Changing lives through learning

Open Awards Level 2 End-point Assessment for

ST0805 Construction Equipment Maintenance Mechanic

Ofqual: 610/3016/8

End-point Assessment Handbook

Contents

Version History

Version	Date	Change(s) made	Section(s)	Publication source(s)
1.1	5/9/23	Gateway clarifications	Gateway	Open Awards website
2.0	13/5/25	Amended EPA duration to typically 6 months to mirror wording in EPA plan. Rebranded.	All	Open Awards website

This EPA Handbook is for apprentices, employers and providers. It provides an overview of the end-point assessment, the assessment methods, the grading criteria etc. It is a reference document which will guide you through each stage of the process.

For further information about apprenticeship standards and Trailblazers please contact **enquiries@openawards.org.uk**

Occupational Overview

This occupation is found in the construction, plant and tool hire industry as well as allied industries such as rail plant, demolition and quarrying that use construction-based equipment. The broad purpose of the occupation is to service, maintain and repair the wide range of construction-based equipment used within the construction and allied industries such as mobile cranes, excavators, disc cutters, crushers, demolition plant, road-rail equipment, water pumps, telescopic handlers etc. so that they function correctly, safely and efficiently, allowing construction and other projects to be carried out efficiently and on time. This occupation provides a vital support service that is crucial to the prosperity of the country through completion of vital infrastructure projects such a (nuclear) power generation, roads, rail, airports etc.

The construction equipment mechanic checks, services and undertakes basic fault finding activities and will either through their own fault-finding activities or through given instructions, remove, dismantle, repair, assemble and refit a wide range of components, and ensure that the item of plant is fully functional prior to handover to the operational side.

Construction equipment mechanics work not just within construction but also in other areas including quarrying, demolition, utilities (water/gas/electric etc.), piling, rail, waste/landfill, housing, highways, etc. In their daily work, an employee in this occupation interacts with customers, members of the public, supervisors, co-workers, other trades/occupations, supporting occupations, managers, suppliers, safety professionals, manufacturers, administration staff. The mechanic can be mobile, working on-site on a national basis and/or workshop-based undertaking maintenance activities in all weathers. This may include sometimes working on their own although they are subject to overall guidance and direction from others. The work can include weekend and night work to cover breakdowns on roadworks, rail maintenance projects, etc.

Construction related environments including site-based, mobile, workshop based in and outdoors, and in all seasons. An employee in this occupation will be responsible for ensuring they have the right tools and resources such as oils, lubricants and parts, for each task. They analyse problems or defects, identify any repair issues and undertake maintenance tasks whilst applying the correct manufacturer's technical information required and in conformance with legislative requirements. They work under generic supervision either within a workshop or on site but are expected to be both autonomous and the technical focal point during any maintenance activity.

Further details on the knowledge, skills and behaviours associated within the occupational standard are accessible on the IfATE website[1] and in the Assessment Specification section in this document.

[1] **https://www.instituteforapprenticeships.org/apprenticeship-standards/**

Standard Information

Level: Two (2)

Reference: ST0805

Approved for delivery: 7th August 2020 (updated: 26th January 2023)

Route: Engineering and manufacturing

Minimum duration to gateway: Typically 24 months (this does not include the EPA period)

Employers involved in creating the standard: A Plant, CRH Plant, Ainscough Cranes, Hanson, Long Water Gravel, Selwood, Keltbray, A P Webb, Speedy Hire, Steve Foster Cranes, HTC Wolffkran, Eagle Plant, Clancy Docwra, Day Group, Wirtgen, Hope Cement, Volvo, Camfaud, William Birch, Chepstow International Plant, Fox (Owmby) Ltd, Qunito Crane Hire, Roger Bullivant, AFI Group, Crowland Cranes, Lavendon Group.

External Quality Assurance Provider: Ofqual

Assessment plan version

Open Awards will undertake End-point Assessment in line with the requirement of the assessment plan version that the learner is registered to (normally based on their start date) or in line with IfATE directions.

Open Awards offers version 1.0 of this apprenticeship Standard.

Entry Requirements

Individual employers will set their own criteria; typically, 3 GCSEs (or equivalent) at grade C or above, including English, maths and a science or technology-based subject.

Progression Opportunities

Apprentices who successfully complete their Construction Equipment Maintenance Mechanic Apprenticeship are likely to attain or be able to work towards roles such as: Maintenance engineer, Mobile engineer, Plant fitter, Plant mechanic, Workshop fitter.

On-programme Requirements

A summary of the on-programme requirements for each apprentice is outlined below.

- Training to develop the knowledge, skills and behaviours (KSBs) of the occupational standard.
- All Apprentices will typically spend 24 months on-programme.
- Compilation of a portfolio of evidence to outline apprentices' work during their apprenticeship programme, mapped to the KSBs from the occupational standard.

End-point Assessment Documents Overview

An overview of the main documents and supporting materials you will encounter during this end-point assessment is in the table below.

Document Name	Brief Description	Who Should Read this Document	When To Use this Document	Additional Information
Skills Scan	This document is designed to support employers and providers to ensure that an apprentice's job role meets the requirements of the standard.	Employers Providers	Use this during the decision making process when considering whether the EPA is appropriate for the apprentice.	This allows employers and providers to ensure that the EPA is a good fit for the skills and aspirations of the apprentice.
Apprentice EPA Journey	A one page visual overview of the different milestones the apprentice will reach within their EPA journey.	Apprentices Employers Providers	Before committing to the course to make sure it is the right fit for you. Throughout the EPA journey.	This roadmap will help you to understand what has been achieved so far and what still needs to be completed.
EPA Handbook	This provides an overview of the end-point assessment, the assessment methods, the grading criteria etc. It is a reference document which will guide you through each stage of the process.	Apprentices Employers Providers	During the apprenticeship as a reminder of the expectations, assessment methods and grading.	This is a key document which will help you to navigate your way through each step of the end-point assessment. Refer back to this frequently.

Document Name	Brief Description	Who Should Read this Document	When To Use this Document	Additional Information
Progression Tracker	This allows the employer to compile and record an evidence base to prove that the apprentice has demonstrated competence against each KSB specified in the assessment plan.	Apprentices Employers Providers	Throughout the EPA prior to gateway.	This document could be a valuable basis for discussions around progress that the employer may have with the apprentice.
Portfolio Referencing Matrix	This gives you an overview of the Portfolio of Evidence requirements. It also includes a declaration for the apprentice and the employer to sign.	Apprentices Employers Providers	When you submit the Portfolio of Evidence to support the Professional Discussion at gateway.	If this document is not signed and submitted the apprentice will not be able to enter gateway.
Gateway Authenticity and Declaration form	This form declares that the apprentice is ready for gateway, the gateway conditions have been met and the evidence submitted has been produced by the apprentice.	Apprentices Employers Providers	At gateway.	This form needs to be signed by employers, providers and the apprentice. The apprentice is unable to enter gateway until this form has been completed and submitted.

Gateway Requirements

Registration

Registration is the point at which an employer or provider signals that it has selected Open Awards as their End-point Assessment provider. Providers are encouraged to register their apprentices with Open Awards as soon as possible, and at least three (3) months in advance of Gateway.

Registrations can be made by providers via the EPA Section of Open Awards' Portal.

Early registrations enable Open Awards to initiate early dialogue to ensure arrangements can be planned, such as IEPA availability, to ensure end-point assessment is delivered as smoothly as possible in a timescale that supports the employer's planned gateway date. It also enables the training provider to access a range of practice and preparation materials, so they and the employer can support the apprentice prepare for end-point assessment.

Gateway

Gateway is the point at which the employer reviews their apprentice's knowledge, skills and behaviours, and formally confirms the apprentice has reached occupational competency, completed all the mandatory elements of their apprenticeship programme and are ready for end-point assessment.

The End-point Assessment period should only start, and the End-point Assessment arrangements confirmed, once the employer is satisfied that the apprentice is consistently working at or above the level of the occupational standard, all of the pre-requisite gateway requirements for EPA have been met and that they can be evidenced to Open Awards. For this standard, End-point Assessment must be completed within a period lasting typically six (6) months, beginning when the apprentice has met the end-point assessment gateway requirements.

The training provider must provide Open Awards with all required evidence to enable Open Awards to undertake the necessary gateway checks. This evidence includes:

- a fully completed and signed Gateway agreement and authenticity form.
- achievement of maths and English qualifications in line with Department for Education (DfE) funding requirements
- apprentices must have completed the minimum apprenticeship on-programme duration (18 months from the start date)
- for this standard, apprentices are also required to have completed a portfolio of evidence.

Open Awards cannot accept end-point assessment booking requests until the gateway checks have been satisfactorily completed, so failure to submit all the necessary information or evidence will delay this process. Open Awards will contact the training provider if the information or evidence is missing or insufficient, so that this can be rectified as quickly as possible. Open Awards aims to complete gateway checks **within five (5) working days** from receipt of the gateway declaration and authenticity form, subject to provision of all necessary information and ancillary evidence.

Once gateway checks have been successfully completed, Open Awards will confirm provisional bookings or schedule subsequent bookings.

