City & Guilds Level 2 Diploma in Rail Engineering Operative Competence (6499-02)

March 2021 Version 1.4

Qualification Handbook

Qualification at a glance

Subject area	Railway
City & Guilds number	6499
Age group approved	16-19, 19+
Entry requirements	None
Assessment types	Portfolio
Grading	Pass/fail
Approvals	Fast track approval
Registration and certification	Consult the Walled Garden/Online Catalogue for last dates

Title and level	TQT	City & Guilds qualification number	Ofqual accreditation number
City & Guilds Level 2 Diploma in Rail Engineering Operative Competence (Track)	370	6499-02	603/1170/8
City & Guilds Level 2 Diploma in Rail Engineering Operative Competence (Overhead Line Equipment)	360	6499-02	603/1170/8
City & Guilds Level 2 Diploma in Rail Engineering Operative Competence (Signaling)	380	6499-02	603/1170/8
City & Guilds Level 2 Diploma in Rail Engineering Operative Competence (Telecoms)	380	6499-02	603/1170/8
City & Guilds Level 2 Diploma in Rail Engineering Operative Competence (Electrification)	380	6499-02	603/1170/8
City & Guilds Level 2 Diploma in Rail Engineering Operative Competence (Traction & Rolling Stock)	370	6499-02	603/1170/8

Version and date	Change detail	Section
1.4 March 2021	Title GLH/TQT table RoC for Electrification pathway Clarifications made to units 208-241, 301-302 and 503	All
1.3 September 2017	Added GLH details	TQT table
1.2 August 2017	Level for unit 301 amended	Units

Contents

1 Qualification at a glance-Assessment

To gain this qualification, candidates must successfully achieve the following assessments:

- a portfolio of evidence for unit.

2 Introduction

This document tells you what you need to do to deliver the qualification:

Area	Description
Who is the qualification for?	These qualifications are aimed at learners aged 16 and above who would like to prove that they are able to work competently at the standard expected for Rail Engineering Operatives. These qualifications are part of new Apprenticeship standards. A learner could also take this qualification as a standalone option if they are self-employed as a contractor or on short term contracts that do not support an Apprenticeship. This would help an individual fit learning in with their own work and home circumstances and the opportunity to prove their competence.
What does the qualification cover?	The railways are a key part of the UK's transport infrastructure for commuting, leisure and business travel, as well as freight services. Rail Engineers are responsible for the safe construction, installation, maintenance and renewal of the railways to provide a safe and reliable railway for customers. Therefore, it is indispensable that rail engineers are able to prove their competence at the level expected by the industry. These qualifications provide evidence of competence for job roles such as: Track Operative, Overhead Line Operative, Electrification Operative, Traction & Rolling Stock Operative, Signaling Operative, Telecoms Operative.
What opportunities for progression are there?	Upon completion of these qualifications 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 by taking up a Rail Engineering Technician Apprenticeship. •Improve their leadership and management skills by taking

Area	Description
	higher level qualifications through the Institute of Leadership and Management (ILM).
Who did we develop the qualification with?	These qualification have been developed in collaboration with the Rail Engineering trailblazer group which is led by organisations from the industry including: Transport for London, Network Rail, Alstom Transport Services, Amey, Babcock, Carillion, DB Schenker Rail UK, DEG Signaling, First Group, Hitachi Europe, HS2, MGB Engineering, National Express (c2c Ltd), Siemens, Signaling Solutions, Southwest Trains, Telent Technology Services Ltd, VolkerRail, National Skills Academy for Rail, Eurostar, Merseyrail and Virgin East Coast.
Is it part of an apprenticeship framework or initiative?	These qualifications have been developed as part of the new Apprenticeships for Rail Engineering Operatives which will replace the following SASE frameworks, at Level 2: • Rail Infrastructure Engineering • Rail Engineering Overhead Line Construction • Rail Traction and Rolling Stock Engineering.

City & Guilds Level 2 Diploma in Rail Engineering Operative Competence (Track)

City & Guilds unit number	Unit title	GLH
Learners must achieve units (301, 302, 503, 204-207) to complete this pathway.		

L2 Track Mandatory

204	Restore rail switches and crossings to operational condition	50
205	Restore track geometry faults to operational condition by the manual repair of permanent way assets and components	30
206	Restore plain line track geometry to operational condition	50
207	Undertake replacement of permanent way assets and components	40
302	Using and communicating technical information	50
301	Complying with statutory regulations and organisational safety requirements in the rail industry	100
503	Working efficiently and effectively as a rail engineering operative	50

City & Guilds Level 2 Diploma in Rail Engineering Operative Competence (Overhead Line Equipment)

City & Guilds unit number	Unit title	GLH

Learners must achieve units (301, 302, 503, 208) plus 3 units from (209 to 213).

QHB ROC L2 OLE Mandatory

302	Using and communicating technical information	50
301	Complying with statutory regulations and organisational safety requirements in the rail industry	100
503	Working efficiently and effectively as a rail engineering operative	50
208	Access overhead line equipment construction sites	40

QHB ROC L2 OLE Optional

209	Undertake overhead line equipment main steelwork installation under direction	40
210	Undertake overhead line equipment small part steelwork installation under direction	40
211	Undertake overhead line equipment wiring installation under direction	40
212	Undertake installation of overhead line equipment sectioning, insulation, registration and in-span components under direction	40
213	Undertake installation, enhancement and renewal of overhead line equipment earthing and bonding under direction	50

City & Guilds Level 2 Diploma in Rail Engineering Operative Competence (Signaling)

City & Guilds unit number	Unit title	GLH

Learners must achieve units (301, 302, 503, 214, 217, 221, 222) plus at least 1 from (215, 216) and at least one from (218 to 220).

QHB ROC L2 Signaling Mandatory

302	Using and communicating technical information	50
301	Complying with statutory regulations and organisational safety requirements in the rail industry	100
503	Working efficiently and effectively as a rail engineering operative	50
214	Determine requirements for the safe access to work locations for signal engineering	30
217	Reinstate the work area after signal engineering activities	30
221	Assist in the removal of Signaling equipment	30
222	Assist in the replacement of Signaling equipment	30

QHB ROC L2 Signaling Optional

215	Establish information for signal engineering installation	30
216	Establish information for signal engineering maintenance and/or fault finding	30

QHB ROC L2 Signaling Optional

220	Assist in the planned maintenance of Signaling equipment	30
219	Assist in the installation of Signaling equipment	30
218	Assist with establishing compliance with specifications for Signaling equipment	30

City & Guilds Level 2 Diploma in Rail Engineering Operative Competence (Telecoms)

City & Guilds unit number	Unit title	GLH

Learners must achieve units (301, 302, 503, 223, 226, 230, 231) plus at least one from (224-225) and at least one from (227-229).

QHB RoC L2 Telecommunications Mandatory

223	Determine requirements for the safe access to work locations for telecoms engineering	30
226	Reinstate the work area after telecoms engineering activities	30
230	Assist in the removal of telecoms equipment	30
231	Assist in the replacement of telecoms equipment	30
302	Using and communicating technical information	50
301	Complying with statutory regulations and organisational safety requirements in the rail industry	100
503	Working efficiently and effectively as a rail engineering operative	50

QHB RoC L2 Telecommunications Optional

224	Establish information for telecoms engineering installation	30
225	Establish information for telecoms engineering maintenance and/or fault finding	30

QHB RoC L2 Telecommunications Optional

227	Assist in the tests and checks of telecoms equipment	30
228	Assist in the installation of telecoms equipment	30
229	Assist in the planned maintenance of telecoms equipment	30

City & Guilds Level 2 Diploma in Rail Engineering Operative Competence (Electrification)

City & Guilds unit number	Unit title	GLH
Learners must achieve units (301, 302, 503, 232-236) to complete this pathway.		
QHB RoC L2 Electrification Mandatory		
301	Complying with statutory regulations and organisational safety requirements in the rail industry	100
302	Using and communicating technical information	50
503	Working efficiently and effectively as a rail engineering operative	50
232	Plan railway electrification activities	30
233	Assist with maintenance on railway electrification equipment and components	40
234	Assist in preparing resources for railway electrification engineering activities	30
235	Assist in preventative and corrective maintenance of traction cabling systems	40
236	Establish the operational condition of electrification and plant assets	40

City & Guilds Level 2 Diploma in Rail Engineering Operative Competence (Traction & Rolling Stock)

City & Guilds unit number	Unit title	GLH

Learners must achieve units (301, 302, 503, 237) plus at least 2 from (238-241)

QHB RoC L2 TRS Mandatory

302	Using and communicating technical information	50
301	Complying with statutory regulations and organisational safety requirements in the rail industry	100
503	Working efficiently and effectively as a rail engineering operative	50
237	Assist in the installation of traction and rolling stock equipment	50

QHB RoC L2 TRS Optional

238	Carry out scheduled maintenance on traction and rolling stock mechanical equipment	60
239	Carry out scheduled maintenance on traction and rolling stock electrical equipment	60
240	Carry out scheduled maintenance on traction and rolling stock communication-electronic equipment	60
241	Carry out scheduled maintenance on traction and rolling stock fluid power equipment	60

Total qualification time (TQT)

Total Qualification Time (TQT) is the total amount of time, in hours, expected to be spent by a Learner to achieve a qualification. It includes both guided learning hours (which are listed separately) and hours spent in preparation, study and assessment.

