentice is not being aided in some way.

The presentation must be submitted at the same time as the technical project report to allow the independent assessors a maximum of 3 working weeks to review it, saving independent assessor time in reviewing multiple documents and will allow the generation and collation of questions from both the report and presentation.

Delivery

The presentation with questioning will last for 30 minutes. The independent assessors have the discretion to increase this time by up to 10% to allow the apprentice to complete their last point.

The presentation will be conducted as follows:

The presentation will typically last 10 minutes and the questioning 20 minutes.

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

- commonly used presentation software
- flip chart
- work products
- videos
- interactive demonstrations
- notes
- computer

The above list is not exhaustive and other presentation methods may be permissible where appropriate. Where specialist presentation or technical software is needed by the apprentice, for example, CAD or BIM, it is the apprentice's responsibility to ensure that their chosen equipment and resources are in place for the presentation. The EPAO will check this at the time of submission of the presentation.

The independent assessors will ask a minimum of 5 questions at the end of the presentation to ensure KSBs assigned to assessment method 1 are covered in sufficient depth and to allow for relevant grading criteria to be drawn out by the independent assessors. The independent assessors may ask additional follow-up questions to seek clarification where required. Assessment should take place against the knowledge, skills and behaviours listed in the mapping section of this document.

The independent assessors must:

- a. plan the assessment prior to it taking place;
- b. ensure that the location for the assessment is appropriate;
- c. ensure the presentation and questioning takes place in a room free from distractions with no other people present except those with prior approval from the EPAO;
- d. ensure any reasonable adjustments are taken into consideration in-line with the EPAO's reasonable adjustments policy;
- e. ensure that the apprentice understands the assessment process, the possible outcomes and how it is graded;
- f. take steps to assist the apprentice to be at ease;
- g. ensure that the grading criteria and relevant documentation are to hand before commencing;
- h. capture an audio record of the presentation and questions;
- i. document the outcomes using the EPAO's standard documentation;
- j. collect any additional presentation materials from the apprentice;
- k. ensure the apprentice is not informed of the outcome of the assessment at this stage;
- l. record the outcome of the assessment and grade before confirming this to the EPAO;
- m. send documentation to the EPAO within the agreed time.

The independent assessors will discuss apprentice performance and agree grading. The outcome of the grading decision from assessment method 1 will be reported to the EPAO. The grade will be based on a holistic view of the report, presentation and questioning and calculated using the grading criteria.

Venue

EPAOs must ensure that the report and presentation and questioning elements are conducted in a suitable controlled environment in any of the following:

- employer's premises
- other suitable venue selected by the EPAO (e.g. a professional institution or training provider)

The venue should be a quiet room, free from distraction and external influence.

Other relevant information

The representation can be:

- Independent assessors

- EPAO internal audit staff
- EQA staff

Support material

Support materials must be produced to ensure the report and presentation is assessed consistently and accurately.

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

- Standard documentation for recording of assessment results
- Marking materials
- Question bank
- Example questions and guidance documents to facilitate independent assessors to prepare for and carry out their questions.

EPAOs must ensure any reasonable presentation requirements are in place e.g. IT with presentation facilities.

Independent assessors must be developed and trained in the conduct of questioning, and reaching consistent judgement, by their EPAO. The independent assessors must use the assessment tools and procedures that are set by the EPAO to record the presentation with questioning.

Apprentices do not need to complete a different project where a re-sit/re-take is required but may need to either re-work their project report and/or presentation. Apprentices must be asked different questions in the case of a re-sit or re-take.

Assessment Method 2: Professional discussion (underpinned by a portfolio)

Overview

A professional discussion is a two-way discussion which involves both the independent assessors and the apprentice actively listening and participating in a formal conversation. The apprentice leads the discussion to provide detailed evidence to confirm their competency across the KSBs mapped to this method.

The rationale for this assessment method is:

The professional discussion is an accurate method to assess those KSBs that are not likely to occur in the post gateway project. A railway engineering design technician will be expected to be able to discuss their findings and results of work-based tasks or projects in a formal setting and be able to explain in detail their results.

The professional discussion will be underpinned by:

- examples of work, that the apprentice has undertaken during the “on-programme” apprenticeship period;

- details of the work, tasks or projects undertaken which will include key objectives and deliverables and a detailed description of the activities of the apprentice in order to achieve deliverables.

EPAOs will receive a copy of the portfolio at the gateway to provide sufficient time for the independent assessors to review its content. The independent assessors must have a minimum of 3 working weeks to review the portfolio in advance of the professional discussion in order to prepare appropriate questions.