Portfolio of Evidence

Apprentices on this standard are required to develop and submit a portfolio of evidence. The portfolio must be submitted to Open Awards alongside other gateway evidence. Open Awards preferred format is an electronic logbook either uploaded by the training provider to their Open Awards SharePoint folder, or else a login provided to enable Open Awards to access the portfolio. Training providers should contact Open Awards to discuss alternative arrangements, e.g., where a paper-based or mixed portfolio is developed.

Apprentices should select their best possible evidence to reflect their current level of proficiency against the standard at the point they undertake their interview. The portfolio is not assessed and will only be used to support the interview. However, where the content requirements (p55) are not met, or the evidence not authenticated, the portfolio will be returned by Open Awards to the apprentice, via the training provider, for amendment and subsequent resubmission. This resubmission will not be considered as an assessment attempt. Resubmission of the portfolio will not constitute either a resit or retake of the interview. However, this will delay completion of the gateway checks therefore, training providers and employers are encouraged to ensure the portfolio requirements are met before submission at gateway.

Open Awards have developed supporting evidence tracking documentation to support apprentices, training providers and employers to meet the portfolio content requirements set out in the assessment plan. This documentation is available from the Open Awards Secure Portal:

- **ST0805-PAS**

Portfolio authenticity statement – Completion of this is a mandatory requirement.

- **ST0805-ECRS**

Evidence and KSB Criteria Reference Sheet (Portfolio) – Completion of this is a mandatory requirement as it shows the evidence requirements within the assessment plan have been met; however, Open Awards will accept any alternative equivalent approach demonstrating that the logbook content and structure requirements set out below have been met. The form may also help the independent end-point assessor (IEPA) to prepare for the interview by giving apprentices the opportunity to signpost to where they believe appropriate evidence may be found.

Portfolio of Evidence Content and Structure

The portfolio of evidence must:

- be compiled during the on-programme period of the apprenticeship
- contain evidence related to the KSBs assessed by assessment method 2: Interview underpinned by a portfolio of evidence
- typically contain 14 or more discrete pieces of evidence
- cover the 22 occupational duties outlined in the standard.

Evidence may be used to demonstrate more than one KSB. The document ST0805-ECRS (seen in Appendix 4, p55) can be downloaded from the Open Awards Secure Portal; this should be used to map on-programme evidence against the relevant KSB criteria demonstrated as set out in the standard. All KSB criteria should be demonstrated in the portfolio.

The portfolio will not be assessed by Open Awards, nor will Open Awards provide feedback on evidenced work, but will be used by the IEPA to prepare for the apprentice's interview.

The portfolio can be made up of a collection of evidence in a variety of formats, including written, audio and video. Sources may include:

- workplace documentation/records for tasks and projects that the apprentice has directly worked on, for example;
    - projects managed by the apprentice
    - relevant workplace policies/procedures
- witness statements
- annotated photographs
- GDPR and safeguarding compliant video clips (maximum total duration 10 minutes); the apprentice must be in view and identifiable
- annotated photographs of the apprentice carrying out relevant tasks
- reports, minutes, action logs
- observations by the apprentice's manager or mentor
- feedback (managers and peers)
- performance reviews.

Mock assessment activities are not considered acceptable evidence to be included within the portfolio.

Authenticity of apprenticeship work

The evidence provided must be valid and attributable to the apprentice. The portfolio of evidence must be submitted with a statement from the employer and apprentice confirming this (form ST0805-PAS in Appendix 5, p61).

What to Avoid

Portfolio evidence should not include reflective accounts or any methods of self-assessment unless this is part of the KSB being assessed, i.e., a KSB criterion directly indicates reflective practice knowledge and/or skills. Any employer contributions should focus on direct observation of performance (for example witness statements) rather than opinions.

Portfolio of Evidence Submission

The portfolio must be submitted at gateway alongside the gateway evidence. Because the portfolio must be completed as a gateway requirement, all evidence must be generated and dated pre-gateway. No post-gateway dated evidence can be included.

Where post-gateway evidence is included within the portfolio, the content requirements are not met or the evidence is not authenticated, the portfolio will be returned by Open Awards to the apprentice via the training provider for amendment and subsequent resubmission. Resubmitted portfolios must be submitted to Open Awards to enable the gateway checks to be completed.

Bookings

Bookings can be made by providers via the EPA Section of Open Awards' Secure Portal. As per ESFA guidance, Open Awards requires at least three (3) months advance notice of the potential gateway date. However, training providers may make provisional bookings at any point following Open Awards acceptance of an apprentice registration.

Open Awards will endeavour to accept and schedule bookings for end-point assessment to meet the expressed preference dates of the employer wherever possible. However, any provisional booking cannot be confirmed or scheduled by Open Awards until gateway checks have been successfully completed. The exception is the online multiple choice test when five (5) working days' notice is required.

Cancelling or rescheduling a booking

Provisional bookings can be re-scheduled or cancelled by providers via the EPA Section of Open Awards' Secure Portal. Confirmed bookings **up to 10 workings days** before the assessment day can be re-scheduled at no charge. Confirmed bookings cancelled or re-scheduled with **less than 10 workings days'** notice will incur a charge in line with Open Awards fees policy[2].

[2] Available on the Open Awards Secure Portal
https://portal.openawards.org.uk/Login.aspx

Assessment

The EPA consists of three assessment methods (Elements) which are individually graded.

- Assessment Method 1: Practical assessment with questions
- Assessment Method 2: Interview (underpinned by a portfolio of evidence)
- Assessment Method 3: Multiple Choice Test

Assessment Preparation

A sample knowledge test is available to support training providers and employers post-gateway to ensure apprentices are well prepared for their EPA experience. They are not intended to be used to measure proficiency pre-gateway or to support gateway decisions. These materials are accessible to training providers through the Secure Portal.

Assessment specifications (Appendix 2) and assessment records (Appendix 5 and appendix 6) are also available to support training providers and employers post-gateway to prepare Apprentices.

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 starting the next.

Assessment Window

EPA assessment components must last for a minimum of one week and are typically undertaken within a period of six (6) months from the gateway.

Observation of Practice with Questions

Assessment Method 1: Practical Assessment with Questions

Overview

A practical assessment with questions involves an independent end-point assessor (IEPA) observing an apprentice undertaking a series of set tasks in a simulated environment and asking questions. The simulated environment must closely relate to their natural working environment. It can also be undertaken in the apprentice's natural working environment. The IEPA will ask questions in relation to KSBs that have not been observed although these should be kept to a minimum.

The primary purpose of this assessment method is to ensure the apprentice can demonstrate all of the KSBs assigned to this assessment method. This is a holistic assessment method, where the KSBs are assessed across all four tasks. Alongside the specific tasks outlined below, the apprentice must be given the opportunity to demonstrate KSBs relating to the wider considerations that need to be taken when carrying out the tasks. This includes health and safety issues, risk assessment and environmental considerations.

The following **four tasks** must be observed during the practical assessment:

Task 1. Remove, dismantle, refit and check functionality - Remove and dismantle (or partially dismantle) either a working power unit, a transmission unit, hydraulic powered or an electrically-powered motor from an item of plant and refit on completion of the rebuild
and check for correct function. The activity includes preparing the area and configuring
the machine for the activity. **(5 hours)**

Task 2. Check, test, repair and restore - With one or more given components such as a
hydraulically, electrically or pneumatically operated unit with known faults, carry out checks and basic testing to establish the fault or faults, disassemble and carry out the
repairs and restore the component to a fully functioning condition. **(2 hours)**

Task 3. Static and functional checks - Carry out a range of static and functional checks to
ensure the plant or equipment is safe, fit-for-purpose and in a condition to perform in the
workplace according to manufacturer's requirements. **(70 minutes)**

Task 4. Welding/thermal joining - Carry out a repair on or modify a component from an item of construction-based plant where welding or other forms of thermal joining are required along with fabrication activities to effect a repair or modification according to a given specification. **(2 hours)**

Questions will be asked at the end of each task (within the time allocated for the task), in order not to disturb the apprentice while they are working. The purpose of the questioning is to assess underpinning knowledge, confirm the apprentice's understanding and to draw out the rationale for their decisions.

The IEPA will observe the apprentice carrying out these activities and record evidence, including answers to questions, that meets the KSB grading criteria shown in the Practical Assessment - Assessment Record (Appendix 5, p61) relevant to this End-point assessment method. Evidence of the following elements are included:

- relevance, sufficiency and completeness of the apprentice's work
- quality of the observed apprentice's performance during activities
- quality of the apprentice's answers to any IEPA questions.

The IEPA will use the full time available for questioning to allow the apprentice the opportunity to evidence occupational competence at the highest level available, unless the apprentice has already achieved the highest grade available.

The IEPA will assess the evidence observed and responses to questions holistically and will make a grading decision.

Preparing for the Practical Assessment with Questions

The employer must discuss scheduling an IEPA for the practical assessment along with the other assessment components with Open Awards delivery team to ensure time windows and resources can be reasonably allocated to meet the needs of all parties.

Open Awards expects the observation will be conducted in the apprentice's normal working environment to take account of the occupational context in which the apprentice operates. The employer is responsible to provide the resources and availability for the practical activities.