Title and level	Size (GLH)	TQT
City & Guilds Level 2 Diploma in Rail Engineering Operative Competence (Track)	370	370
City & Guilds Level 2 Diploma in Rail Engineering Operative Competence (Overhead Line Equipment)	360	360
City & Guilds Level 2 Diploma in Rail Engineering Operative Competence (Signaling)	380	380
City & Guilds Level 2 Diploma in Rail Engineering Operative Competence (Telecoms)	380	380
City & Guilds City & Guilds Level 2 Diploma in Rail Engineering Operative Competence (Electrification)	380	380
City & Guilds Level 2 Diploma in Rail Engineering Operative Competence (Traction & Rolling Stock)	370	370

3 Centre requirements

Approval

If your Centre is approved to offer the qualification City & Guilds Level 2 Certificate/Diploma in Rail Engineering (7597-03, -05, -06, -12, -13, -52) or the City & Guilds Level 3 Diploma in Rail Engineering Technician (Competence) (6499-03), then you can apply for the new City & Guilds Level 2 Diploma in Rail Engineering Operative (Competence) (6499-02) approval using the fast track approval form, available from the City & Guilds website. Please see the Fast Track form for further details.

Centres should use the fast track form if:

- there have been no changes to the way the qualifications are delivered, and
- they meet all of the approval criteria in the fast track form guidance notes.

Fast track approval is available for 12 months from the launch of the qualification. After 12 months, the Centre will have to go through the standard Qualification Approval Process. The centre is responsible for checking that fast track approval is still current at the time of application.

To offer these qualifications, new centres will need to gain both centre and qualification approval. Please refer to the Centre Manual - for further information.

Centre staff should familiarise themselves with the structure, content and assessment requirements of the qualifications before designing a course programme.

Resource requirements

Resources

Centres can use specifically designated areas within a centre to assess, for example, the installation of specialised electrical equipment, alignment and setting up of electric motors and driven devices (pumps, compressors, generators) or areas of track. The equipment, systems and machinery must meet industrial standards and be capable of being used under normal working conditions, for example electric motors must have a method of applying sufficient power and not be connected up to show movement.

Centre staffing

Staff delivering these qualifications must be able to demonstrate that they meet the following occupational expertise requirements. They should:

- be occupationally competent or technically knowledgeable in the area[s] for which they are delivering training and/or have experience of providing training. This knowledge must be to the same level as the training being delivered
- have recent relevant experience in the specific area they will be assessing
- have credible experience of providing training.

See also page 18 for details from the assessment strategy on the role of supervisors and managers in the assessment process.

Centre staff may undertake more than one role, eg tutor and assessor or internal verifier, but cannot internally verify their own assessments.

Learner entry requirements

City & Guilds does not set entry requirements for these qualifications. However, centres must ensure that candidates have the potential and opportunity to gain the qualifications successfully.

Age restrictions

City & Guilds cannot accept any registrations for learners under 16 as these qualifications are not approved for learners under 16.

Access to assessment and special consideration

Learners can have access to all forms of equipment and software that constitute their normal way of working, provided that these do not affect the reliability or validity of assessment outcomes or give the learner an assessment advantage over other learners undertaking the same or similar assessments. For more information on how to apply for access arrangements please refer to **How and when to apply for access arrangements and special consideration (cityandguilds.com)**

4 Delivering the qualification

Initial assessment and induction

An initial assessment of each candidate should be made before the start of their programme to identify:

- if the candidate has any specific training needs
- support and guidance they may need when working towards their qualifications
- any units they have already completed, or credit they have accumulated which is relevant to the qualifications
- the appropriate type and level of qualification.

We recommend that centres provide an induction programme so the candidate fully understands the requirements of the qualifications, their responsibilities as a learner, and the responsibilities of the centre. This information can be recorded on a learning contract.

Recording documents

Candidates and centres may decide to use a paper-based or electronic method of recording evidence.

City & Guilds endorses several ePortfolio systems, including our own, Learning Assistant, an easy-to-use and secure online tool to support and evidence learners' progress towards achieving qualifications. Further details are available at: www.cityandguilds.com/eportfolios.

City & Guilds has developed a set of *Recording forms* including examples of completed forms, for new and existing centres to use as appropriate. Recording forms are available on the City & Guilds website.

Although new centres are expected to use these forms, centres may devise or customise alternative forms, which must be approved for use by the external verifier, before they are used by candidates and assessors at the centre. Amendable (MS Word) versions of the forms are available on the City & Guilds website.

5 Assessment

Summary of assessment methods

Candidates must complete a portfolio of evidence for each unit.

- Although all of the content and assessment requirements must be met in full employers can tailor the training outcomes to ensure that the content of the programme is specific to their requirements in terms of products, processes, procedures, tools, equipment, materials, documentation and information systems.

This will allow each organisation to develop their own specific and tailored apprentice training programme whilst meeting their own business requirements whilst at the same time ensuring that the overall generic content is to a high standard in terms of depth and breadth to enable progression and/or transferability to other employers.

Assessment strategy

Access to assessment
There are no entry requirements required for the Units of Competence unless this is a legal requirement of the process or the environment in which the Apprentice is working in. Assessment is open to any Apprentice who has the potential to reach the assessment requirements set out in the relevant units.

Aids or appliances, which are designed to alleviate disability, may be used during assessment, providing they do not compromise the standard required.

Carrying out assessments
The Units of Competence have been specifically developed to cover a wide range of activities. The evidence produced for the units will, therefore, depend on the skills and knowledge required by employer and specified in the Apprentice's Training Plan. The Skills section of the Units of Competence makes reference to a number of optional items listed (for example 'any three from five'). This is the minimum standard set by employers.

Where the unit requirements gives a choice of optional areas, Assessors should note that Apprentices do not need to provide evidence of the other areas to complete the unit, unless specified by the employer particularly where these additional items may relate to other activities or methods that are not part of the Apprentice's normal workplace activities or required by the employer.

Performance evidence requirements

Performance evidence must be the main form of evidence gathered. In order to demonstrate consistent competent performance for a unit, a minimum of three different examples of performance of the unit activity will be required. Items of performance evidence often contain features that apply to more than one unit, and can be used as evidence in any unit where they are suitable.

Performance evidence must be:

- products of the Apprentice's work, such as items that have been produced or worked on, plans, charts, reports, standard operating procedures, documents produced as part of a work activity, records or photographs of the completed activity

together with:

- evidence of the way the Apprentice carried out the activities, such as witness testimonies, assessor observations or authenticated Apprentice reports of the activity undertaken.

Competent performance is more than just carrying out a series of individual set tasks. Many of the units in the Development Phase contain statements that require the Apprentice to provide evidence that proves they are capable of combining various features and techniques. Where this is the case, separate fragments of evidence would not provide this combination of features and techniques and, therefore, will not be acceptable as demonstrating competent performance.
If there is any doubt as to what constitutes suitable evidence the Internal/External Quality Assurer should be consulted.

