



ETCAL Level 2 Certificate in Rail Engineering (Technical
Knowledge)
603/5700/9

Assessment Guide

Assessment Principles

Introduction

ETA qualifications are developed in conjunction with the industries and employers they service. They are designed to add value and deliver multidimensional outputs that provide impact for both learners and employers.

It is therefore important that the assessment requirements of ETA qualifications are robust whilst not containing unnecessary and over-burdensome challenges that detract from the intended outcomes and impact.

Principles

There are four key principles to underpin assessment delivery:

1. Assessment should contribute to developing a learners' knowledge and/or skills and provide relevant and current development as the related industry requires.
2. Systems for capturing evidence of competence should be integrated and efficient. Assessment practices for both competence-based and knowledge-based aspects of qualifications should, where possible, be integrated with industry-driven standards and requirements.
3. Assessment methods must be appropriate for the level and nature of the qualification units to be assessed. Methods of assessing achievement against learning outcomes and assessment principles must be accommodating and flexible, whilst remaining appropriate for both the level being assessed and industry expectations of learners at that level.
4. Evidence of knowledge and understanding must be recorded and be clearly attributable to the learner. This can be delivered using task-based activity with questions and answer sessions, supported by assessor observation.

The choice and application of assessment methods must be consistent with these principles and will generally include:

- Direct Observation
- Written evidence (portfolio/workbook)
- Centre set assignment
- Centre set coursework
- Oral examination
- Professional/open discussion

Delivery Team Requirements

Tutors / Assessors

- Tutors / Assessors should have a detailed knowledge of, and be competent in, the occupational requirements of the units
- Tutors / Assessors should hold or be working towards the related professional qualifications for delivery and assessment as required
- This competence will have been acquired either in direct employment in the occupational role to which the unit relates, or in employment as a manager, supervisor or in-house trainer of employees carrying out the role
- It is unlikely that occupational competence will have been achieved in less than twelve months of employment, but individuals with less experience could be considered as assessors if sufficiently occupationally competent

Internal Quality Assurers (IQAs)

- IQAs must have a thorough understanding of the structure, content and occupational requirements of the units that they are internally quality assuring. This understanding will have been acquired while either working directly within or delivering within the relevant occupational area in either an operational or a support function
- The level of understanding must be sufficient to allow the IQA to judge whether the assessor has fully assessed learners against all the principles within the unit
- It is unlikely that a person could have gained this level of understanding in less than twelve months of being employed, but individuals with less experience could be considered as IQAs if they have the required level of experience, knowledge and understanding

Technical / Expert Witness

Expert witnesses can be drawn from a wide range of people who can observe, 'measure and examine performance against the industry and qualification principles. These can include line managers and experienced individuals within a related sector-based organisation. The Technical Expert Witnesses should have proven practical experience and knowledge relating to the content of the principles being assessed.

It is unlikely that someone could become an expert in their entire job role in less than twelve months of being employed in their industry. They could, however, very quickly become an expert in the content of a single unit if this was the focus of their job role. The assessor should make a judgement as to the level of expertise held by a potential Technical Expert Witness and, where necessary, this should be confirmed with the awarding organisation.

Assessment Materials

ETC Awards Ltd. (ETA) Assessment Materials are protected by copyright and are supplied only to Approved Centres for use solely for the purpose of the assessment of ETA learners.

Instructions for Conducting Assessment

the Approved Centre must either:

- Secure approval of in-house assessment material by ETA's External Quality Assurance team prior to use
- Use ETA Assessment Materials
- We recognise that reasonable adjustments may be considered at the time of assessment, please refer to the ETA Reasonable adjustments and considerations policy

All approved centres must then handle and store securely all Assessment Materials in accordance with the following:

- Assessment Material must be accessible to learners only during their programme
- The Approved Centre must not make public in any format the contents of any materials either in part or in full.
- Materials must be securely handled and under no circumstances shared with third party organisations or individuals
- The Approved Centre must seek permission from ETA through the External Quality Assurance team if they want to convert Material for alternative storage, retrieval and delivery in electronic formats.

Qualification aim

This qualification is aimed at operatives in the rail engineering industry who need to demonstrate their knowledge to enable progression within the industry or their workplace and careers. There may be learners who have limited prior experience in rail engineering but have the ability to achieve a level 2 qualification. Operatives who are working in a railway engineering track maintenance environment and would like to work towards a relevant Level 2 qualification, those who are new to railway engineering track maintenance but are looking for a career change and wish to develop new skills within the industry.