The IEPA will always attend the practical assessment with questions in person, unless this is not possible due to restrictions imposed by the venue (e.g., with a secure estate or specific health settings). In these exceptional circumstances, agreement for a video recording of the session to be submitted may be approved by Open Awards, subject to confidentiality and GDPR legal requirements. Where these exceptional circumstances exist, Open Awards expects to be informed prior to the gateway to be able to make an informed decision as to whether the proposed observation activity is appropriate. Where a video submission is approved arrangements will be made for it to be viewed by the IEPA alongside the apprentice, to replicate the observation process. Questions can then be defined for clarification in the same way as they would be after a normal, in person observation.

Apprentices should be encouraged to ask questions and confirm understanding of what is required of them during the pre-assessment discussion when the IEPA outlines what is required of them. The practical assessment tasks reflect frequent scenarios from the apprentice's normal work activities. The structure of the practical assessment should require the apprentice to demonstrate they can work safely whilst conducting inspection, fault finding, removal & replacement, set-up and repair activities.

Assessment Conditions

The practical observed assessment will be delivered in a strictly controlled environment by an independent end-point assessor (IEPA).

Practical assessment with questions includes **four (4)** discrete tasks that overall will take **10 hours** and **10 minutes** to complete as follows:

- Task 1 – 5 hours (plus **30 minutes** at the IEPA's discretion)
- Task 2 – 2 hours (plus **12 minutes** at the IEPA's discretion)
- Task 3 – 70 minutes (plus **7 minutes** at the IEPA's discretion)
- Task 4 – 2 hours (plus **12 minutes** at the IEPA's discretion).

The IEPA has the discretion to increase the time of the practical assessment with questions by up to **10%** to allow the apprentice to complete a task or respond to a question. The additional time can be applied as indicated in the bullet points in the paragraph above. The IEPA will **not** inform the apprentice whether they have additional time or how much additional time may be available. The apprentice should **not** assume that they will receive any additional time.

The practical assessment with questions may be split into discrete sections held over a maximum of **2 working days** to ensure each task is conducted with due care and attention. Breaks in between tasks may be taken, and where these occur, they will not count towards the total assessment time.

The IEPA will supervise apprentices during breaks in order to maintain security of the assessment in line with Open Awards malpractice policy. IEPAs must ensure apprentices don't have opportunity to observe, hear or interact with other apprentices who are being assessed.

Observation of the practical assessment will be undertaken on a one-to-one basis and the IEPA is only able to assess one apprentice at a time. The IEPA must be non-obtrusive while the apprentice is carrying out activities, i.e., they must observe the apprentice carrying out the work and only ask questions at the end of each Task.

The independent assessor must ask a minimum of **13 questions** according to the following proportions:

- Task1 - minimum **5 questions** in **15 minutes**
- Task 2 - minimum **3 questions** in **10 minutes**
- Task 3 – minimum **3 questions** in **10 minutes**
- Task 4 – minimum **2 questions** in **6 minutes**.

The IEPA may ask additional follow-up questions where clarification is required. The IEPA will ensure that there are no other apprentices in the immediate area while questioning is taking place.

The questions are chosen or adapted from a question bank developed and maintained by Open Awards. Open Awards will provide training and guidance for IEPAs on how to select the most relevant questions and how flexible they can be in amending the questions or asking follow up questions in order to best draw out the apprentice's knowledge, skills and behaviour. IEPAs must ensure that apprentices have the opportunity to demonstrate their knowledge, skills and behaviours at the highest available grading point for each KSB criterion or set of KSB criteria.

Assessment Method 2: Interview (underpinned by a portfolio of evidence)

The interview is designed to enable the apprentice to demonstrate how they have combined their skills, technical knowledge and behaviours in order to carry out their occupational role effectively and safely. The apprentice should expect to discuss evidence of their work as recorded in their portfolio of evidence compiled from job related tasks.

The apprentice and the IEPA will have a two-way dialogue, allowing the apprentice to evidence the KSBs assigned to this end-point assessment method and focusing on the following **nine (9)** topics and themes:

- Types and uses of construction equipment.
- Compliance, regulations and best practice.
- Dealing with hazards.
- Diagnosing, checking and testing.
- Tools and resources.
- Communicating and reporting.
- Producing components.
- Teamwork and working with others.
- Assertiveness and Resilience.

The IEPA will ask a minimum of **14** open competence-based questions drawn and adapted from an Open Awards developed and maintained question bank.

The IEPA will draw on appropriate evidence from the apprentice's portfolio to underpin the discussion. The portfolio itself will not be assessed, but it must meet a minimum level of quality to enable the professional discussion to take place.

Preparing for the Interview

The IEPA will conduct a thorough review of the apprentice's submitted portfolio of evidence in order to plan and structure the interview. To do this, IEPAs will draw on the training and guidance provided by Open Awards. IEPAs will also use a question bank prepared and maintained by Open Awards. The apprentice must be given at least **5 working days'** notice of the date and time of the professional discussion.

Assessment Conditions

The interview will be undertaken on a one-to-one basis between the IEPA and the apprentice. The duration of the technical interview will be **90 minutes.** However, the IEPA can increase the overall time by up to **9 minutes**, but only to allow the apprentice to complete the answer they are giving. The IEPA will **not** inform the apprentice whether they have additional time or how much additional time may be

available. The apprentice should **not** assume that they will receive any additional time.

The professional discussion can and should be undertaken remotely through video conferencing (e.g., MS Teams or Zoom). Further details of this option are available from Open Awards. Further details of this option are available from Open Awards. The records will be filled out during the interview by the IEPA and then retained by Open Awards.

As the professional discussion only involves the apprentice and the IEPA, neither the employer nor provider are required to attend.

Assessment Method 3: Multiple Choice Test

Overview

This is a computer-based test which will be undertaken online. This may be invigilated at the test premises or remotely invigilated by Open Awards. It is a closed book test so the apprentice may not use or refer to any books, notes or other materials during the test.

Apprentices have 60 minutes maximum to complete the 30 multiple-choice questions in which they will demonstrate the KSBs assigned to this assessment method (see Appendix 2).

Each of the 30 multiple-choice questions will have four possible answers, of which only one is correct scoring 1 mark each.

Any incorrect or missing answers must be assigned zero marks. The total number of marks available for the knowledge test is 30.

The apprentice will be awarded a pass or fail grade. A score of 21 (or higher) out of 30 equates to a pass grade.

Preparing for the Knowledge Test

The apprentice may be booked in for the knowledge test as soon as Open Awards have confirmed that the Apprentice has successfully passed through Gateway. The apprentice may be provided with the sample knowledge test (available on the Secure Portal) in order to familiarise themselves with the nature and style of the test and the questions which cover the same knowledge areas as their live test. The sample knowledge test will consist of 30 knowledge questions.

Assessment Conditions

The knowledge test will consist of 30 multiple choice questions delivered online in a strictly controlled environment and in the presence of an invigilator or web proctor in line with Open Awards Remote Invigilation Terms and Conditions.

Grading

Mapping of KSBs against Assessment Methods

Appendix 1, p38, shows each assessment method and the KSBs from the apprenticeship standard that are assessed by that method. Additionally, appendix 2, p42, and appendix 1, p38, detail the breakdown of the KSBs assessed in each of the key areas within each EPA method and their associated grading criteria.

Grading Individual Assessments

Practical assessment with questions

Apprentices must meet **all** the pass criteria to gain a pass.

Apprentices must meet **all** the distinction criteria to gain a distinction.

Interview (underpinned by a portfolio of evidence)

Apprentices must meet **all** the pass criteria to gain a pass.

Apprentices must meet **all** the distinction criteria to gain a distinction.

Multiple choice test

Apprentices must score 21 or higher to gain a pass.

Aggregation of Individual Assessment Grades into an Overall Grade

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

Apprentices who fail one or more assessment method will be awarded an overall EPA 'fail'.

To achieve an overall EPA 'pass', apprentices must achieve a pass in all the assessment methods. All assessment methods are weighted equally in their contribution to the overall EPA pass grade.

To achieve an overall EPA 'distinction', apprentices must achieve a 'distinction' in both assessment methods that have a possible 'distinction' grade, i.e., Assessment Method 1: Practical assessment with questions, and Assessment Method 2: Interview (underpinned by a portfolio of evidence).

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 – Practical assessment with questions	Assessment Method 2 – Interview	Assessment Method 3 – Multiple choice test	Overall grading
Fail	Any Grade	Any Grade	Fail
Any Grade	Fail	Any Grade	Fail
Any Grade	Any Grade	Fail	Fail
Pass	Pass	Pass	Pass
Distinction	Pass	Pass	Pass
Pass	Distinction	Pass	Pass
Distinction	Distinction	Pass	Distinction

Resits and Retakes

Open Awards provides resit and retake opportunities in line with Department for Education requirements unless the assessment plan associated with the apprenticeship contains alternative requirements.

Apprentices who fail one or more assessment method will be offered the opportunity to take a resit or a retake. Open Awards will provide feedback alongside the result notification to all apprentices who fail an assessment method. This feedback will be provided via the training provider, normally **within 10 workings days** of the assessment taking place. The exception to this is the online multiple choice test where only the result notification will be provided and this will normally be **within 72 hours** of the assessment taking place.

Where the result notification suggests a retake may be appropriate, the Department for Education recommend the employer and training provider consider a supportive action plan that responds to the performance weaknesses identified within the feedback. This action plan should clearly state the nature and extent of the re-training and include the estimated time to prepare the apprentice for the retake. When a retake is booked, Open Awards will require confirmation from the training provider that the apprentice has received further training and is ready to be assessed.