Assessing knowledge and understanding requirements
Knowledge and understanding are key components of competent performance, but it is unlikely that performance evidence alone will provide enough evidence in this area. Where the Apprentice's knowledge and understanding is not apparent from performance evidence, it must be assessed by other means and be supported by suitable evidence.

Knowledge and understanding can be demonstrated in a number of different ways. It is recommended that oral questioning and practical demonstrations are used perhaps whilst observing the apprentice undertake specific tasks, as these are considered the most appropriate for these units. Assessors should ask enough questions to make sure that the Apprentice has an appropriate level of knowledge and understanding, as required by the unit.

Evidence of knowledge and understanding will **not** be required for those items in the skills section of the Units of Competence that have not been selected by the employer.

Where oral questioning is used the assessor must retain a record of the questions asked, together with the Apprentice's answers.

Witness testimony
Where observation is used to obtain performance evidence, this must be carried out against the unit assessment criteria. Best practice would require that such observation is carried out by a qualified assessor. If this is not practicable, then alternative sources of evidence may be used.

For example, the observation may be carried out against the assessment criteria by someone else that is in close contact with the Apprentice. This could be a team leader, supervisor, mentor or line manager who may be regarded as a suitable witness to the Apprentice's competency. However, the witness must be technically competent in the process or skills that they are providing testimony for, to at least the same level of expertise as that required of the Apprentice. It will be the responsibility of the assessor to make sure that any witness testimonies accepted as evidence of the Apprentice's competency are reliable, auditable and technically valid.

Maximising opportunities to use assessment evidence
One of the critical factors required in order to make this Assessment Strategy as efficient and effective as possible and to ease the burden of assessment, is the Assessor's ability and expertise to work in partnership with the apprentice and their employer to provide advice and guidance on how to maximise opportunities to cross reference performance and knowledge evidence to all relevant Units of Competence. For example if a knowledge statement is repeated in a number of separate Units of Competence and the expected evidence/response to that statement is the same including the context, then the same piece of evidence should be cross referenced to the appropriate units.

Recognition of prior learning (RPL)

Recognition of prior learning means using a person's previous experience, or qualifications which have already been achieved, to contribute to a new qualification.

For this qualification, RPL is allowed and is not sector specific.

http://www.cityandguilds.com/delivering-our-qualifications/centre-development/centre-document-library/policies-and-procedures/quality-assurance-documents

Unit 204 Restore rail switches and crossings to operational condition

Unit level:	Level 2
GLH:	50
Unit aim:	The purpose of this unit is for learners to demonstrate occupational competency in restoring rail switches and crossings to operational condition

Learning outcome

The learner will:

1 Be able to restore rail switches and crossings to operational condition

Assessment criteria

The learner can:

1.1 Set up a safe system of work in line with organisational procedures and work to the system

1.2 Source and interpret the relevant specifications

1.3 Prepare the worksite for repair

1.4 Carry out the repairs within agreed timescales using approved materials and components, methods and procedures

1.5 Ensure that the repaired asset meets the specified operating conditions

1.6 Produce accurate and complete records of all repair work carried out

Learning outcome

The learner will:

2 Know how to restore rail switches and crossings to operational condition

Assessment criteria

The learner can:

2.1 List the organisation's procedures that define the appropriate safe system of work for the activity

2.2 Describe how to source and interpret engineering specifications as approved by own organisation

2.3 Describe the methods, techniques and procedures for worksite repair as approved by own organisation including those that are both temporary and permanent

2.4 Describe how incorrectly repaired switches and crossings can affect the safety and performance of the permanent way

2.5 Describe own organisation's procedures for the care and control of mechanised equipment, including calibration requirements

2.6 Describe own organisation's procedures for recording maintenance activities, including both paper based and computer based

2.7 Describe own organisation's methods and techniques for ensuring that repaired assets meet the specified operational conditions

2.8 Describe the importance of carrying out repair activities in the specified sequence and agreed timescale

2.9 Describe the relevant reporting lines and procedures as approved by own organisation

2.10 Describe the likely impact of the activity on the operations of other departments and the impact of their work on the activity

2.11 Explain the limits of own authority and responsibility and those of others involved

Unit 204 Restore rail switches and crossings to operational condition

Supporting Information

Unit guidance

The learner must be able to mark out and carry out repairs on all types of track including those with steel, concrete and wood bearers. Dimensional clearances must be taken into account at all times. The nature of the repairs using manual equipment may include as appropriate:

- Top
- Alignment
- Cross level
- Track gauge

The type of assets to be repaired will be:

- Switches and crossing

The quality standards and accuracy to be achieved will be approved by the learner's organisation and the manufacturer and must include restoring components to within operational tolerances.

When assessing the unit the following points should be covered as appropriate:

Assessment criterion 2.1

The organisation's safety management system
Relevant sections of the health and safety at work act
Control of substances hazardous to health (COSHH)
Track access restrictions
Track work instructions
Task risk control sheets
Current rule book
Regulations for working under overhead line equipment (OHLE) and in vicinity of direct current (DC) lines
Manual handling regulations
Reporting of injuries, diseases and dangerous occurrences regulations (RIDDOR)
Safety sign regulations
Personal protective equipment (PPE)
Health and safety at work act (HASWA)

Unit 205 Restore track geometry faults to operational condition by the manual repair of permanent way assets and components

Unit level:	Level 2
GLH:	30
Unit aim:	The purpose of this unit is for learners to demonstrate occupational competency in restoring track geometry to operational condition by the manual repair of Permanent Way assets and components

Learning outcome

The learner will:

1 Be able to restore track geometry faults to operational condition by the manual repair of permanent way assets and components

Assessment criteria

The learner can:

1.1 Set up a safe system of work in line with organisational procedures and work to the system

1.2 Identify the asset to be restored

1.3 Follow the relevant specifications for the track to be repaired

1.4 Prepare the track for repair

1.5 Carry out the repairs within agreed timescale using approved materials and components, methods and procedures

1.6 Ensure that the repaired track meets the specified operating conditions

1.7 Produce accurate and complete records of all repair work carried out in line with organisational procedures

Learning outcome

The learner will:

2 Know how to restore track geometry faults to operational condition by the manual repair of permanent way assets and components

Assessment criteria

The learner can:

2.1 List the organisation's procedures that define the appropriate safe system of work for the activity

2.2 Describe how to access and follow the related engineering specifications as approved by own organisation for the components concerned

2.3 Describe the methods and techniques for track repair including those that are temporary and permanent

2.4 Describe own organisation's procedures for the use, care and control of tools and equipment including calibration

2.5 Describe how incorrectly repaired track can affect the safety and performance of the permanent way

2.6 Describe the maintenance recording and documentation procedures for track as approved by own organisation, including paper based records, computer based records

2.7 Describe the relevant reporting lines and procedures as approved by own organisation

2.8 Describe the likely impact of the work on the operations of other departments and the impact of their work on the activity

2.9 Explain the limits of own authority and responsibility and those of others involved in the activity

Unit 205 Restore track geometry faults to operational condition by the manual repair of permanent way assets and components

Supporting Information

Unit guidance

The learner will be expected to work to within their organisation's approved procedures and specifications and will be responsible for the quality of their work within the limits of their responsibility. The type of asset to be repaired will be on plain line. The learner will be able to deal with basic manual track repairs as defined by the organisations standards and procedures
The complexity of repairs to be carried out will be influenced by geometrical tolerances and clearances. This will involve measuring using tapes and gauges. The repairs may include, as appropriate:

- Manual lifting and packing
- Restoring gauge
- Restoring alignment
- Fitting packings

The quality standards and accuracy to be achieved will be as approved by the learners organisation and the manufacturer and must include restoring components to within operational tolerances.