Qualification introduction

This qualification covers the competency requirements of the Level 2 Rail Engineering Knowledge and is made up of three mandatory units that will help learners to develop skills and capabilities relevant to the sector. It provides evidence of competence for job role such as a track operative and will help the learner to acquire the self-confidence and motivation to take advantage of the many opportunities for their progression and development within the industry.

Assessment

In order to achieve this qualification learners must complete three mandatory units.

The qualification is assessed by an assessor who validates the portfolio evidence and supports with assessor workplace observation and questioning. The assessor and the operative also agree an assessment plan of what will be done and when. The assessment criteria determine the standard required to achieve each unit and allow for a variety of assessment methods to be used as appropriate to the environment the qualification is delivered in. This qualification is not graded and is marked either pass or fail.

Progression

Upon completion of this qualification learners will have been provided with the self-confidence and motivation to take advantage of the many opportunities for progression and development within the industry, such as carrying out further training in the following areas; track renewals, track maintenance, traction and rolling stock, electrification construction, electrification maintenance and signal and telecommunications, progression into employment and by taking up a Rail Engineering Technician Operativeship.



Level 2 Unit – Working in the Rail Engineering Industry

Unit aim

This unit is aimed at learners who would like to develop health, safety, knowledge and skills that are relevant to a Rail Track Engineering Operative.

Unit introduction

This unit will help learners to undertake core learning across all areas and specialise in their discipline of choice. The main rail engineering areas covered within these qualifications are:

- track (including minor works)
- overhead line, electrification,
- signalling
- telecommunications and traction
- rolling stock

Assessment

To achieve this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit, through a variety of assessment methods appropriate to the delivery environment.

Unit Reference Number		T/618/0686
Qualification Framework		RQF
Title		Working in the Rail Engineering Industry
Unit Level		Level 2
Guided Learning Hours		90 GLH
Total Qualification Time		90 TQT
Unit Credit Value		9 Credits
Unit Grading Structure		Pass / Fail

	Learning Outcome		Assessment Criteria - The learner can	Criteria expansion
1	Understand rail engineering health and safety workplace requirements	1.1	Define the responsibilities of both employers and employees in terms of compliance with health and safety legislation in the workplace	
		1.2	Explain how health and safety is controlled within rail engineering organisations	Include legislation, regulation, specific rail industry procedures, individual organisational safety requirements
		1.3	Define the roles, responsibilities and powers of workplace health and safety personnel	
		1.4	Identify the different types of health and safety signs that are used in a rail engineering environment	Include the following colour coded convention (red, yellow, green, blue), engineering workshop, rail specific signage
		1.5	Outline how safety is maintained when accessing a rail engineering workplace	Can include possessions, authorisation, controlled access and egress, movement of resources, personnel certification, SSOW, PPE, drugs and alcohol testing

		1.6	Describe the human and environmental conditions that can lead to accidents in the workplace	Examples of night working, extreme weather conditions, worksite location (urban/countryside)
		1.7	Define the difference between a hazard and a risk	
		1.8	Explain how risk assessments are carried out and the individual roles in identifying and reporting risks	Risk assessment: Identification of hazards, Identification of risk mitigation factors,
		1.9	Explain what is meant by a 'dangerous occurrence' in the workplace	
		1.10	Outline the methods and procedures used to make an identified hazardous area safe	
		1.11	Describe the role of first aid personnel, equipment and treatment facilities in the workplace	Role of first aiders: performing emergency first aid, assess the situation, Recording and reporting the relevant information; accident report form
		1.12	List the types of fire and the methods of prevention used to control them	Classes of fire: Fire hazards: Fire extinguisher types
2	Know effective means of workplace communications	2.1	Give examples of the methods of communication used in the rail engineering workplace	Examples for the following oral, IT, ICT, written (posters signs etc)
		2.2	List the sources of engineering information relevant to rail engineering activities	To include the following drawings, circuit diagrams, NR standards, safe systems of work (SSOW), work instructions
		2.3	Explain the need to understand and adhere to corporate policies on ethics, equality and diversity	legal requirements within the Equality Act 2010