A resit involves the apprentice attempting one or more failed assessment components again, without the need to undertake further training.

Open Awards normally require a **minimum of 10 workings days'** notice when booking a resit or a retake. The exception is the online multiple choice test when **five (5) workings days'** notice is required.

The number of resits and retakes that can be taken by an apprentice will normally be at the discretion of the employer. The Department for Education recommends a limit of two (2) resits or retakes, however, more than two (2) resits or retakes may be taken if available, or unless otherwise specified or limited within the assessment plan.

Resits or retakes are only to be taken in the event of a failure. A resit or retake cannot be taken with the intention of increasing the original grade if an apprentice has passed their EPA. Therefore, feedback will not normally be provided to apprentices who achieve a pass or higher.

The maximum grade that can be achieved for a resit or retake is a pass, unless Open Awards has determined there are exceptional circumstances. Where an apprentice believes exceptional circumstances impacted on their initial assessment attempt, they must submit a formal request with supporting evidence for exceptional circumstances to be considered, directly to Open Awards **within five (5) working days** of receiving the assessment decision.

The same IEPA who undertook the initial assessment attempt may be allocated by Open Awards to assess an apprentice's resit or retake. This may be a requirement of the assessment plan. The allocation of IEPAs to assessments will be taken by Open Awards based upon the requirements of the assessment plan or operational considerations.

Appeals and Complaints

Open Awards is committed to ensuring that all assessment decisions are consistent, fair and based on valid judgements made by independent IEPAs.
If an apprentice is satisfied with their result but seeks information as to why a specific grade was awarded, they can request formal feedback through their training provider. This feedback will be limited to justification of the decision and will not be developmental in nature (i.e., indicate how they may have achieved a higher grade). This feedback may take **up to 20 working days** to be provided. Further details are available from Open Awards.
If an apprentice is not satisfied with their result, they can request an enquiry about results which is an informal appeal. Open Awards will review the documentation for administrative errors and correct these if identified. An enquiry about results must be made by the apprentice **within 10 working days** of notification of the results concerned.
Alternatively, or subsequent to an enquiry about results, if an apprentice is not satisfied with their result, they may lodge an appeal. Appeals can be made by the training provider on behalf of the apprentice, but they must have the permission of the apprentice to do this.
Appeals made in respect of the final overall grade will result in a delay to the completion certificate being requested by Open Awards. For further details regarding the process, timelines and fees, please refer to Open Awards' Enquiries and Appeals Policy and Procedures which can be found on the Portal.

Completion and Certification

Open Awards will issue a summary of results following successful completion of all EPA assessments. This will be issued to the apprentice via the provider and show the grade associated with each assessment, alongside the overall grade and the date this was awarded.

Open Awards will also request the apprenticeship completion certificate from the IfATE on behalf on an apprentice once they have completed their apprenticeship. As part of the gateway declaration form an apprentice is required to give Open Awards permission to do this on their behalf. Without this permission Open Awards is unable to claim the certificate.

Open Awards will request the certificate once the apprentice has received and agreed the final grade. Where the apprentice does not formally agree the final grade, Open Awards will assume it is agreed once the window for an enquiry about results or appeal is extinguished (**10 working days** from the notification of results). Requests for the certificate are then made **within 20 working days** and in most instances, sooner. IfATE normally send the completion certificate directly to the employer by recorded delivery; this can take **up to 15 working days** to arrive from the date it is requested.

Quality assurance

Independent End-point Assessor Standard Requirements

Independent End Point Assessors must meet the following criteria:

- have the competence to assess the apprentice at this level and hold any required qualifications and experience in line with the requirements of the independent assessor as detailed in the IQA section of this EPA plan
- have or are working towards an assessor qualification. Typical examples include:
    - Level 3 Award in Assessing Competence in the Work Environment
    - Level 3 Award in Assessing Vocationally Related Achievement
    - Level 3 Certificate in Assessing Vocationally Related Achievement
    - Level 3 Certificate in Assessing Vocational Achievement an appropriate
    - Assessor qualification as identified by SQA Accreditation or hold one of the following:
      A1 Assess candidates using a range of methods
      D32/33 Assess candidate performance, using differing sources of evidence
      Assessors holding A1 or D32/D33 should be assessing against the latest standards
- understand the occupational standard and the requirements of this EPA
- have, maintain and be able to evidence up to date knowledge and expertise of the subject matter
- deliver the end-point assessment in-line with the EPA plan
- comply with the IQA requirements of the EPAO
- have no direct connection or conflict of interest with the apprentice, their employer or training provider; in all instances including when the EPAO is the training provider (i.e. HEI)
- attend induction training
- attend standardisation events when they begin working for the EPAO, before they conduct an EPA for the first time and a minimum of annually on this apprenticeship standard
- assess each assessment method, as determined by the EPA plan, and without extending the EPA unnecessarily
- assess against the KSBs assigned to each assessment method, as shown in the mapping of assessment methods and as determined by the EPAO, and without extending the EPA unnecessarily
- make all grading decisions
- record and report all assessment outcome decisions, for each apprentice, following instructions and assessment recording documentation provided by the EPAO in a timely manner

- use language in the development and delivery of the EPA that is appropriate to the level of the occupational standard

Internal quality assurance

Quality assurance is at the heart of Open Awards' practices and we follow suitably rigorous processes to ensure that the integrity of our assessments is maintained.

Internal quality assurance is the process of reviewing and evaluating assessment practices and decisions to ensure that:

- an identified individual is responsible for coordinating internal quality assurance processes
- there are clear and documented roles and responsibilities for all those involved
- all learners are assessed accurately, fairly and consistently to the right standard
- internal quality assurance is structured and incorporates all of the requirements set out in the assessment plan associated with the apprenticeship standard
- assessment tasks and learner work are sampled appropriately
- good practice is promoted through internal standardisation events and quality assurance meetings
- decisions are supported by full and clear records and action plans that are followed
- internal processes are transparent and regularly evaluated.

External quality assurance

External quality assurance for this apprenticeship standard is undertaken by Ofqual.

Appendix 1: Mapping of KSBs against Assessment Methods

Details of which elements of the apprenticeship standard will be assessed by assessment component are given below.

Assessment Method 1: Practical Assessment with Questions

KSBs	Apprenticeship standard descriptor (knowledge)
K1	Types and appropriateness of information sources that would be used to provide repair and maintenance information on construction-based equipment.
K9	Fundamentals of health and safety control equipment, the principles of protection, how they should be used/worn and the different types that are available for specific activities or sectors.
K12	Methods of protecting work and working areas from damage, pollution, ingress of contaminants, inclement weather etc. and from controlling others entering or within the working area.
K19	Requirements and hazards of carrying out maintenance and servicing activities on construction and allied sector work environments, including how static and dynamic risk assessments, method statements, safe systems of work and permit to work systems are devised, implemented and used
K20	Machines, equipment and components handling, supporting, moving and isolation requirement and methods.
KSBs	**Apprenticeship standard descriptor (skills)**
S1	Working area preparation including workshop, facility and construction site-based to carry out maintenance activities on construction-based equipment.
S3	Configure, set, rig and prepare the plant or equipment safely and efficiently for the accessing, handling and removal of typical components, including the use of securing, jacking and lifting aids for supporting, securing and handling purposes.
S4	Disconnect, detach and/or remove a wide range of components and ancillary equipment Safely and efficiently from construction-based equipment, including using lifting, securing and handling aids.
S5	Dismantle worn, damaged or faulty parts, components and equipment.
S6	Overhaul, repair, renovate or repair worn, damaged or faulty parts, components and equipment.
S7	Replace and reinstate worn, damaged or faulty construction equipment parts.
S8	Assemble, connect, attach and refit a comprehensive range of new of repaired construction-based equipment components and ancillary equipment.
S9	Checks of static and operational performance on repaired construction-based equipment to ensure full safe functional activity prior to handover and re-commissioning to operation.

S10	Basic visual inspections on construction-based equipment both in a workshop, facility and site-based environments to identify potential issues and problems.
S13	Repair or modify existing components from construction-based equipment which requires heating, welding and brazing.
S15	Basic fault-finding and diagnostic activities on hydraulic, electric, mechanical and pneumatic systems to identify existing problems on construction-based equipment.
S17	Source, extract, identify, interpret and apply technical information from workshop-type manuals, given verbal information, organisational and manufacturers' literature and documentation, both on and off-line.

Assessment Method 2: Interview (underpinned by a portfolio of evidence)

KSBs	Apprenticeship standard descriptor (knowledge)
K2	Types, uses, core function and operation of construction-based equipment.
K8	Company procedures and responsibilities in relation to working with the sector, customer and organisational requirements for working within construction and alongside other colleagues.
K11	Environmental regulations and considerations for the containment and disposal of waste materials and equipment.
K13	Working timetables/deadlines, behaviours, technical abilities and working practices effects on customer relations and why.
K14	Methods and procedures for dealing with typical workplace and site-specific emergencies including fire, spillages, injuries and other task-related hazards.
K18	Techniques for checks and inspections, why typical components failures and causes of failure of relevant construction-based equipment.
K21	Different communication and record-keeping methods, when they are used and the consequences of poor communication and record keeping.
KSBs	**Apprenticeship standard descriptor (skills)**
S2	Identify, handle and store required resources, tools and equipment necessary to maintain construction-based equipment, reporting shortages/incomplete stock as.
S11	Specified testing activities on construction-based equipment both in a workshop, facility and site-based environments that ensure correct and safe functional effectiveness.
S12	Produce one-off components against given information and specifications that requires fabrication and welding activities.