When assessing the unit the following points should be covered as appropriate:

Assessment criterion 2.1

The organisation's safety management system
Relevant sections of the health and safety at work act
Control of substances hazardous to health (COSHH)
Track access restrictions
Track work instructions
Task risk control sheets
Current rule book
Regulations for working under overhead line equipment (OHLE) and in vicinity of direct current (DC) lines
Manual handling regulations
Reporting of injuries, diseases and dangerous occurrences regulations (RIDDOR)
Safety sign regulations
Personal protective equipment (PPE)
Health and safety at work act (HASWA)

Unit 206 Restore plain line track geometry to operational condition

Unit level:	Level 2
GLH:	50
Unit aim:	The purpose of this unit is for learners to demonstrate occupational competency in restoring plain line track geometry to operational condition

Learning outcome

The learner will:

1 Be able to restore plain line track geometry to operational condition

Assessment criteria

The learner can:

1.1 Set up a safe system of work in line with organisational procedures and work to the system

1.2 Source and interpret the relevant specifications

1.3 Prepare the worksite for repair

1.4 Carry out the repairs within agreed timescales using approved materials and components, methods and procedures

1.5 Ensure that the repaired asset meets the specified operating conditions

1.6 Produce accurate and complete records of all repair work carried out

Learning outcome

The learner will:

2 Know how to restore plain line track geometry to operational condition

Assessment criteria

The learner can:

2.1 List the organisation's procedures that define the appropriate safe system of work for the activity

2.2 Describe how to source and interpret engineering specifications as approved by own organisation

2.3 Describe the methods, techniques and procedures for worksite repair as approved by own organisation including those that are both temporary and permanent

2.4 Describe how incorrectly repaired plain line can affect the safety and performance of the permanent way

2.5 Describe own organisation's procedures for the care and control of mechanised equipment, including calibration requirements

2.6 Describe own organisation's procedures for recording maintenance activities, including both paper based and computer based

2.7 Describe own organisation's methods and techniques for ensuring that repaired assets meet the specified operational conditions

2.8 Describe the importance of carrying out repair activities in the specified sequence and agreed timescale

2.9 Describe the relevant reporting lines and procedures as approved by own organisation

2.10 Describe the likely impact of the activity on the operations of other departments and the impact of their work on the activity

2.11 Explain the limits of own authority and responsibility and those of others involved

Unit 206 Restore plain line track geometry to operational condition

Supporting Information

Unit guidance

The learner must be able to mark out and carry out repairs on all types of track including those with steel, concrete and wood bearers. Dimensional clearances must be taken into account at all times. The nature of the repairs using manual equipment may include as appropriate:
Top
Alignment
Cross level
Track gauge

The type of assets to be repaired will be:
Plain line
The quality standards and accuracy to be achieved will be approved by the learner's organisation and the manufacturer and must include restoring components to within operational tolerances.

When assessing the unit the following points should be covered as appropriate:

Assessment criterion 2.1
The organisation's safety management system
Relevant sections of the health and safety at work act
Control of substances hazardous to health (COSHH)
Track access restrictions
Track work instructions
Task risk control sheets
Current rule book
Regulations for working under overhead line equipment (OHLE) and in vicinity of direct current (DC) lines
Manual handling regulations
Reporting of injuries, diseases and dangerous occurrences regulations (RIDDOR)
Safety sign regulations
Personal protective equipment (PPE)
Health and safety at work act (HASWA)

Unit 207 Undertake replacement of permanent way assets and components

Unit level:	Level 2
GLH:	40
Unit aim:	The purpose of this unit is for learners to demonstrate occupational competency in undertaking replacement of Permanent Way assets and components

Learning outcome

The learner will:

1 Be able to undertake replacement of permanent way assets and components

Assessment criteria

The learner can:

1.1 Set up a safe system of work for the activity in line with organisational procedures and work to the system

1.2 Follow the appropriate engineering diagrams and related specifications for the components/asset being replaced

1.3 Obtain all the required components and ensure that they are in a suitable condition for replacement and fit for purpose

1.4 Ensure that any replacement components used meet the required specification

1.5 Prevent damage to components, tools and equipment during replacement

1.6 Replace the components in the correct sequence using appropriate tools and techniques

1.7 Make necessary settings or adjustments to the components to ensure they will function correctly

1.8 Deal promptly with problems within own control and report those that cannot be resolved

1.9 Maintain documentation in line with own organisation's procedures

Learning outcome

The learner will:

2 Know how to undertake replacement of permanent way assets and components

Assessment criteria

The learner can:

2.1 List the relevant health and safety legislation, regulations and safe working practices appropriate to the activity and organisation

2.2 Describe how to follow engineering diagrams and related specifications as approved by own organisation

2.3 Describe the methods and techniques for component and asset replacement appropriate to own role

2.4 Describe the methods and techniques for ensuring that components meet the required specification

2.5 Explain how defects in components can affect the performance of the permanent way assets

2.6 Describe the methods and techniques for handling equipment including:

- 2.6a manual handling
- 2.6b mechanical handling
- 2.6c use of small tools
- 2.6d equipment handling

2.7 Describe the organisation's procedures for the use, care and control of tools and equipment including calibration

2.8 Describe the organisation's approved relevant reporting lines and procedures

2.9 Describe the impact of the activity on other departments and the impact of their actions on the activity

2.10 Explain the limits of own authority and responsibility and those of others involved

Unit 207 Undertake replacement of permanent way assets and components

Supporting Information

Unit guidance

The type of asset to be worked on will be either plain line or switches and crossings equipment and associated fastenings. The type of components to be replaced in respect of either plain line or switches and crossings, including as appropriate:
Ballast (wet beds)
Rails
Sleeper/bearers
Drains
Fastenings
Insulations
Chairs and base plates
Fish-plated joints
Welded joints (preparatory work)
Lubricators
The assembly methods and techniques to be used will either be manual and mechanical methods and may include the use of small plant and equipment. The complexity of the assembly operations will be influenced by:
Track configuration
Using variable/diverse sources of information
Track stability
Environmental procedures

When assessing the unit the following points should be covered as appropriate:
Assessment criterion 2.1
The organisation's safety management system
Relevant sections of the health and safety at work act
Control of substances hazardous to health (COSHH)
Track access restrictions
Track work instructions
Task risk control sheets
Current rule book
Regulations for working under overhead line equipment (OHLE) and in vicinity of direct current (DC) lines
Manual handling regulations
Reporting of injuries, diseases and dangerous occurrences regulations (RIDDOR)
Safety sign regulations
Personal protective equipment (PPE)
Health and safety at work act (HASWA)

Unit 208 Access overhead line equipment construction sites

Unit level:	Level 2
GLH:	40

Learning outcome

The learner will:

1 Be able to access overhead line equipment construction sites

Assessment criteria

The learner can:

1.1 Work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines

1.2 Identify the requirements for site briefings to include the following:

- 1.2a safety arrangements
- 1.2b nature of work
- 1.2c hazards associated with the site
- 1.2d extent of safe working limits
- 1.2e emergency arrangements
- 1.2f welfare arrangements
- 1.2g PPE requirements
- 1.2h whom they will need to report to while on site
- 1.2i limits of personal responsibility

1.3 Adhere to and follow site access requirements for receiving safety briefings and personal safety

1.4 Identify the types of documentation that apply to access requirements including:

- 1.4a signing in and off site register
- 1.4b site briefing attendance
- 1.4c site access authorisation card
- 1.4d personal track safety certificate
- 1.4e track visitor permit

1.5 Follow instructions in line with safe access procedure

1.6 Adhere to site requirements for personal protective equipment (PPE) including:

- 1.6a safety helmets
- 1.6b approved high visibility clothing

1.6c approved safely footwear

1.6d gloves

1.6e goggles

1.6f ear protection

1.6g safety harnesses

1.7 Follow directions from competent personnel

1.8 Identify the hazards and risks related to the following:

1.8a electrified lines

1.8b radial loaded and tensioned lines

1.8c limited clearances

1.8d moving machinery (such as road rail vehicles (RRV's)

1.8e working at height

1.8f lifting and moving equipment

1.8g overloaded plant and equipment

Learning outcome

The learner will:

2 Know how to access overhead line equipment construction sites

Assessment criteria

The learner can:

2.1 Describe the specific safety requirements surrounding construction site access, and how the safety requirements can differ at each site of work, regarding:

2.1a moving machinery

2.1b working plant and equipment

2.1c electrified lines

2.1d hazards associated with OLE systems

2.1e awareness of working at height

2.2 List the technical terminology associated with construction sites and who it applies to the safe access to the site

2.3 Describe the documentation associated with access to OLE construction sites

2.4 Describe the requirements for signing in and off site

2.5 Describe the purpose of the briefing by the site access controller before gaining access

2.6 Describe the procedures to be followed, to ensure operational and personal safety is maintained during the work

2.7 Describe the procedures to be followed for visitors to the construction site

2.8 Describe how to avoid personal injury while working

2.9 Describe how the construction activity may affect the safe operation of the railway

2.10 State how the OLE is designed to function under normal operating conditions

2.11 List the component parts and state how they contribute to the overall operation of the OLE system

2.12 List what terminology and methods are used to identify OLE and describe operational status of the equipment

2.13 State the recording, reporting lines and escalation procedures

2.14 Describe the industry protocols relating to communication of safety information

2.15 Describe what the limits of their own responsibility/authority are and whom they should report to if they have a problem they cannot resolve

Unit 209 Undertake overhead line equipment main steelwork installation under direction

Unit level:	Level 2
GLH:	40

Learning outcome

The learner will:

1 Be able to undertake overhead line equipment main steelwork installation under direction

Assessment criteria

The learner can:

1.1 Work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines

1.2 Carry out all of the following activities during the installation:

- 1.2a adhere to safety briefing instructions, risk assessments, COSHH, safe system of work and other relevant safety standards
- 1.2b obtain authority before carrying out the installation activities and follow the directions given
- 1.2c leave the work area in a safe condition

1.3 Select and use correctly six of the following types of personal protection equipment:

- 1.3a safety harnesses
- 1.3b safely helmets
- 1.3c approved high visibility clothing
- 1.3d approved safety footwear
- 1.3e gloves
- 1.3f goggles
- 1.3g ear protection (as appropriate)
- 1.3h other specific equipment

1.4 Undertake activities within the limits of own authority, following recording, reporting and escalation procedures

1.5 Follow the relevant renewal, installation or enhancement documentation for the main steelwork to be renewed or installed as directed

1.6 Undertake all of the following installation activities under direction:

- 1.6a use of lifting equipment
- 1.6b positioning and fastening of steelwork

1.6c adjustments to level, rake and alignment

1.7 Install or renew the one of the following types of main steelwork under direction:

1.7a cantilever masts

1.7b twin track cantilevers

1.7c head span masts

1.7d portals 'A' frames

1.8 Carry out the installation activities within agreed timescales using approved materials and components and method and procedures and under direction

1.9 Apply installation methods and techniques under direction, to include five of the following:

1.9a hole and fixing preparation

1.9b shimming and packing (as applicable)

1.9c positioning equipment

1.9d securing using mechanical fixings

1.9e levelling and aligning equipment

1.9f torque loading

1.9g applying locking devices (as applicable)

1.10 Carry out checks appropriate to the type of steelwork being installed under direction, to include all of the following:

1.10a assist with checking that the installed steelwork complies with the installation specification

1.10b making visual checks for completeness and freedom from damage

1.11 Complete activities under direction of competent personnel and using correct tools and equipment as specified within the limits of own authority

1.12 Assist with the production of accurate records of work undertaken

1.13 Follow relevant recording and reporting procedures to include one of the following:

1.13a installation record

1.13b hand over document

1.13c other specific recording document

Learning outcome

The learner will:

2 Know how to undertake overhead line equipment main steelwork installation under direction

Assessment criteria

The learner can:

2.1 Describe what health and safety legislation, regulations and safe working practices and procedures apply including:

2.1a current Rule Book

2.1b working on or about 25kV AC electrified lines

2.1c Health and Safety at Work Act

2.1d control measures

2.1e Provision and Use of Work Equipment Regulations (PUWER)

2.1f Lifting Operations and Lifting Equipment Regulations (LOLER)

2.2 Describe the industry protocols relating to communication of important safety information

2.3 Describe the procedures to be followed, to ensure operational and personal safety, is maintained during the work

2.4 Describe the system of work associated with safe access and the procedures associated with working under isolated conditions of the OLE

2.5 Describe how to avoid personal injury during the work

2.6 Describe the hazards associated with working with rail and road/rail machinery

2.7 Describe the personal protective equipment (PPE) needed for the activities to be undertaken

2.8 Describe the general electrical hazards associated with working on and around overhead line equipment

2.9 Describe the hazards associated with erecting structural steel components (such as lifting and handling long and heavy components, working at height) and how the risks can be minimised

2.10 Describe the correct methods of moving, lifting, handling and supporting heavy structural steel sections

2.11 State the purpose of engineering specifications associated with OLE equipment (such as overhead line specifications, work/task instructions, inspection/test plan)

2.12 State the purpose for the different types of design drawings used in OLE steelwork installation (such as layouts and cross section diagrams)

2.13 State how the OLE is designed to function under normal operating conditions

2.14 State what each of the OLE component parts contribute to the overall operation of the system

2.15 State what terminology and methods are used to identify OLE steelwork and to describe the operational status of the steelwork

2.16 Describe the tools, plant and equipment used in the installation process and how to use them safely

2.17 Describe the torque loading requirements of the fasteners and what to do if these loadings are exceeded or not achieved

2.18 Describe the types of tools and instruments used to position, secure and align the steelwork including: podgers, spanners, wrenches, sockets, torque wrenches, levels, alignment and laser devices

2.19 Describe the equipment operating, care and control procedures applicable to OLE equipment

2.20 Describe the techniques used to position, align, level and adjust the main steelwork

2.21 State the inspection and testing procedures needed to be completed prior to hand back

2.22 State what authorisation procedures are and the limits of their responsibility and authority

2.23 State the reporting documentation and control procedures and reporting lines and escalation procedures

Unit 210 Undertake overhead line equipment small part steelwork installation under direction

Unit level:	Level 2
GLH:	40

Learning outcome

The learner will:

1 Be able to undertake overhead line equipment small part steelwork installation under direction

Assessment criteria

The learner can:

1.1 Work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines

1.2 Carry out all of the following activities during the installation:

- 1.2a adhere to safety briefing instructions, risk assessments, COSHH, safe system of work and other relevant safety standards
- 1.2b obtain authority before carrying out the installation activities and follow the directions given
- 1.2c leave the work area in a safe condition

1.3 Select and use correctly six of the following types of personal protection equipment:

- 1.3a safety harnesses
- 1.3b safely helmets
- 1.3c approved high visibility clothing
- 1.3d approved safety footwear
- 1.3e gloves
- 1.3f goggles
- 1.3g ear protection (as appropriate)
- 1.3h other specific equipment

1.4 Undertake activities within the limits of own authority, following recording, reporting and escalation procedures

1.5 Follow the relevant renewal, installation or enhancement documentation for the small part steelwork to be renewed or installed as directed

1.6 Undertake all of the following installation activities under direction:

- 1.6a use of lifting equipment (as appropriate)

1.6b positioning and fastening of small part steelwork

1.6c adjustments to position, level and alignment

1.7 Install or renew small part steelwork components on different types of structures including one of the following under direction:

1.7a twin track cantilevers

1.7b head spans

1.7c portals

1.7d bridge/tunnel

1.7e rigid contact systems

1.7f 'A' frames

1.8 Carry out the installation activities under direction within agreed timescale using approved materials and components, methods and procedures

1.9 Apply installation methods and techniques under direction, to include six of the following:

1.9a mounting/locating area preparation

1.9b shimming and packing (as applicable)

1.9c positioning equipment

1.9d securing using mechanical fixings

1.9e position, levelling and aligning equipment

1.9f torque loading

1.9g applying locking devices

1.10 Carry out checks under direction on the small part steelwork being installed, to include all of the following:

1.10a assist with checking that the installed small part steelwork complies with the installation specification

1.10b making visual checks for completeness and freedom from damage

1.10c checking locking devices

1.11 Use correct tools and equipment as specified within the limits of authority

1.12 Assist with the production of accurate records of work undertaken

1.13 Follow relevant recording and reporting procedures to include one of the following:

1.13a installation record

1.13b hand over document

1.13c other specific recording document

Learning outcome

The learner will:

2 Know how to undertake overhead line equipment small part steelwork installation under direction

Assessment criteria

The learner can:

2.1 Describe which health and safety legislation, regulations and safe working practices and procedures apply to the installation including:

- 2.1a current Rule Book,
- 2.1b Working on or about 25kV AC electrified lines
- 2.1c Health and Safety at Work Act,
- 2.1d control measures
- 2.1e Provision and Use of Work Equipment Regulations (PUWER)
- 2.1f Lifting Operations and Lifting Equipment Regulations (LOLER)