		2.4	Describe the roles and responsibilities of the departments and personnel within a rail engineering organisation	Identify the function of each department, relationships between departments, personnel within departments and how they relate to other company personnel
		2.5	Outline the approach to be taken when seeking advice or guidance in the workplace	Must include being respectful of others, ensuring you are following company procedures
3	Understand how to contribute to work activities in the rail engineering environment	3.1	Explain how to work effectively within an engineering workplace displaying the conduct/behaviors expected	Must be in line with company expectations, policies and procedures
		3.2	Explain the importance of time management in meeting project/work deadlines	To include work planning, meeting deadlines, following company policies and procedures
		3.3	Describe the importance of innovation and continuous improvement when applied to rail engineering	Procedures for suggesting new solutions for existing, working more efficiently, included plan, do, check, and action
		3.4	Outline how to deal with and how to avoid conflict situations	How to avoid conflict situations, following reasonable requests from supervisors, offering help when colleagues are in need of assistance
		3.5	Describe how to function effectively within a workplace team	Teamwork value of individuals contribution, define the meaning of the term 'team' importance of effective communication within the team
		3.6	Explain how quality assurance and quality management are used to ensure rail engineering workplace outputs are fit for purpose and meet customer expectations	Include the following: fitness for purpose, meeting customer expectations, quality control, ensure quality control takes place, stages of application of quality

4	Know how the UK rail sector works commercially	4.1	Outline how the UK rail system works commercially in relation to the railway infrastructure	Covering the role of regulation/regulators, financially (including funding, franchising, sustainability) and the role of train and freight operating companies (TOCs and FOCs) contractually (including SLA's, implications)
		4.2	Explain the role of the customer in the rail industry	Include meeting customer expectations, end to end journey, Service Level Agreements, contractual obligations to the customer, and contingency planning to avoid disruption to the customer.
5	Understand the responsibility for health and safety in the rail workplace	5.1	Outline knowledge that is focused on the employer, describing the responsibilities for health and safety within the organisation	Include description of the responsibilities of employers, employees, how health and safety is controlled in the workplace, the roles, responsibilities, powers of health and safety personnel within the rail workplace.
6	Know how to ensure a safe workplace	6.1	Outline in report form how the safety is maintained in the workplace; the, in the rail engineering workplace.	Procedures for accessing a rail engineering workplace, the safety signs used, types of fire (class) and the various methods used to control them, first aid personnel, working conditions, following company procedures.
7	Demonstrate completion of a Risk assessment of the working environment	7.1	Produce a detailed risk assessment to include how the safety is maintained in the rail engineering workplace;	Procedures for accessing a rail engineering workplace, the safety signs used, types of fire (class) and the various methods used to control them, first aid personnel, working conditions, following company procedures.
8	Understand the communication and information sources in the workplace	8.1	State examples of the methods of communication used in the rail engineering workplace.	List the sources of information relevant to rail engineering, the sources of information must include those specific to rail engineering, correct approach to be taken when seeking advice or

				guidance on engineering or safety information in the workplace.
9	Understanding your organisation	9.1	Produce detailed annotated organogram that clearly describes the structure of a rail engineering company, the departments, the roles and responsibilities of the staff roles within them.	To include the importance of each member of staff adhering to and not adhering to ethics, equality and diversity.
10	Know the importance of an effective workplace	10.1	Produce a report that describes the importance of workplace behaviours and how they have an effect on an effective workplace.	<p>Include a statement on how innovation and continuous improvement are important to working effectively how the individual can make a contribution to both in their day to day work.</p> <p>Include how to function effectively within a workplace team, how to deal with and avoid conflict situations at work, how timekeeping is important in ensuring work/project deadlines can be adhered to.</p>
11	Understanding how to identify different aspects of rail and how these underpin meeting customer expectations	11.1	Produce a detailed statement that describes the difference in quality assurance and quality management.	Must include how both are applied in the rail engineering workplace, ensuring work outputs are fit for purpose and meet customer expectations.
12	Understand the UK commercial rail system		Produce a detailed account that explains how the UK rail system works commercially; ownership of the infrastructure	Must include how customer expectations are met, how it is funded/franchised by both infrastructure and train owning companies (TOCs) in providing an end to end service that is reliable and cost effective, how the infrastructure is maintained/renewed and how contracts are awarded to contactors and managed by contractors.