EPAOs must provide guidance on what format the portfolio might take, including how it will be submitted and stating that it should not include any reflective self-assessment.

The content of the portfolio is expected to be used to support the professional discussion. The portfolio of evidence itself is not assessed; it is used to inform the questioning for the professional discussion.

The professional discussion can take place in any of the following:

- employer's premises
- a suitable venue selected by the EPAO (e.g. a professional institution or a training provider's premises).

If the employer premises are not used, the EPAO is responsible for ensuring that it can facilitate the EPA.

Delivery

Two independent assessors will conduct and assess the professional discussion.

To allow the apprentice to apply for professional registration on completion of the apprenticeship, two independent assessors must holistically assess all components of the professional discussion, in-line with the independent assessor requirements set out in this plan. They will have equal responsibility in grading the assessment. The use of two independent assessors will enable the provision of balance to assessment, to bring in greater breadth and depth of technical expertise to questioning and discussion with the apprentice, elucidating more accurate grading decisions.

In the event that the two independent assessors cannot agree on whether to grade the professional discussion a pass, fail or distinction, the EPAO is required to moderate. The EPAO will then make the final decision on the grade to award.

No independent assessors can be from the employer in order to maintain independence and to ensure there is no conflict of interest.

The professional discussion must last for 40 minutes. The independent assessors have 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 the EPAO's reasonable adjustments policy.

The independent assessors will ask a minimum of 5 questions during the professional discussion and may ask follow-up questions to seek clarification where required. During the discussion, the independent assessors must combine questions from the EPAO's question bank and those generated by themselves.

Assessment should take place against the knowledge, skills and behaviours assigned to this assessment method, which are listed in the mapping section of this document. Independent assessors must use the question bank as a source for questioning and are expected to use their professional judgment to tailor those questions appropriately in line with the EPAO's training and standardisation process.

The purpose of the professional discussion is to:

- clarify any questions the independent assessors have from their review of the portfolio;
- explore aspects of the work, including how it was carried out, in more detail;
- require the apprentice to draw on their evidence to demonstrate the KSBs.

Requirements:

- Apprentices must receive appropriate notice of their professional discussion time. There should be a minimum of 3 working-weeks' notice of the time, date and venue.
- EPAOs must structure their discussion around the following three areas, covering the KSBs to be tested as detailed in the KSB mapping section of this document. These areas are:
 - Contributing to railway engineering design solutions by preparing and producing engineering drawings or models, with consideration for health, safety, and risk assessment.
 - Utilising quality management systems within their work
 - Personal and professional practice and development
- Independent assessors must assess the professional discussion using the grading criteria in this document.
- Video conferencing can be used to conduct the professional discussion, but the EPAO must have processes in place to verify the identity of the apprentice and ensure the apprentice is not being aided in some way.
- Apprentices may refer to their portfolio when answering the questions.

The independent assessors must use the assessment tools and procedures that are set by the EPAO to record the professional discussion.

If at any point the two independent assessors cannot agree on an assessment decision, then all assessment evidence must be submitted to the EPAO for moderation and a final decision. This process must adhere to all the parameters defined within the roles/responsibilities and IQA section of this assessment plan, particularly with regard to the independence and occupational competence requirements of anyone making assessment judgements. Outcomes from this process will inform future standardisation activity.

The grading decision for assessment method 2 will be reported to the EPAO. The grade will be based on a holistic view of the professional discussion and calculated using the grading criteria.

Venue

The professional discussion should take place in a quiet room, free from distractions.

Other relevant information

A structured question bank must be developed by EPAOs. The question bank must be of sufficient size to prevent predictability and review it regularly (at least once a year) to ensure that it, and its content, are fit for purpose. The questions relating to the underpinning knowledge, skills and behaviours, must be varied yet allow assessment of the relevant KSs.

EPAOs must ensure that apprentices have a different set of questions in the case of re-sits/re-takes. Independent assessors must be developed and trained by the EPAO in the conduct of professional discussions and reaching consistent judgement.

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

- Standard documentation for recording of assessment results.
- Sample questions for independent assessors
- Question bank

Weighting of assessment methods

All assessment methods are weighted equally in their contribution to the overall EPA grade.