S14	Install and commission construction-based equipment on site-based environments for operational activities.
S16	Complete organisational reports to confirm and document the work activity that was undertaken and inform employer and clients of work progress and problems encountered.
S18	Working activities in compliance with legislation, regulations, best practice and organisational requirements in the construction, industrial, quarrying, hire, port, mining and other allied environments.
KSBs	**Apprenticeship standard descriptor (behaviours)**
B1	Teamwork and independent working – working and engaging collaboratively and effectively with co-workers of different occupations to achieve requisite results safely and efficiently and safe working, and achieving those results through independence, resourcefulness and ability.
B2	Forming and enhancing customer relationships – as a front-line facing role, creating and maintaining effective working and commercial relationships.
B3	Time management – planning and delivering set tasks within specified targets and timescales.
B4	Assertiveness, confidence and resilience – dealing with unexpected situations, pressure to complete work safely and on time, resolutely advising less-informed parties of realistic completion times and the rationales of the processes involved.
B5	Respect – dealing equally and fairly with for example, people of different genders, disabilities, backgrounds, races, cultures and creeds; taking care of the environment.

Assessment Method 3: Multiple Choice Test

KSBs	Apprenticeship standard descriptor (knowledge)
K3	Principles, function, operation, application and limitation of energy sources and transmission methods eg. IC power units, hydraulics, pneumatics, electrics.
K4	Principles, function, application and types of components used on relevant equipment including those that provide direction, retardation, movement, power-transmission, heat, light and flow.
K5	Types, applications and limitations of fluids used in construction-based plant including oils/lubricants, cooling/heating and for power/work transmission.
K6	Mechanical principles and efforts that apply to construction-based plant that produce outcomes of work from an energy source.
K7	Aims and compliance requirements of regulations and legislation that apply to the maintenance and repair of construction-based equipment, typically including Health and Safety at Work Act, LOLER, COSHH, PUWER.

K10	Use of length/height, weight, area, volume, heat, pressure, electrical conductivity etc. for measuring and calculating, what units are used and with what typical types of measuring equipment.
K15	Tools and equipment relevant to tasks on construction-based equipment and why they need to be fit-for-purpose, calibrated, checked before use, maintained, and stored correctly on completion of activities.
K16	Safety requirements for dealing with pressurised systems, hot/cold systems, stored energy and electrical/electronic systems.
K17	Principles of material forming, cutting, shaping, joining and fitting.
K22	Additional training required for workplace activities including. manufacturer's specific, manual handling, COSHH and other environmental control requirements, working safely courses such as IOSH, CITB, PTS and the requirements of CSCS-badged certification.

Appendix 2 Assessment Specifications

Assessment Method 1: Practical assessment with questions	10 hours and 10 minutes (+61 mins at IEPAs discretion)
Assessment conditions • The practical assessment must be carried out in a controlled environment within the apprentice's workplace or other appropriate work area. • A suitable, clean and safe area must be provided to allow the activity to take place which entails a clean hard standing, sheltered from inclement weather and segregated from other vehicle movements. If conditions allow, the assessment area may be outdoors. • During the assessment all health, safety and environmental requirements along with lifting regulations and Approved Codes of Practice (ACOPs) must be adhered to. • The venue must be fully equipped for a construction equipment maintenance mechanic environment and include a range of tools, equipment and PPE to support the tasks, including: relevant specialist tools, equipment including lifting aids and accessories, environmental protection and cleaning materials, fluids, lubricants, gaskets, seals and other parts for reassembly and refitting purposes, access and work-at-height fall-prevention equipment where required, barriers/equipment to form an exclusion zone for the activity, workshop and equipment manuals, any other equipment deemed necessary to carry out this activity. • All tools, equipment and accessories supplied for the assessment should be fully serviceable and correctly identified/labelled. • A pre-constructed risk assessment and method statement for the activity must be provided for apprentices to refer to. • The independent assessor may observe one apprentice during this assessment method. • The practical assessment with questions may be split into discrete sections held over a maximum of 2 working days. Where breaks occur, they will not count towards the total assessment time.	
Tasks The apprentice must be observed undertaking the following tasks: **Task 1: Remove, dismantle, refit and check functionality (5 hours)** Remove and dismantle (or partially dismantle) either a working power unit, a transmission unit, hydraulic powered or an electrically-powered motor from an item of plant and refit on completion of the rebuild and check for correct function. The activity includes preparing the area and configuring the machine for the activity. **Task 2: Check, test, repair and restore (2 hours)** With one or more given components such as a hydraulically, electrically or pneumatically operated unit with known faults, carry out checks and basic testing to establish the fault or faults, disassemble and carry out the repairs and restore the component to a fully functioning condition. **Task 3: Static and functional checks (70 minutes)** Carry out a range of static and functional checks to ensure the plant or equipment is safe, fit-for-purpose and in a condition to perform in the workplace according to manufacturer's requirements. **Task 4: Welding/thermal joining (2 hours)** Carry out a repair on or modify a component from an item of construction-based plant where welding or other forms of thermal joining are required along with fabrication activities to affect a repair or modification according to a given specification.	

KSBs	Pass criteria	Distinction criteria
Sourcing and applying information		
K1, S17	Identifies, checks and applies the appropriate information for the task from a range of information, including assessor's instructions, workshop-type manuals and manufacturers' literature and documentation.	
Preparing the work area		
K9, K12, K19, S1	Prepares the working area, including relevant protection from pollution, inclement weather etc. and checks the work areas for hazards, conducts visual dynamic risk assessment against given risk assessments, methods statements and other work instructions.	Lays out required tools relative to the sequence of the task before starting. Selects the correct tool for the task first time. Maintains a tidy workstation, free of hazards.
	Creates exclusion zones for each activity, applies and uses appropriate personal protective equipment, safety aids and other health, safety and welfare equipment and controls others entering or within the working area.	
Set up and prepare the equipment		
K20, S3, S4	Ensures each machine type and component is isolated and configured correctly, disconnects, detaches and removes given components using relevant lifting, securing and handling aids.	Explains what needs to be taken into consideration when connecting or disconnecting components using lifting, securing and handling aids.
Parts and components		
S5, S6, S7, S8	Removes, dismantles, disconnects, replaces, repairs, renovates, reinstates, reassembles, connects and refits given parts and components in accordance with correct procedures, manufacturer's instructions, the given time and safety requirements.	Explains at least two potential consequences of not following correct procedures for removing, dismantling, disconnecting, replacing, repairing, renovating, reinstating, reassembling, connecting and refitting given parts.
Checks and tests		
S9, S10, S15	Carries out checks, tests and basic inspections which identified faults and problems and ensures correct function on completion of maintenance activities.	
Repair and modification		
S13	Completes repairs or modifications of given components using fabrication, heating and thermal joining methods according to given instructions and within the given timescales.	

Assessment Method 2: Interview (underpinned by a portfolio of evidence)	90 minutes (+9 mins at IEPAs discretion)
Assessment conditions • The interview must be carried out under controlled conditions in a suitable environment. • The IEPA must have reviewed the apprentice's portfolio evidence report in advance. • The IEPA must ask **a minimum of 14** questions to give the apprentice an opportunity to demonstrate **all** the criteria in the **nine (9)** topics and themes shown in the grading criteria table on pages 3 & 4.	

Themes, topics and grading criteria		
KSBs	**Pass Criteria**	**Distinction Criteria**
Topic/Theme 1. Types and uses of construction equipment.		
K2 Types, uses, core function and operation of construction-based equipment	Describes the types of plant they have worked on, how they function and are used.	Describes typical faults and failures that occur in construction equipment and why they occur. Explains the factors that determine the maintenance requirements for a selected machine type from the type of plant they have worked on.
Key Topic/Theme 2. Compliance, regulations and best practice.		
K8 Company procedures and responsibilities in relation to working with the sector, customer and organisational requirements for working within construction and alongside other colleagues. K11 Environmental regulations and considerations for the containment and disposal of waste materials and equipment. S18 Working activities in compliance with legislation, regulations, best practice and organisational requirements in the construction, industrial, quarrying, hire, port, mining and other allied environments.	Outlines the regulatory requirements, organisational, customer and workplace procedures and best practices that apply including environmental aspects and how they complied with each during maintenance activities.	States a range (at least two) specific work and environmental regulations that they complied with during maintenance activities and how those regulations add value. Explains the impact of not complying with regulations.
Key Topic/Theme 3. Dealing with hazards		
K14 Methods and procedures for dealing with typical workplace and site-specific emergencies including fire, spillages, injuries and other task-related hazards.	Describes organisational and site methods and procedures for typical emergencies including fire evacuations, injuries and environmental aspects.	
Topic/Theme 4. Diagnosing, checking and testing.		