2.2 Describe industry protocols relating to communication of important safety information

2.3 Describe what procedures need to be followed, to confirm operational and personal safety, is maintained during the work

2.4 Describe the system of work associated with safe access and the procedures associated with working under isolated conditions of the OLE

2.5 Describe how to avoid personal injury during the work

2.6 Describe working with rail and road/rail machinery and their associated hazards

2.7 Describe the personal protective equipment (PPE) needed for the activities to be undertaken

2.8 Describe the general electrical hazards associated with working on and around overhead line equipment

2.9 Describe the hazards associated with erecting small part steelwork including:

- 2.9a lifting and handling long and heavy components
- 2.9b working at height

2.10 Describe the correct methods of moving, lifting, handling and supporting heavy steel assemblies

2.11 State the purpose of engineering specifications associated with OLE equipment overhead line specifications, work/task instructions, inspection/test plan

2.12 State the purpose for the different types of design drawings used in OLE steelwork installation (such as layouts and cross section diagrams and OLE system design range (such as OLEMI))

2.13 State how the OLE is designed to function under normal operating conditions

2.14 State how each of the OLE component parts contribute to the overall operation of the system

2.15 Describe the storage and handling precautions to be taken to protect easily damaged components

2.16 State the terminology and methods used to identify OLE small part steelwork and to describe the operational status of the steelwork

2.17 Describe the tools, plant and equipment used in the installation process and how to use them safely

2.18 Describe the torque loading requirements of the fasteners and what to do if these loadings are exceeded or not achieved

2.19 Describe the types of tools and instruments used to position, secure and align the steelwork including:

- 2.19a podgers
- 2.19b spanners

2.19c wrenches

2.19d sockets

2.19e torque wrenches

2.19f levels

2.19g alignment and laser devices

2.20 Describe the methods of securing the small part steelwork components safely

2.21 Describe the equipment operating and care and control procedures applicable to OLE equipment

2.22 Describe the techniques used to position, align, level and adjust the small part steelwork

2.23 State the inspection and testing procedures needed to be completed prior to hand back

2.24 Outline the authorisation procedures required and the limits of own responsibility and authority

2.25 Identify the reporting documentation, control procedures, reporting lines and escalation procedures

Unit 211 Undertake overhead line equipment wiring installation under direction

Unit level:	Level 2
GLH:	40

Learning outcome

The learner will:

1 Be able to undertake overhead line equipment wiring installation under direction

Assessment criteria

The learner can:

1.1 Work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines

1.2 Carry out all of the following activities during the installation:

- 1.2a adhere to safety briefing instructions, risk assessments, COSHH, safe system of work and other relevant safety standards
- 1.2b obtain authority before carrying out the installation activities and follow the directions given
- 1.2c leave the work area in a safe condition

1.3 Select and use correctly six of the following types of personal protection equipment:

- 1.3a safety harnesses
- 1.3b safely helmets
- 1.3c approved high visibility clothing
- 1.3d approved safety footwear
- 1.3e gloves
- 1.3f goggles
- 1.3g ear protection (as appropriate)

1.4 Undertake activities within the limits of own authority, following recording, reporting and escalation procedures

1.5 Follow the relevant renewal, installation or enhancement documentation for the wiring and components to be renewed or installed as directed

1.6 Carry out three of the following wiring installation activities under direction:

- 1.6a recovery of wire
- 1.6b running out wire
- 1.6c splicing of conductors

1.6d wire termination

1.6e wire tensioning

1.7 Install or renew one of the following types of wiring under direction:

1.7a catenary wire

1.7b auxiliary wire (as appropriate)

1.7c contact wire

1.7d contenary wire

1.7e auto transformers feeder

1.7f return conductors

1.7g earth wire

1.8 Install or renew one of the following wiring components under direction:

1.8a droppers

1.8b jumpers

1.9 Use specialist plant and equipment including all of the following under direction:

1.9a drum carriers

1.9b winches

1.9c tensioners

1.10 Carry out the installation activities under direction within agreed timescale using approved materials, components, methods and procedures and

1.11 Carry out checks on the wiring being installed under direction, to include all of the following:

1.11a assist with checking that the installed wiring complies with the installation specification

1.11b making visual checks for completeness and freedom from damage

1.12 Complete activities under direction of qualified personnel and using correct tools and equipment as specified within the limits of own authority

1.13 Assist with the production of accurate records of work undertaken

1.14 Follow relevant recording and reporting procedures to include one of the following:

1.14a installation record

1.14b hand over document

1.14c other specific recording document

Learning outcome

The learner will:

2 Know how to undertake overhead line equipment wiring installation under direction

Assessment criteria

The learner can:

2.1 Describe what which health and safety legislation, regulations and safe working practices and procedures apply to the installation including:

2.1a current Rule Book,

2.1b Working on or about 25kV AC electrified lines,

2.1c Health and Safety at Work Act,

2.1d control measures,

2.1e Provision and Use of Work Equipment Regulations (PUWER)

2.1f Lifting Operations and Lifting Equipment Regulations (LOLER)

2.2 Describe industry protocols relating to communication of important safety information

2.3 Describe what procedures need to be followed, to confirm operational and personal safety, is maintained during the work

2.4 Describe the system of work associated with safe access and the procedures associated with working under isolated conditions of the OLE

2.5 Describe how to avoid personal injury during the work

2.6 Describe working with rail and road/rail machinery and their associated hazards

2.7 Describe the personal protective equipment (PPE) needed for the activities to be undertaken

2.8 Describe the general electrical hazards associated with working on and around overhead line equipment

2.9 Describe the hazards associated with wiring activities including:

2.9a lifting and handling wire drums

2.9b working at height

2.9c tensioning wires

2.9d radial load and how the risks can be minimised

2.10 Describe the correct methods of moving, lifting, handling, straightening and supporting wires and associated components

2.11 State the purpose of engineering specifications associated with OLE equipment (such as overhead line specifications, work/task instructions, inspection/test plan, height/stagger sheet, dropper schedules)

2.12 State the purpose for the different types of design drawings used in OLE wire installation (such as layouts and cross section diagrams and OLE system design range (such as OLEMI))

2.13 State how the OLE is designed to function under normal operating conditions

2.14 State how each of the OLE component parts contribute to the overall operation of the system

2.15 Describe the range of cables used in wiring installation

2.16 State the terminology and methods used to identify OLE wiring and its operational status

2.17 Describe the tools, plant and equipment used in the wiring installation process and how to use them safely

2.18 Describe the torque loading requirements of the components or connectors and what to do if these loadings are exceeded or not achieved

2.19 Describe the methods of securing the wiring components safely

2.20 Describe the types of tools and instruments used to position, secure, terminate and tension the wiring (such as torque wrenches, winches, tensioners, tension gauges/meters)

2.21 Describe the equipment operating and care and control procedures applicable to OLE equipment

2.22 Describe the techniques used to run out, terminate and tension the wiring

2.23 State the inspection and testing procedures needed to be completed prior to hand back

2.24 Outline the authorisation procedures and the limits of own responsibility and authority

2.25 Identify the reporting of documentation and control procedures, reporting lines and escalation procedures

Unit 212 Undertake installation of overhead line equipment sectioning, insulation, registration and in-span components under direction

Unit level:	Level 2
GLH:	40

Learning outcome

The learner will:

1 Be able to undertake installation of overhead line equipment sectioning, insulation, registration and in-span components under direction

Assessment criteria

The learner can:

1.1 Work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines

1.2 Carry out all of the following activities during the installation:

- 1.2a adhere to safety briefing instructions, risk assessments, COSHH, safe system of work and other relevant safety standards
- 1.2b obtain authority before carrying out the installation activities and follow the directions given
- 1.2c leave the work area in a safe condition

1.3 Select and use correctly six of the following types of personal protection equipment:

- 1.3a safety harness
- 1.3b safety helmets
- 1.3c approved high visibility clothing
- 1.3d approved safety footwear
- 1.3e gloves
- 1.3f goggles
- 1.3g ear protection

1.4 Undertake activities within the limits of own authority, following recording, reporting and escalation procedures

1.5 Follow the relevant documentation for the overhead line components to be renewed or installed and adjusted as directed