Grading

Assessment method 1: Technical project with report and presentation (technical project)

KSs	Fail	Pass– all pass criteria must be met	Distinction (in addition to the pass criteria / all distinction statements must also be met)
K1, K2, K3, K5, K6, K8 S1, S2, S3, S9, S10, S11 B1, B3, B5	Does not meet pass criteria	<p>(1) Demonstrates, applies and correctly interprets core engineering principles and methods, using mathematical, scientific, technical principles, as applied to rail systems and the design process. (K1, S1)</p> <p>(2) Explains how rail and rail systems interface with each other. (K2)</p> <p>(3) Demonstrates key data collection and handling principles, methods and techniques, enabling calculations and data analysis and evaluation to be performed to support the delivery</p>	<p>(8) Justifies the methods and techniques used in the technical project based upon the principles, laws and regulations that underpin them. (K1, K2, S1)</p> <p>(9) Validates the evidence and assumptions underpinning the railway engineering calculations applied to the technical project. Provides comparison with</p>

		<p>of valid railway engineering designs and technical solutions correctly. (K3, S2, S3, B3)</p> <p>(4) Complies with relevant statutory and regulatory health and safety requirements. (K5, B1)</p> <p>(5) Identifies and applies appropriate industry standards or guidance. Considers sustainability to the technical project solution presented. (K6, K8, S9, S11a, B1)</p> <p>(6) Reports project solutions using different communication methods, taking care to incorporate relevant and appropriate terminology accurately. (S10)</p> <p>(7) Reflects independently on their project outcomes, considers feedback, responds appropriately, standing ground where necessary. (B5)</p>	<p>alternative methods of calculation or data analysis. (K3, S2)</p> <p>(10) Critically analyses their choice of industry standards or guidance related to their project solution. Provides reasoning as to the implications of not following these. (K6, S9, B1)</p> <p>(11) Uses a range of communication methods and styles. Explains how to adapt these to take account of internal and external audiences. (S3, S10)</p> <p>(12) Uses critical thinking on the technical project to analyse and evaluate the outputs, testing results against standards, guidance and other feedback, and responds professionally to differing points of view posed. (K6, S3, B5)</p>
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Assessment method 2: Professional discussion (PD) (underpinned by a portfolio)

KSBs	Fail	Pass– all pass criteria must be met	Distinction (in addition to the pass criteria / all distinction statements must also be met)
Contributing to railway engineering design solutions by preparing and producing engineering drawings or	Does not meet pass criteria	(1) Demonstrates how they effectively use technical drawing, modelling and methods, including software packages, such as CAD or BIM, in their work to produce accurate and appropriate technical drawings or designs. Describes why these packages were the most appropriate for the task. (K4, S4, S5)	(7) Interprets and explains the results of their designs produced by computer-based modelling software. Justifies their choice of techniques. (K4, S4, S5)

models, with consideration for health, safety and risk assessment. (K4, S4, S5, S7)		(2) Demonstrates how they effectively apply relevant health and safety standards through the appropriate use of risk assessment processes, procedures and documentation. (S7)	
Utilising quality management systems within their work (K7, S6, S8, B2)		(3) Demonstrates how they effectively plan, prioritise, and manage their own work, in line with quality management and assurance processes, and within project parameters for cost and resource utilisation, communicating any conflicts appropriately. Outlines when and how they ask for support. (K7, S6, S8, B2)	(8) Evaluates how their application of quality assurance techniques contributes to their own and wider stakeholder continuous improvements. (K7, S6, S8, B6)
Personal and professional practice and development (K9, K10, S11b, S12, B4, B6, B7)		(4) Demonstrates how they apply ethical principles and practices to design solutions. (K9, S11b) (5) Demonstrates how they work effectively with others, taking into consideration equality and diversity. (B4, B6) (6) Demonstrates how they effectively apply the values and standards of a professional engineering technician, developing their own technical expertise. (K10, S12, B7)	(9) Analyses how they effectively manage their own work and use this to inform and improve their own or others' practices. (S8, B4, B7)

Overall EPA grading

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

- Fail - Fail in at least one method
- Pass - A pass in one method plus a pass or higher in the other method
- Distinction – Distinction in both methods

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	Overall grading
Fail	Fail	Fail
Pass	Fail	Fail
Fail	Pass	Fail
Fail	Distinction	Fail
Distinction	Fail	Fail
Pass	Pass	Pass
Pass	Distinction	Pass
Distinction	Pass	Pass
Distinction	Distinction	Distinction

Roles and responsibilities

Role	Responsibility
Apprentice	As a minimum, apprentices should: <ul style="list-style-type: none"> complete the on-programme element of the apprenticeship prepare for and complete the EPA
Employer	As a minimum, employers should: <ul style="list-style-type: none"> identify when the apprentice is ready to pass the gateway and undertake their EPA engage with the training provider throughout the duration of the apprenticeship engage with the EPAO to agree a suitable technical project specialism ensure the provision of both appropriate time, resources and mentoring of the apprentice throughout the apprenticeship training and end-point assessment ensure access to resources within the company to support the end-point assessment ensure independent assessors have access to relevant company systems / processes / documents to support the end-point assessment
EPAO	As a minimum, EPAOs should: <ul style="list-style-type: none"> appoint administrators to administer the EPA appoint two independent assessors who are suitably qualified, experienced, and professionally registered per apprentice candidate provide training and CPD to the independent assessors they employ to undertake the EPA have no direct connection with the apprentice, their employer or training provider i.e. there must be no conflict of interest