K18 Techniques for checks and inspections, why typical components failures and causes of failure of relevant construction-based equipment. S11 Specified testing activities on construction-based equipment both in a workshop, facility and site-based environments that ensure correct and safe functional effectiveness. S14 Install and commission construction-based equipment on site-based environments for operational activities. B3 Time management – planning and delivering set tasks within specified targets and timescales.	Describes how they conducted specific diagnostic checks, inspections and testing activities, on a selected range of equipment, what techniques were used, and how they installed and commissioned a range of relevant plant or equipment. (K18, S11, S14) Describes how they planned and delivered the tasks within specific target and timescales. (B3)	Critically analyse why they used particular methods of diagnostic checks and tests over other available methods. (K18, S11)
Topic/theme 5. Tools and resources		
S2 Identify, handle and store required resources, tools and equipment necessary to maintain construction-based equipment, reporting shortages/ incomplete stock as appropriate.	Describe resources, tools and equipment used to maintain construction-based equipment, how these were identified and handled and how any shortages/ incomplete stock was reported on.	
Theme/Topic 6. Communicating and reporting		
K13 Working timetables/ deadlines, behaviours, technical abilities and working practices effects on customer relations and why. K21 Different communication and record-keeping methods, when they are used and the consequences of poor communication and record keeping. S16 Complete organisational reports to confirm and document the work activity that was undertaken and inform employer and clients of work progress and problems encountered. B2 Forming and enhancing customer relationships – as a front-line facing role, creating and maintaining effective working and commercial relationships.	Describes the organisational processes and forms to record work undertaken, measures taken to communicate work progress and issues encountered with co-workers, customers and employers and the consequences of incomplete or poor levels of communication, record-keeping and not complying with deadlines and timetables. Supports this with an example of a report they completed and explains what factors they considered when they discussed this with the customer or employer. (K13, K21, S16)	Describes how they exceeded customer expectations through excellent working practices and effective communication. (K13)

	Describes how they have formed and maintained effective customer relationships. (B2)	
Key Topic/Theme 7. Producing components		
S12 Produce one-off components against given information and specifications that requires fabrication and welding activities.	Discussed when they have produced one-off components which required fabrication and welding activities that were completed to the required specifications.	
Key Topic/Theme 8. Teamwork and working with others		
B1 Teamwork and independent working – working and engaging collaboratively and effectively with co-workers of different occupations to achieve requisite results safely and efficiently and safe working, and achieving those results through independence, resourcefulness and ability B5 Respect – dealing equally and fairly with for example, people of different genders, disabilities, backgrounds, races, cultures and creeds; taking care of the environment.	Pass: Describes how they worked and engaged collaboratively and effectively with co-workers, including those in different occupations, to achieve requisite results safely and efficiently. Using a different example, describes how they worked independently to achieve requisite outcomes safely. (B1) Describes how they created and maintained effective working and commercial relationships with clients, co-workers and employers, dealing equally with people from different backgrounds (for example gender, disability, culture, race and social background). (B5)	
Key Topic/Theme 9. Assertiveness and resilience		
B4 Assertiveness, confidence and resilience – dealing with unexpected situations, pressure to complete work safely and on time, resolutely advising less-informed parties of realistic completion times and the rationales of the processes involved.	Discusses how they dealt with unexpected situations, how they managed internal pressure to complete work safely and on time, how they advised less-informed parties in a correct manner of realistic completion times of particular maintenance or repair activities and provided rationales of the processes involved.	Evaluates how successful they were in dealing with unexpected situations. Describes how they varied their approach when managing completion times, depending on the customer and their response.

Assessment Method 3		30 multiple choice questions, 60 minutes, controlled/invigilated conditions	
Ref	**Assessment Criterion**	**Indicative knowledge**	**Qsts**
K3.1	Describe principles of energy sources and transmission methods e.g., IC power units, hydraulics, pneumatics, electrics.	Pascal's Law relating to hydraulic and pneumatic system flow, pressure, force and area, mechanical advantage used for energy transmission (drive ratios, leverage, torque multiplication, cable reeving), I.C. power units, conversion of thermal energy to kinetic energy, Bernoulli's Theorem as applied to the carburettor venturi, stoichiometric fuel mixture for SI Engine, thermal heat transference, convection, conduction and radiation, electrical principles relating to Ohms Law, Amperes force law, Power (Electro Motive Force, Current, Resistance, Watt).	**1**
K3.2	Explain the function and operation of energy sources and transmission methods e.g., IC power units, hydraulics, pneumatics, electrics.	**IC power units:** Transforming thermal conversion to mechanical power, 2 & 4 stroke single and multiple cylinder Spark ignition & Compression Ignition engines, cylinder configuration, phasing, lubrication systems, thermal cooling (liquid & air), atmospheric and pressurized fuel systems, air induction systems, intercoolers, environmental protection systems, exhaust gas regeneration (EGR), diesel oxidization catalysts (DOC), diesel particle filters (DPF), exhaust fluid injection systems (AdBlue). **Hydraulic**: Transforming fluid power into motive power (hydraulic pumps, rotary and linear actuators), hydraulic power transmission (types of hoses and lines), control of hydraulic fluid (directional control, open and closed centre circuits, open and closed loop circuits, series and parallel circuit layout). **Pneumatics**: Air compressors, storage, control and transmission (air pumps, receivers, pipes, hoses, pressure regulating valves, flow control), conversion of pneumatic power to mechanical power (rotary and linear actuators). **Electrical:** Electrical power transmission, materials used, circuit types (series and parallel), transforming electricity into motive power. Electronic control units, sensors, analogue and digital communication networks.	**2**
K3.3	Recognise the limitation of energy sources and transmission methods e.g., IC power units, hydraulics, pneumatics, electrics.	**IC power units:** Exhaust emission (Carbon monoxide, nitrogen oxides, hydrocarbons), mechanical failure, temperature control, frost protection required, periodic maintenance and adjustments. Power taken from: crankshaft pulley, flywheel, timing gears. **Hydraulics**: Fluid spillages creating environmental damage, fire risk, hazards of high-pressure atomised fluid leaks, periodic maintenance and adjustments required, high pressure containment result in heavy components, sudden system failure due to leaks. Failure of Lines, pipes, hoses due to: fatigue, mechanical damage, ageing. **Pneumatics:** Require continuous lubrication, seizing due to lubrication failure, requirement for water separators, air driers, prone to freezing in cold weather, low power conversion efficiency, motors lack torque at low speed. Lines, pipes, hoses failure due to: fatigue, mechanical damage, age. **Electrical:** Environmental (water ingress causes damage, restrictive usage in explosive environments, damage due dust ingress, connector corrosion creates high resistance and power drop), Insulation failure (electrocution, short circuit fires). Direct current (DC) motor requires periodic carbon brush replacements. **Transmission**: cables, wires, magnetic fields.	**1**
K3.4	Identify the application *(context in which these are applied in practice)* of energy sources and transmission methods e.g., IC power units, hydraulics, pneumatics,	**IC Power Units:** Portable, static and mobile plant: Mechanical gearboxes, hydraulic mechanical gearboxes, propeller shafts, driveshafts, axles, final drive, direct drive, drive belts, chain drives. **Hydraulic:** Portable, static and mobile plant: Converting mechanical power to fluid power by rotary actuators (fixed & variable displacement motors), linear actuators (single and double acting, differentiating and non-differentiating) in combination with mechanical drive systems (torque converter, hydrostatic drive systems). **Electrical:** Portable, static and mobile plant: Converting electrical power to mechanical by D.C. and A.C. motors, direct drive	**1**

	electrics.	mechanical and hydraulic transmission systems. Electrical power for heating (engine cold star aids, site space heating) and lighting (work lamps, warning beacons, instrument lamps), electronic communication signals (analogue and digital), Can-bus, sensors, electronic control units.	
K4.1	Describe principles of components used on relevant equipment including those that provide direction, retardation, movement, power-transmission, heat, light and flow.	**Direction:** Wheeled vehicle steering systems: Two, four, crab and pivot steering systems. Ackerman steering principle. Tracked vehicles: Hydrostatic steering using open centre valve block system and hydraulic differential steering. **Retardation:** Mechanical, hydraulic, power assisted hydraulic, full air braking systems. Leading & trailing, twin leading drum brake, external and internal disc brake (oil immersed and dry), band brakes. Exhaust, electrical and hydraulic brake retarders. Types of brake friction materials and the effect of heat (brake fade, co-efficient of friction). **Movement:** Mechanical Torque multiplication: Gear ratio, siding mesh, constant mesh, power shuttle, powershift gearboxes. four-wheel drive drop-boxes, rigid and steer drive axles, differentials (limited slip, mechanical lock), final drive units, chain drives including tracked machines. **Power-transmission:** Friction clutches: drive plates (single and multiplate clutches), centrifugal, cone, friction materials, cover plates (diaphragm, coil spring), dog clutches, torque converters, friction and mechanical drive belts. **Heat:** Engine cold starting aids (heater plugs), cab heaters (heater matrix), cab heat reduction (air conditioning unit). Portable site heaters (Infrared tubes). **Light:** Bulbs (Incandescent, halogen), Light Emitting Diodes (LED). Series and parallel circuits. **Flow:** Water, sludge & concrete pumps (Centrifugal, diaphragm, piston). Pumping head and lift. **Suspension:** springs, suspension systems, ADT, gas/air systems, shock absorption	**1**
K4.2	Explain the function of components used on relevant equipment including those that provide direction, retardation, movement, power-transmission, heat, light and flow.	**Direction:** Steering box, drop arm, drag link, stub axle, track rod, steering joints wheels (solid, split), tyres (radial, cross-ply construction). Rack and pinion, tie-rods, ball joints. Steering pump, pressure relief valve, orbital steering valve, hoses, hydraulic steering ram, fluid filter, fluid, centre pivot bearings and links. Tracked vehicles: Hydrostatic steering open centre valve, pump, pressure relief valve, motor counterbalance valve, hydraulic differential steering motor, steering control valve, direction control valve (DCV). **Retardation:** Mechanical brake linkage (cables, rods, compensators, brake pedal/levers, trailer break-away cable). Hydraulic system (Master cylinder, wheel cylinders, load valve, pipe and hoses), brake drums, brake shoes, backplates, adjusters, expanders, brake discs, brake pads, brake callipers. Exhaust brake (butterfly, sliding gate, control system). Hydraulic retarder (Stator, rotor, enclosure and control valve). Electrical retarder (coil pack, coil, disc). **Movement**: Siding mesh, constant mesh, power shuttle, powershift gearboxes. Four-wheel drive drop-boxes, drive axles. Gear ratios, gear types, selector forks and interlocks, synchromesh hubs, dog clutches, Input shaft, layshaft, output shafts, wet clutches, epicyclic gear units, crown wheel & pinion, differential gears (plant & sun), differential limited and full lock, propeller and drive shafts. Drive chains and sprockets, drive belts and pulleys. Suspension components. **Power-transmission:** Friction clutches: drive plates (single and multiplate clutches), centrifugal, cone, friction materials, cover plates (diaphragm, coil spring), dog clutches, torque converters, friction and mechanical drive belts **Heat:** Engine cold starting aids (heater plugs), cab heaters (heater matrix), cab heat control (air conditioning unit). Portable site heaters (Infrared tubes). **Light**: Light Emitting Diodes (LED), bulbs (wattage, voltage, fitting type), Series and parallel circuits (overload protection, switches, relays, timers). **Flow:** Pumps: Impellers, volute chamber, housing, mechanical seals, clack valves, hoses, strainers, diaphragms, bearing types, bushes, cylinder tubes.	**1**