1.6 Install or renew one of the following overhead line equipment components under direction:

- 1.6a section insulators

1.6b neutral sections

And one of the following:

1.6c cross contact assemblies

1.6d droppers and jumpers

And one of the following:

1.6e overlaps

1.6f switches and isolators

1.6g booster/auxiliary transformers

1.6h cross track feeders

1.7 Adjust the registration and installed components for all of the following under direction:

1.7a stagger

1.7b height

1.7c tension (as appropriate)

1.8 Carry out under direction the installation and adjustment activities within agreed timescale using approved materials, components, methods and procedures

1.9 Carry out under direction checks on the components being installed and adjusted, to include all of the following:

1.9a assist with checking that the installed and adjusted components comply with the installation specification

1.9b making visual checks for completeness and freedom from damage

1.10 Complete activities under direction of qualified personnel and using correct tools and equipment as specified within the limits of own authority

1.11 Assist with the production of accurate records of work undertaken

1.12 Follow relevant recording and reporting procedures to include one of the following:

1.12a installation record

1.12b hand over document

1.12c other specific recording document

Learning outcome

The learner will:

2 Know how to undertake installation of overhead line equipment sectioning, insulation, registration and in-span components under direction

Assessment criteria

The learner can:

2.1 Describe what health and safety legislation, regulations and safe working practices and procedures apply including:

2.1a current Rule Book

2.1b Working on or about 25kV AC electrified lines

2.1c Health and Safety at Work Act

2.1d control measures,

2.1e Provision and Use of Work Equipment Regulations (PUWER)

2.1f Lifting Operations and Lifting Equipment Regulations (LOLER)

2.2 Describe industry protocols relating to communication of important safety information

2.3 Describe what procedures need to be followed, to confirm operational and personal safety, is maintained during the work

2.4 Describe the system of work associated with safe access and the procedures associated with working under isolated conditions of the OLE

2.5 Describe how to avoid personal injury during the work

2.6 Describe working with rail and road/rail machinery and their associated hazards

2.7 Describe the personal protective equipment (PPE) needed for the activities to be undertaken

2.8 Describe the general electrical hazards associated with working on and around overhead line equipment

2.9 Describe the hazards associated with installation and registration adjustment activities including:

2.9a lifting components

2.9b working at height

2.9c tensioned wires

2.9d radial loads

2.10 Describe the correct methods of moving, lifting, handling and supporting wires and associated components

2.11 State the purpose of engineering specifications associated with OLE equipment (such as overhead line specifications, work/task instructions, inspection/test plan, height/stagger sheet)

2.12 State the purpose for the different types of design drawings used in OLE wire installation (such as layouts and cross section diagrams and OLE system design range (such as OLEMI)

2.13 State how the OLE is designed to function under normal operating conditions

2.14 State how each of the installed component parts contribute to the overall operation of the system

2.15 State the purpose of contact wire registration, neutral sections and section insulation of the contact wire

2.16 Describe the storage and handling precautions to be taken to protect easily damaged components (such as insulators and section insulators)

2.17 State the terminology and methods used to identify OLE components and their operational status

2.18 Describe the tools, plant and equipment used in the installation and registration adjustment process and how to use them safely

2.19 Describe the torque loading requirements of the components or connectors and what to do if these loadings are exceeded or not achieved

2.20 Describe the methods of securing the installed components and connectors safely

2.21 Describe the types of tools and equipment used to position, adjust, secure, installed components and tension the wiring (such as torque wrenches, winches, clamps/wedges, tensioners, tension gauges/meters and jumpers for earth continuity)

2.22 Describe the equipment operating, care and control procedures applicable to OLE equipment

2.23 State the inspection and testing procedures needed to be completed prior to hand back

2.24 Outline the authorisation procedures and the limits of own responsibility and authority

2.25 Identify the reporting documentation and control procedures, reporting lines and escalation procedures

Unit 213 Undertake installation, enhancement and renewal of overhead line equipment earthing and bonding under direction

Unit level:	Level 2
GLH:	40

Learning outcome

The learner will:

1 Be able to undertake installation, enhancement and renewal of overhead line equipment earthing and bonding under direction

Assessment criteria

The learner can:

1.1 Work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines

1.2 Carry out all of the following activities during the installation:

- 1.2a adhere to safety briefing instructions, risk assessments, COSHH, safe system of work and other relevant safety standards
- 1.2b obtain authority before carrying out the installation activities and follow the directions given
- 1.2c leave the work area in a safe condition

1.3 Select and use correctly six of the following types of personal protection equipment:

- 1.3a safety harnesses
- 1.3b safely helmets
- 1.3c approved high visibility clothing
- 1.3d approved safety footwear
- 1.3e gloves
- 1.3f goggles
- 1.3g ear protection (as appropriate)

1.4 Undertake activities within the limits of own authority, following recording, reporting and escalation procedures

1.5 Follow the relevant renewal, installation or enhancement documentation for the earthing and bonding components to be renewed or installed as directed

1.6 Carry out earthing and bonding activities including all of the following under direction:

- 1.6a cutting required length of bond

1.6b termination of bond connections

1.6c installation of bonds in the correct sequence

1.6d correct use of tools and equipment

1.6e assist with electrical continuity testing (as appropriate)

1.6f removal of temporary bonding (as appropriate)

1.7 Install or renew one of the following types of bonding systems under direction:

1.7a Miles Royston (Glenair)

1.7b Cembre

1.8 Carry out under direction the installation activities within agreed timescale using approved materials, components, methods and procedures

1.9 Carry out under direction checks on the earthing and bonding being installed, to include all of the following:

1.9a assist with checking that the installed bonds comply with the installation specification

1.9b making visual checks for completeness and freedom from damage

1.10 Complete activities under direction of qualified personnel and using correct tools and equipment as specified within the limits of own authority

1.11 Assist with the production of accurate records of work undertaken

1.12 Follow relevant recording and reporting procedures to include one of the following:

1.12a installation record

1.12b hand over document

1.12c other specific recording document

Learning outcome

The learner will:

2 Know how to undertake installation, enhancement and renewal of overhead line equipment earthing and bonding under direction

Assessment criteria

The learner can:

2.1 Describe what health and safety legislation, regulations and safe working practices and procedures apply including:

2.1a current Rule Book

2.1b Working on or about 25kV AC electrified lines

2.1c Health and Safety at Work Act

2.1d control measures

2.1e Provision and Use of Work Equipment Regulations (PUWER)

2.1f Lifting Operations and Lifting Equipment Regulations (LOLER)

2.2 Describe industry protocols relating to communication of important safety information

2.3 Describe what procedures need to be followed, to confirm operational and personal safety, is maintained during the work

2.4 Describe the system of work associated with safe access and the procedures associated with working under isolated conditions of the OLE

2.5 Describe how to avoid personal injury during the work

2.6 Describe working with rail and road/rail machinery and their associated hazards

2.7 Describe the personal protective equipment (PPE) needed for the activities to be undertaken

2.8 Describe the general electrical hazards associated with working on and around overhead line equipment

2.9 Describe the hazards associated with earthing and bonding activities including:

- 2.9a working at height
- 2.9b drilling holes
- 2.9c cutting and terminating cables
- 2.9d how the risks can be minimised

2.10 Describe the correct methods of moving, lifting, handling, shaping and supporting cables and associated components

2.11 State the purpose of engineering specifications associated with OLE equipment (such as overhead line specifications, work/task instructions, inspection/test plan)

2.12 State the purpose for the different types of design drawings used in OLE wire installation (such as layouts and cross section diagrams and OLE system design range (such as OLEMI

2.13 State how the OLE is designed to function under normal operating conditions

2.14 State how each of the earthing and bonding component parts contribute to the overall operation of the OLE and how it interfaces with the Signaling system

2.15 Describe how to identify the correct type and size of earthing and bonding cables required

2.16 State the basic principles of the electrical checks to be carried out on the earthing and bonding cables

2.17 State the terminology and methods used to identify OLE earthing and bonding and their operational status

2.18 Describe the tools, plant and equipment used in the earthing and bonding installation process and how to use them safely

2.19 Describe the torque loading requirements of the components or connectors and what to do if these loadings are exceeded or not achieved