Level 2 Unit – Rail Engineering Principles

Unit aim

This unit introduces and guides learners to develop a knowledge and understanding of engineering materials and their properties so that they can select appropriate materials for different engineering applications. Learners will also develop their understanding of how to apply analytical methods to mathematical and science applications.

Unit introduction

This unit will help learners identify materials for common rail engineering applications, understand the properties of engineering materials used in rail engineering, physical, mechanical and electrical properties of materials, the application of analytical methods to rail engineering mathematical, electrical science.

Assessment

To achieve this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit through a variety of assessment methods appropriate to the delivery environment.

Unit Reference Number		A/618/0687
Qualification Framework		RQF
Title		Rail Engineering Principles
Unit Level		Level 2
Guided Learning Hours		90 GLH
Total Qualification Time		90 TQT
Unit Credit Value		9 Credits
Unit Grading Structure Pass		Pass / Fail

	Learning Outcome		Assessment Criteria - The learner can	Criteria expansion
1	Know the requirements of materials used in rail engineering	1.1	List materials for common rail engineering applications	To include metals, non-metallic, substances, gaseous
		1.2	List the forms of supply of materials used in rail engineering activities	To include metals, non-metallic, substances, gaseous
		1.3	Describe the physical, mechanical and electrical properties of rail engineering materials	Differentiate between rail engineering materials Physical properties, Mechanical Modifying properties,
2	Know how to use analytical methods to solve mathematical engineering functions	2.1	Calculate the area of basic shapes	Regular shapes e.g. squares, rectangles, triangles, circles
		2.2	Calculate the surface area of compound shapes	L-shapes, parallelograms, squares, rectangles, triangles, circles
		2.3	Calculate the surface area of regular shape solids	For example, regular solid bodies e.g. right rectangular prisms, cylinders, cones, spheres
		2.4	Calculate the volume of regular shapes	regular solid bodies e.g. right rectangular prisms, cylinders, cones, spheres
		2.5	Use Pythagoras' theorem to solve right angled triangle problems	The definition and application and how used in solving problems

		2.6	Interpret straight line graphs using given data	Determining gradient, intercept eg for $V=IR$ plot V against I for constant value of R , for $V = U+ AT$, plot V against T for constant value of A
		2.7	Apply multiple prefix and suffix symbols appropriately	Include 10^{-3} (multiple) has the prefix milli and uses the symbol m , 10^{-3} (multiple) has the prefix kilo and used the symbol k ; use examples such as mm , kg , ns (nanoseconds)
3	Understand how to apply analytical methods to rail engineering electrical science applications	3.1	Describe the basic theory of electricity	Basic theory of electricity (electron flow, amperage, voltage, resistance)
		3.2	Perform simple calculations using the basics of electricity	calculations convert millilitres to litres, convert obits/second to gigabits/second, convert nanoseconds to seconds
		3.3	Use Ohms law to calculate resistors in series and parallel circuits	Simple electrical circuit problems: Ohm's law $V = IR$; formulae for resistors in series and parallel
		3.4	Identify lines of flux within magnetic fields	Magnets and coils
		3.5	Outline the relationship between conductors, current, magnetic fields and relative movement	
		3.6	Describe both AC and DC currents and the advantages and disadvantages of both when applied in a rail application	Must identify rail applications and the advantages and disadvantages of both
		3.7	State the principles used to determine simple electrical circuit problems	



Level 2 Unit – Rail Engineering Practices

Unit aim

This unit introduces and guides learners to identify and use safe and effective working practices within the related working environment and develop the skill to interpret related drawings and specifications to make informed decisions.

Unit introduction

This unit will help learners to develop an understanding of the process and delivery of applications to secure opportunities. They will understand the personal qualities that are valued by employers and contribute towards securing and progressing their career within the industry.

Assessment

The qualification is assessed by an assessor who validates the portfolio evidence and supports with assessor workplace observation and questioning. The assessor and the operative also agree an assessment plan of what will be done and when. The assessment criteria determine the standard required to achieve each unit and allow for a variety of assessment methods to be used as appropriate to the environment the qualification is delivered in. This qualification is not graded and is marked either pass or fail.