K4.3	Identify types of components used on relevant equipment including those that provide direction, retardation, movement, power-transmission, heat, light and flow.	**Direction:** Steering box, drop arm, drag link, stub axle, track rod, steering joints, wheels, tyres. Rack & pinion, tie-rods and joints. Steering pump, pressure relief valve, hoses, hydraulic steering ram, steering filter, fluid, centre pivot bearings and link. Hydrostatic steering open centre valve, pump, pressure relief valve, motor counterbalance valve, hydraulic differential units and steering motor, steering control valve, direction control valves (DCV), orbital steering valves. **Retardation**: Mechanical brake linkage (cables, rods, compensators, brake pedal/lever, trailer break-away cable). Hydraulic system (master cylinder, wheel cylinders, load sensing valves pipe and hoses), brake drums, brake shoes, backplates, adjusters, expanders, brake discs, brake pads, brake callipers, exhaust brake (butterfly and sliding gate), hydraulic retarder (stator, rotor, enclosure and control valve). **Movement**: Sliding mesh, constant mesh, power shuttle, powershift gearboxes. Four-wheel drive drop-boxes, drive axles. Gear ratios, gear types, selector forks and interlocks, synchromesh hubs, dog clutches, Input shaft, layshaft, output shafts, wet clutches, epicyclic gear units, crown wheel & pinion, differential gears (plant & sun), propeller and drive shafts. drive chains, sprockets, belts, pulleys, suspension components (springs, accumulators, airbags, anti-roll bars, shackles, pins and bushes, solid bushes). **Power-transmission:** Friction clutches: drive plates (single and multiplate clutches), centrifugal, cone, friction materials, cover plates (diaphragm, coil spring), dog clutches, torque converters, friction and mechanical drive belts (Vee, multi-rib, toothed). **Heat:** Heat exchangers, coolers, cab air conditioning drive, magnetic clutch, compressor, evaporator, receiver-drier, condenser). **Light:** Light Emitting Diodes (LED), bulbs (wattage, voltage, fitting type), series and parallel circuits, overload protection, switches, relays, timers. **Flow:** Electrical systems for engine cold starting aids (heater plugs), Infrared heater (infrared tubes, holders, safety cut-outs, switches). Cab heaters (coolant supply system, controls, heater matrix), Pump: Impellers, volute, housing, mechanical seals, clack valves, hoses, strainers, diaphragms, bearing types, bushes, cylinder tubes.	**1**
K4.4	Identify the application *(context in which these are applied in practice)* of components used on relevant equipment including those that provide direction, retardation, movement, power-transmission, heat, light and flow.	**Direction:** Steering components used on: Rear and front axles (counterbalance industrial forklift, powered access lifts, backhoe loaders). Four-wheel steering (telescopic material handlers, backhoe loaders). Crab steer (telescopic material handlers, backhoe loaders). Tracked machine steering (excavators, dozers, tracked dumpers). **Retardation**: Mechanical brakes: trailers, bowsers, compressors and mobile plant parking brakes. Hydraulic system: Site dumpers, industrial counterbalance forklifts. Powered hydraulic brakes: Telescopic material handlers, backhoe loaders. Exhaust brake and Hydraulic retarder: spring brakes (tandem rollers, hydrostatic drive site dumpers), air brakes, articulated dump trucks and rigid dump trucks. **Movement**: Transmission components for: Mechanical transmissions (site dumpers), Torque convertors, Power-shuttle and Power-shift (Backhoe loaders, site dumpers, telescopic material handlers). Hydrostatic drive (Tandem rollers, site dumpers, industrial counterbalance forklifts). Track chain components (excavators, tracked dumpers, dozers), suspension. **Power-transmission**: Power transmission components for: Friction clutches and belts (Cut-off saws, compaction plates, engine auxiliary component drives). Toothed belts: (Engine timing, cement mixer drives). Chains: Engine timing. **Heat**: Components for: Cab heating and cooling systems, Engine cold starting aids, portable site heaters **Light**: Lamp and circuit components for: Light Emitting Diodes (LED) and Light bulbs (Panel warning lamps, working lamps, warning beacons, indicator lamps).	**2**

		Flow: Water Pump components: Engine cooling systems, Portable site pumps (clear water and sludge).	
K5.1	Identify types of fluids used in construction-based plant including a) oils/lubricants b) cooling/heating c) for power/work transmission	**Oils/lubricants:** Mono and multi-grade fluid viscosity, mineral and synthetic based engine oils. Fleet lubricants. **Cooling/heating:** OAT, IAT, HOAT Si-OAT engine coolants. R22 Freon, R410A Puron refrigerants. **Power/work transmission:** Mineral and synthetic gear oils, wet brake transmission oils, automatic transmission fluids, mineral and vegetable based hydraulic fluids, brake fluids, pneumatic oils	**1**
K5.2	Describe the appropriate application of fluids used in construction-based plant including a) oils/lubricants b) cooling/heating c) for power/work transmission	**Oils and lubricants:** Engines have specific lubrication requirements, correct grade and type of oil must be used (Mono and multi-grade viscosity, mineral and synthetic based engine oils). Fleet lubricants. **Cooling/heating:** Components are manufactured from different materials which can be damage by use of incorrect coolants: Green (Inorganic Additive Technology – IAT), Orange (Organic Acid Technology – OAT), Yellow (Hybrid Oat – HOAT) Turquoise Phosphate free HOAT), Pink or Blue (Phosphated P- HOAT), Purple Si- OAT, Silicated OAT). Air conditioning systems use: R22 Freon (Banned since2004 but still in older units), R410A Puron now used in air conditioning units **Power/work transmission:** Transmission axles, gearboxes, final drives etc all have specific lubrication requirements and the correct type of transmission lubricant must be used: Mineral and synthetic gear oils, wet transmission oils, automatic transmission fluids, mineral and vegetable based hydraulic fluids, brake fluids, pneumatic oils	**1**
K5.3	Explain the limitations of fluids used in construction-based plant including a) oils/lubricants b) cooling/heating c) for power/work transmission	**Oils and lubricants:** Over time engine oils will chemically breakdown due to heat exposure, loss of viscosity, fuel dilution, coolant contamination **Cooling/heating:** Coolant becomes more acid and will lose rust inhibition properties, this will create internal damage to cooling system components. Air conditioning unit permeate refrigerant. **Power/work transmission:** Overtime transmission oils chemically change due to pressure and heat created by gear teeth contact. Contamination from metal shavings due to component wear along with water ingress due to condensation, seal and breather leakage all reduce the oil's ability to lubricate and cool.	**1**
K6.1	Describe the **mechanical principles** that apply to construction-based plant that produce outcomes of work from an energy source.	Torque multiplication to increase transmission power. Small gear (Driver) driving large gear (Driven) Driver/Driven = Drive Ratio. Output torque increase but speed decrease. Lever lengths increase or decrease input required to move load. Reeving of crane block, winch snatch blocks to increase lifting/pulling capacity or adjust hoisting speed.	**1**
K6.2	Describe the **mechanical efforts** that apply to construction-based plant that produce outcomes of work from an energy source.	Simple and complex drive systems: chain sprockets, drive pulleys, gear trains to increase torque and alter speed. Leverage to balance and multiply force: Reeving of crane block, winch snatch blocks to increase lifting/ pulling capacity, increase/decrease hoist speed.	**1**
K7.1	Describe the aims of regulations and legislation that apply to the maintenance and repair of construction-based	**Health and Safety at Work Act 1974 (HASAWA):** Places duties on employers and employees to ensure the safety of workers and others at the premises where work activities are occurring. HASWA is the overarching H&S legislation and breaches of this legislation can lead to enforcement action or prosecutions by the Health and Safety Executive. (HSE). **Lifting Operations and Lifting Regulations 1998 (LOLER):** Supports HASAWA where lifting operations or lifting equipment is being used. Regulation is risked based, sets out the maximum periods between inspections for different groups of lifting	**2**