	<ul style="list-style-type: none"> • have processes in place to conduct internal quality assurance and do this on a regular basis • organise standardisation events and activities in accordance with this plan's IQA section • organise and conduct moderation of independent assessors' marking in accordance with this plan • have, and operate, an appeals' process • ensure external quality assurance body can access documentation relevant to quality assurance of the end-point assessment
Independent assessors	<p>As a minimum, the independent assessors should:</p> <ul style="list-style-type: none"> • be independent of the apprentice, their employer and training provider(s) i.e. there must be no conflict of interest • be an Engineering Council registered member of a relevant professional engineering institution (PEI) • be professionally active and maintain their CPD record annually • have had training from their EPAO in terms of good assessment practice, operating the assessment tools and grading • have the capability to assess the apprentice at this level • attend the required number of EPAOs standardisation and training events per year (as defined in the IQA section)
Training provider	<p>As a minimum, the training provider should:</p> <ul style="list-style-type: none"> • provide supervision and support to the apprentice throughout their training • advise and identify the employer and apprentice, on the apprentice's readiness for EPA prior to the gateway • engage with the employer throughout the duration of the apprenticeship to ensure that the apprentice is given the opportunities to develop the KSBs outlined in the standard and monitor their progress during the on-programme period • play no part in the EPA itself

Internal Quality Assurance (IQA)

Internal quality assurance refers to the requirements that EPA organisations must have in place to ensure consistent (reliable) and accurate (valid) assessment decisions. EPA organisations for this EPA must:

- have effective and rigorous quality assurance systems and procedures that ensure fair, reliable and consistent assessment across employers, places, times and independent assessors
- appoint independent assessors who have knowledge of the following occupational areas: railway engineering design or rail (or rail systems) design
- appoint independent assessors who have recent relevant experience of the occupation/sector at least one level above the apprentice gained in the last two years or significant experience of the occupation/sector.

- appoint two independent assessors who are professionally registered members of relevant professional engineering institutions (PEIs) per apprentice candidate
- appoint independent assessors who are competent to deliver the end-point assessment
- Independent Assessors will be required to:
 - be an Engineering Council registered member of a relevant professional engineering institution (PEI),
 - be professionally active and maintain their CPD record annually,
 - complete an EPAO induction to demonstrate working knowledge of the apprenticeship standard and assessment methodology,
 - have had training from their EPAO in terms of good assessment practice, operating the assessment tools and grading
- provide training for independent assessors in terms of good assessment practice, operating the assessment tools and grading
- have robust quality assurance systems and procedures that support fair, reliable and consistent assessment across the organisation and over time.
- operate induction training and standardisation events for independent assessors when they begin working for the EPAO on this standard and before they deliver an updated assessment method for the first time
- Require independent assessors to attend at least one standardisation event per year and deliver standardisation events

Re-sits and re-takes

Apprentices who fail one or more assessment method/s will be offered the opportunity to take a re-sit or a re-take at the employer's discretion. The apprentice's employer will need to agree that either a re-sit or re-take is an appropriate course of action.

A re-sit does not require further learning, whereas a re-take does.

Apprentices should have a supportive action plan to prepare for a re-sit or a re-take.

The timescale for either a re-sit or re-take is agreed between the employer and EPAO. A re-sit is typically taken within 4 months of the EPA outcome notification. The timescale for a re-take is dependent on how much further learning is required and is typically taken within 7 months of the EPA outcome notification.

All assessment methods must be taken within an 11-month period, otherwise the entire EPA will need to be re-sat/re-taken (i.e. 4 months typical EPA period plus 4 or 7 months for a re-sit or re-take respectively).

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

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.

Affordability

Affordability of the EPA will be aided by using at least some of the following practice:

- using an employer's, professional institution's or training provider's premises
- carrying out the presentation with questioning and the professional discussion on the same day
- using IT software and systems that can allow remote assessment

Professional body recognition

On completion of the apprenticeship, the apprentice will be eligible for registration as an engineering technician by the relevant professional engineering institution.