Unit Reference Number		F/618/0688
Qualification Framework		RQF
Title		Rail Engineering Practices
Unit Level		Level 2
Guided Learning Hours		90 GLH
Total Qualification Time		90 TQT
Unit Credit Value		9 Credits
Unit Grading Structure Pass		Pass / Fail

	Learning Outcome		Assessment Criteria - The learner can	Criteria expansion
1	Understand safe and effective working practices in rail engineering	1.1	Identify the general rules for safe working practices in a rail engineering maintenance, construction or renewals environment	Include: correct PPE, maintaining good housekeeping warning signs, Communication procedures system isolation procedures for power and pressure sources, permit-to work procedures, preparing the work area,
		1.2	State the hazards associated with rail engineering maintenance, construction or renewals activities	To include the use of tools, equipment, hazardous substances, electricity, working at height.
		1.3	Describe the procedures for cleaning work areas following a spillage or leakage	To include approved waste disposal methods, absorbent substances, use of detergents and solvents
		1.4	Identify the range of personal protective equipment required to work in a rail engineering environment	Must cover class 1 or 2 high visibility clothing, safety boots, helmet, safety glasses, gloves
2	Understand drawing and specifications	2.1	Outline the purpose of the engineering drawings and specifications used in rail engineering	To include standards, quality assurance, safety, work planning (resource, materials etc) checking and inspection of completed work
		2.2	Interpret engineering drawings or specifications using current rail engineering standards	Examples drawings, charts, tables, manufacturer's instructions, service manuals, drawings (orthographic, isometric, exploded views), technical specifications
		2.3	Ensure correct revision / issue of drawing or specifications is being used	

		2.4	Identify the technical information contained within drawings or specifications	
3	Know how to select working methods, tools and equipment for a routine maintenance activity	3.1	Plan for a maintenance, construction or renewals activity	To include tools and equipment requirements, materials and replacement parts, importance of minimising downtime to avoid waste, site conditions, component location, provision of services (electricity, water, drainage), method statements
		3.2	List appropriate tools and equipment to carry out a planned maintenance, construction or renewals activity	Correct selection of tools and equipment relevant to the task.
		3.3	Identify for use safety equipment to support safety whilst working	
		3.4	Explain how you might demonstrate safe manual handling techniques	To include two of the following, correct technique, seek assistance, use correct PPE, use lifting aids, team lifting, assess the area, test lift
		3.5	Describe the safe lifting and moving of materials, components and equipment	Lifting equipment (with records) relevant to the task, Safe manual handling relevant to the moving of materials resources, fixtures and fittings.
		3.6	Describe the types of and correct methods for using maintenance, construction or renewals tools and equipment	
		3.7	Explain why tools and equipment are calibrated and how the calibration is controlled in terms of ensuring compliance	
		3.8	Identify the correct type of fasteners used in rail engineering activities	The correct identification of the fixtures, fittings, materials fasteners for rail engineering activities.
		3.9	Explain sequential tightening and why it is applied	Must state that it prevents warping and damage to component being tightened
		3.10	State the function of a torque wrench and how it is applied to tightening fasteners	

4	Understand how to carry out a routine maintenance activity	4.1	Describe the correct handling, storage of tools, materials and equipment	Must include at least three from tools, test equipment, materials, consumables, plant, communications equipment
		4.2	Explain dismantling techniques when working on a rail engineering component	To include proof marking, a range of rail engineering related parts, and materials.
		4.3	Explain engineering measurements and alignment using suitable equipment	
		4.4	Describe tolerances in terms of limits of size	
		4.5	Outline fault finding techniques that can be used to support engineering activities	To include a minimum of two techniques such as evaluation using sensory information (sight, sound, smell, touch), diagnostic techniques, fault location techniques, diagnostic aids
		4.6	Explain 'life determined' items in line with manufacturers data ensuring the asset is not contaminated during the replacement	Identify correct procedure, materials, parts, fixtures and fittings for the related task.
		4.7	State reassembly techniques when working on a rail engineering asset	To include the correct procedure, selection of equipment, parts, materials PPE
		4.8	Identify types of function tests or inspection on completed work	
		4.9	Explain how to leave the work area after rail engineering activities including the identification and disposal or reuse of waste	To include how to leave the work area free of unused consumables, cleaning the work area, putting tools and equipment into safe storage, identifying and recording finished work
		4.10	Explain the importance of completing documentation following maintenance activities.	