	equipment, typically including Health and Safety at Work Act, LOLER, COSHH, PUWER	equipment, the frequency of operation and environmental considerations should be taken into account and inspection period adjusted accordingly. **Control of Substances Hazardous to Health Regulation 2002 (COSHH):** Support the HASAWA where hazardous materials used in the workplace. Employers have to identify the hazards, develop risk assessments and produce safe system of work /method statements to protect employees and others in the workplace. COSHH sheets should detail how to use, store, dispose, emergency procedures, contact details and medical treatment information. **Provision and Use of Works Equipment Regulation 1998 (PUWER):** Supports HASAWA where equipment and machinery are used in the workplace. Employers must identify the hazards that equipment present, develop appropriate maintenance schedules, inspections and statutory testing where required. Employees operating the equipment must be trained, competent, have adequate information available for reference. **RIDDOR:** **Lone working regulations:**	
K7.2	Translate compliance requirements of regulations and legislation that apply to the maintenance and repair of construction-based equipment, typically including Health and Safety at Work Act, LOLER	**Health and Safety at Work Act 1974 (HASAWA):** Not to endanger self or others, cooperate with employer and follow company procedures and guidance, duty to report hazards. **Lifting Operations and Lifting Regulations 1998 (LOLER):** Lifting operations must be planned, lifting equipment and accessories must be maintained, inspected and periodically thoroughly examined. Operators must be trained, competent, have sufficient information available to operate the equipment safely. **RIDDOR**	**1**
K7.3	Translate compliance requirements of regulations and legislation that apply to the maintenance and repair of construction-based equipment, typically including COSHH, PUWER	Personal responsibilities of individuals in the workplace to comply with legislation. **Control of Substances Hazardous to Health Regulation 2002 (COSHH)**: Follow procedures, wear specified PPE, correctly store and returned to storage after use. Emergency procedures involving substance been used. **Provision and Use of Works Equipment Regulation 1998 (PUWER)**: Ensure equipment is suitable for intended purpose, in good working order, maintained, inspected and tested as required. Operators are trained and competent, have adequate information available to enable safe operation. **Lone working regulations:**	**1**
K10.1	Describe use of length/height, weight, area, volume for measuring and calculating.	To ensure: quality, monitoring, safety, making something fit (design or assembly) and problem solving. Calculation: Rectangle area = Length x Width. Cube volume = Length x Width x Height. Circle area = πr^2. Cylinder volume = πr^2 x height. Torque: Force = Weight x Length. Perimeter = Total length of all sides. Circle circumference = πd.	**1**
K10.2	Describe use of heat, pressure, electrical conductivity etc. for measuring and calculating.	**Heat:** Testing thermostats, thermostatic switches, digital and analogue sensor function. Identifying excessive friction, hot/cold running and circulation issues. Temperature control for component fitting, thermal cutting, material working and joining. **Pressure**: Hydraulic and pneumatic systems inspecting and testing. Force = Area x Pressure. Unit Bar. Pressure = Area/Force. Engine diagnostics: Compression and cylinder leakage testing Unit: Bar **Electrical**: Circuit continuity and resistance testing: Volts/Amps = Ohms. Circuit load calculation: Volts x Ohms = Amps. Circuit supply voltage testing: Amps x Ohms = Voltage	**1**
K10.3	Identify the units used with typical types of measuring	Flow gauges: Litre per minute, Pressure gauges: Bar, Thermometers: Celsius, Vernier calliper: 0.1mm, Micrometre, feeler gauges and Dial Test Indicator gauge :0.001mm. Voltmeters: AC & DC Volts. Ammeter: Amps. Ohmmeter and Insulation	**1**

	equipment.	Resistance Testers: Ohms. Capacitance Meter: Farads. Electrical load banks: Volts, amps and Hertz. Torque Wrenches: Newton Metres (Nm) Hydrometer: Battery Specific Gravity Tester (Relative density) Weight of electrolyte to water at 20^{o} c 1.280 = Fully Charged. Steering tracking gauges: Toe angle in degrees and minutes.	
K15.1	Identify tools and equipment relevant to tasks on construction-based equipment	Range of: hand tools, workshop equipment (including lifting equipment), measuring devices.	**1**
K15.2	Explain why tools and equipment need to be fit-for purpose, calibrated, checked before use, maintained, and stored correctly on completion of activities.	Reduce risks and hazards associated with workshop tools and equipment, calibration maintains accuracy, pre-use checks ensure equipment is safe to use, maintenance ensure efficiency and maximum working life, correct storage prevents equipment damage, compliance with legislation/regulation, verify performance data.	**1**
K16	Describe safety requirements for dealing with pressurised systems, hot/cold systems, stored energy and electrical/electronic systems.		
K16.1	*Pressurised (fluid & pneumatic) systems*	Support raised components with appropriate support struts and Safe Working Load (SWL), Release trapped residual pressure by operating controls, venting system. Take precaution to prevent fluid injection e.g., initially release pressure pipe nuts, pressure caps etc slowly and wear PPE to protect hands and face.	**1**
K16.2	*Mechanical systems*	Safe release and clamping/securing of: spring pressured, tortional, raised loads, inertia, compressed.	**1**
K16.3	*Hot & cold systems*	Allow hot system to sufficiently cool before commencing work. Allow cold system to sufficiently warm before commencing work, wear appropriate PPE, use correct tools.	**1**
K16.4	*Isolation/making safe of electrical systems and storage*	Isolate and lock out equipment from energy supply before commencing work activity. Discharging capacitors before commencing work or placing in storage, avoiding contact with capacitor terminals. Safety procedures when removing and replacing batteries. Ventilation requirements for battery storage and charging.	**1**
K17.1	Describe principles of material forming and shaping	Plastic deformation by applying a force greater than the materials yield strength: Bending, stretching, shaping by means of thermal application and cold methods including tools and equipment requirements. Preparation of the starting material, processing operation and post processing operation.	**1**
K17.2	Describe principles of material cutting	Hot cutting (plasma and gas cutting), Sawing (power and handsaws). Abrasive cut-off discs (angle grinders), shearing (guillotine, hand shears)	
K17.3	Describe principles of material joining and fitting	Joining steels, plastics, non-ferrous materials. Total fusion (Manual Metal Arc (MMA), Metal Inert Gas (MIG), Tungsten Inert Gas (TIG)) and surface fusion (soldering and brazing). Chemical joining: Adhesives (wet, contact, reactive, single component reactive, two-component reactive, hot-melt). Mechanical fastening (rivet, bolt, screw). Sealants and gasket materials.	
K22.1	Explain why additional training required for workplace activities including a) manufacturer's specific, manual handling, COSHH and other environmental	Potential to expand skills set, increase knowledge, generate new ideas and perspectives, contributes to workplace safety. Manual handling: Skills to safely undertake manual handling tasks, reduce risk of injury. COSHH: Safe use of substances, PPE requirements, emergency procedures, reduce the number of people who become unwell due to harmful substances. Environmental control training: Spill kits, mechanical ventilation systems, waste disposal to safeguards the environment.	**1**

	control requirements.		
K22.2	b) working safely courses such as IOSH, CITB, PTS and the requirements of CSCS-badged certification	The Institution of Occupational Safety and Health (IOSH) working safely training: Essential H&S in the workplace, people's responsibilities, knowledge of legislation and its practical application. Construction Industry Training Board (CITB): Supports construction related employers with financial grants, specialist courses, upskilling of construction employees, apprentices training support. Personal Track Safety (PTS): Safety guidance to rail track worker. CSCS cards requirements: mandatory H&S knowledge test certificate, appropriate qualification, types of cards (Red -Apprentice, Blue - Skilled worker, Gold – Advanced craftworker, Black - Manager), promoting a safer work environment. Contractor requirement for access to construction site.	
Total			**30**

Open Awards Policies

Current versions of the following Open Awards policies are accessible through the Secure Portal.

These policies include:

- End Point Assessment Pricing Policy
- Reasonable Adjustments and Special Considerations Policy
- Data Protection
- Enquiries and Appeals Policy
- Complaints Policy
- Malpractice and Maladministration Policy
- Equality and Diversity Policy
- Sanctions Policy
- Safeguarding Policy
- Conflict of Interest Policy
- Fair Access Policy

In addition, the current version of the following relevant document may be obtained by training providers, employers or apprentices by contacting Open Awards directly:

- Instructions for Conducting Controlled Assessment Remotely

Support

For information about Open Awards support offer, including information on our policies, quality assurance, re-sits, appeals, complaints and general enquiries, please see our website: **www.openawards.org.uk** or contact our customer service team on 0151 494 2072 or via email at **enquiries@openawards.org.uk**.

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