- Institution of Civil Engineers (ICE)
- The Institution of Engineering and Technology (IET)
- Permanent Way Institution (PWI)

Reasonable adjustments

The EPAO must have in place clear and fair arrangements for making reasonable adjustments for this apprenticeship standard. This should include how an apprentice qualifies for reasonable adjustment and what reasonable adjustments will be made. The adjustments must maintain the validity, reliability and integrity of the assessment methods outlined in this assessment plan.

Mapping of knowledge, skills and behaviours (KSBs)

KSB code	KSB statement	Methods mapped against
Knowledge		
K1	Core engineering principles, underpinned by appropriate mathematical, scientific and technical knowledge and understanding, relating to railway systems and the design process.	AM 1 / Technical Project
K2	Fundamental principles of rail and rail systems engineering and how they interface with each other.	AM 1 / Technical Project
K3	Key principles, techniques and methods of data collection, analysis and evaluation used in delivering railway engineering design and technical solutions.	AM 1 / Technical Project
K4	Technical drawings, modelling and methods, using computer-based software system/packages, such as Computer Aided Design (CAD), Building Information Modelling (BIM), and their use in the sector.	AM 2 / Professional Discussion
K5	Statutory health and safety policies, procedures and regulations that must be adhered to in the railway engineering design environment.	AM 1 / Technical Project
K6	Industry policies, standards and regulations that must be adhered to in the railway engineering design environment.	AM 1 / Technical Project
K7	Project management, quality management and assurance systems and continuous improvement as applied to Railway Engineering Design.	AM 2 / Professional Discussion
K8	Principles of sustainable development as applied to Railway Engineering Design.	AM 1 / Technical Project
K9	Ethical principles as applied to Railway Engineering Design.	AM 2 / Professional Discussion
K10	The values and standards by which they maintain their professional and technical knowledge and skills through CPD.	AM 2 / Professional Discussion
Skills		
S1	Apply core engineering principles, including mathematical, scientific and technical know-how, to railway systems and the design process.	AM 1 / Technical Project
S2	Apply key principles, techniques and methods of data collection, analysis and evaluation to support the delivery of valid railway engineering design and technical solutions.	AM 1 / Technical Project

S3	Plan and carry out calculations, data collection, analysis, evaluation, and report the outputs through appropriate means.	AM 1 / Technical Project
S4	Create technical drawings, plans and technical documentation using relevant conventions and engineering terminology related to railway systems.	AM 2 / Professional Discussion
S5	Operate appropriate software packages for data gathering and analysis, such as Computer Aided Design (CAD), Building Information Modelling (BIM).	AM 2 / Professional Discussion
S6	Apply document control processes and procedures using the approved processes, maintaining quality compliance when creating or amending engineering and/or design documentation.	AM 2 / Professional Discussion
S7	Apply statutory health and safety policies, procedures and regulations in the railway engineering design environment, using risk assessment processes, procedures and documentation.	AM 2 / Professional Discussion
S8	Plan, carry out and manage own work in line with quality management and assurance polices, recognising the wider implications to client or customer needs, and within cost and resource limitations.	AM 2 / Professional Discussion
S9	Support and contribute to the production of railway engineering design solutions in accordance with relevant industry standards, regulations and procedures, with consideration for security, cultural and societal, and environmental considerations.	AM 1 / Technical Project
S10	Communicate using appropriate methods for the audience, and incorporate relevant and appropriate terms, standards and data.	AM 1 / Technical Project
S11	Apply (a) sustainable and (b) ethical principles to Railway Engineering Design.	AM 1 / Technical Project (a) AM 2 / Professional Discussion (b)
S12	Plan, undertake and review their own professional competence, regularly updating and reviewing their CPD to improve performance.	AM 2 / Professional Discussion
Behaviours		
B1	Complies with health and safety, and industry standards, statutory regulations and policies.	AM 1 / Technical Project
B2	Works independently, operating in a systematic, proactive and transparent way, using resources effectively to complete	AM 2 / Professional Discussion

	tasks, knowing their limitations and when to ask for support or escalate.	
B3	Applies a structured approach to problem solving with attention to detail, accuracy and diligence.	AM 1 / Technical Project
B4	Is motivated when collaborating in teams, offering sensible challenge, reflects on and provides constructive feedback and contributes to discussions, demonstrating an awareness of diversity and inclusion issues.	AM 2 / Professional Discussion
B5	Acts professionally with a positive and respectful attitude; can reflect on own learning, is receptive to constructive feedback and resilient when facing challenge.	AM 1 / Technical Project
B6	Maintains professional and ethical working relationships with internal, external and connected stakeholders, recognising the importance of equality, diversity and inclusion.	AM 2 / Professional Discussion
B7	Takes responsibility for their own professional development, seeking opportunities to enhance their knowledge, skills and experience.	AM 2 / Professional Discussion