2.20 Describe the types of bonding systems used including:

- 2.20a Miles Royston (Glenair)
- 2.20b Cembre

2.21 Describe the types of tools and equipment used to shape, position, adjust, terminate and secure the installed components (such as drills, presses, pullers, torque wrenches)

2.22 Describe the equipment operating, care and control procedures applicable to OLE equipment

2.23 Describe the methods of securing the installed earthing and bonding components and connections safely

2.24 State the inspection and testing procedures needed to be completed prior to hand back

2.25 Outline the authorisation procedures and the limits of own responsibility and authority

2.26 Identify the reporting documentation and control procedures reporting lines and escalation procedures

Unit 214 Determine requirements for the safe access to work locations for signal engineering

Unit level:	Level 2
GLH:	30

Learning outcome

The learner will:

1 Be able to determine requirements for the safe access to work locations for signal engineering

Assessment criteria

The learner can:

1.1 Work safely at all times, complying with your organisation's procedures

1.2 Confirm the location of the activity and determine the access requirements

1.3 Check that the requirements for safe access meet your organisation's procedures

1.4 Advise other people as required of the requirements for safe access

1.5 Take action to ensure the requirements for safe access to work are implemented and remain in place for the duration of the activity

1.6 Establish and maintain communication with relevant person(s)

1.7 Deal effectively with problems within the limits of your own authority and report those that cannot be resolved

Learning outcome

The learner will:

2 Know how to determine requirements for the safe access to work locations for signal engineering

Assessment criteria

The learner can:

2.1 List the relevant health and safety legislation, regulations and safe working practices and procedures as appropriate to the activity such as Safe System of Work Planner (SSOWP)

2.2 Describe the methods and techniques for conducting safety assessments, including assessment of risk

2.3 Explain how to locate and safely access the work area/site

2.4 Explain how to source and interpret information and document systems relating to the work area/site and activity

2.5 Describe the relevant railway possession and protection arrangements for the work site and equipment to provide a safe system of work and how to check these have been implemented

2.6 Explain how to secure the work area/site/system for maintenance/fault finding/installation/testing purposes

2.7 Explain how to identify, agree and implement safe access

2.8 Describe the relevant reporting lines and procedures that are approved by your organisation

2.9 Describe the limits of you own authority and responsibility and those of others involved such as the Safe Work Leader (SWL)

Unit 214 Determine requirements for the safe access to work locations for signal engineering

Supporting Information

Unit Range Description

The learner can:

1.1 Follow the health and safety legislation, regulations and safe working practices and procedures, from the following as applicable to the work location:
- 1.1a your organisation's safety management system
- 1.1b relevant sections of the HASWA
- 1.1c COSHH
- 1.1d safe work plans (such as SSOWP)
- 1.1e SWL
- 1.1f track access restrictions
- 1.1g track work instructions
- 1.1h track possession
- 1.1i task risk control sheets
- 1.1j current rule book
- 1.1k regulations for working under OHLE and in the vicinity of DC lines
- 1.1l equipment disconnections
- 1.1m manual handling regulations
- 1.1n RIDDOR
- 1.1o safety sign regulations
- 1.1p PPE

1.2 Identify the types of documentation from the following that applies to the access requirements as applicable to the work location:
- 1.2a signing in and off site register
- 1.2b site briefing attendance
- 1.2c site access authorisation card
- 1.2d personal track safety certificate

1.3 Identify the access requirements related to two of the following types of site locations:
- 1.3a trackside
- 1.3b internal (such as signal box, equipment room)
- 1.3c areas to which the public have access
- 1.3d confined spaces
- 1.3e elevated structures

1.4 Agree and implement the necessary safety requirements to ensure safe access from the following as applicable to the activity:
- 1.4a protection and possession
- 1.4b isolation
- 1.4c traction supply OHLE and DC

1.4d establishment of a communication system

Unit 215 Establish information for signal engineering installation

Unit level:	Level 2
GLH:	30
Unit aim:	This standard identifies the competences you need to establish information for signal engineering installation tasks which is technical and detailed and could be from a variety of sources such as design drawings, installation plans, handbooks, installation standards and equipment specific requirements prior to undertaking signal installation activities. The Signaling equipment in this standard can be for over ground or underground rail transportation systems and can be applicable for the new European Train Control System (ETCS). You will be able to source and interpret the information required to undertake the allocated installation tasks in accordance with your organisation's procedures. You will be required to extract the necessary data from the various specifications and related documentation, in order to establish and carry out the work requirements, and to make valid decisions about the work activities based on the information extracted. Your responsibilities will require you to comply with organisational policy and procedures for obtaining and using the documentation applicable to the activity. You will be expected to report any problems with the use and interpretation of the data that you cannot personally resolve, or that are outside your permitted authority, to the relevant people. You will be expected to work to instructions, with a minimum of supervision, and to take personal responsibility for your own actions and for the quality and accuracy of the work that you carry out. Your underpinning knowledge will provide a good understanding of the types of documentation available for use, and will provide an informed approach to applying signal engineering instructions and procedures. You will be able to read and interpret the documentation available, and will know about the conventions, symbols and abbreviations used, in adequate depth to provide a sound basis for carrying out the activities to the required specification.

Learning outcome

The learner will:

1 Be able to establish information for signal engineering installation

Assessment criteria

The learner can:

1.1 Identify and source the information required for installation activities

1.2 Source and interpret accurately relevant information on technical requirements

1.3 Ensure that the information is current, authorised and contains all essential data

1.4 Identify and deal promptly with information, which is inadequate, contradictory and/or ambiguous

Learning outcome

The learner will:

2 Know how to establish information for signal engineering installation

Assessment criteria

The learner can:

1.1 Describe how to source and interpret technical information for the installation activity

1.2 Describe your organisation's procedures for documentation care and control and the requirements for the retention of records

1.3 Explain how to ensure that documents are current and authorised and reflect the required level of detail accurately

1.4 Describe how to interpret the relevant conventions, symbols, terminology and abbreviations used in site and equipment diagrams, engineering drawings and specifications including an understanding of Signaling terminology

1.5 Explain the relevant methods and techniques covering the installation of Signaling equipment and how to interpret them

1.6 Describe how to identify, evaluate and respond to problems occurring with the information and its interpretation

1.7 Describe the relevant reporting lines and procedures that are approved by your organisation

1.8 Explain the limits of your own authority and responsibility, and those of others involved

Unit 215 Establish information for signal engineering installation

Supporting Information

Unit Range Description

The learner can:

1.1 Establish the required installation technical information for one of the following types of Signaling equipment:

- 1.1a points
- 1.1b train control (such as signals or other method of authorising train movements)
- 1.1c train detection
- 1.1d power supplies
- 1.1e balises
- 1.1f ETCS
- 1.1g other industry specific equipment

2.1 Obtain and extract information from the following sources as applicable to the equipment being installed:

- 2.1a design drawings
- 2.1b installation plans
- 2.1c handbooks
- 2.1d installation standards
- 2.1e equipment specific requirements
- 2.1f manufactures instructions
- 2.1g schedules
- 2.1h procedures

Unit 216 Establish information for signal engineering maintenance and/or fault finding

Unit level:	Level 2
GLH:	30
Unit aim:	This standard identifies the competences you need to establish information for signal engineering maintenance tasks which is technical and detailed and could be from a variety of sources such as drawings, defect history, fault reports, handbooks, maintenance specifications, instructions, procedures and schedules prior to undertaking maintenance and/or fault finding activities. The Signaling equipment in this standard can be for over ground or underground rail transportation systems and can be applicable for the new European Train Control System (ETCS). You will be able to source and interpret the information required to undertake the allocated maintenance and/or fault finding tasks in accordance with your organisation's procedures. You will be required to extract the necessary data from the various specifications and related documentation, in order to establish and carry out the work requirements, and to make valid decisions about the work activities based on the information extracted. Your responsibilities will require you to comply with organisational policy and procedures for obtaining and using the documentation applicable to the activity. You will be expected to report any problems with the use and interpretation of the data that you cannot personally resolve, or that are outside your permitted authority, to the relevant people. You will be expected to work to instructions, with a minimum of supervision, and to take personal responsibility for your own actions and for the quality and accuracy of the work that you carry out. Your underpinning knowledge will provide a good understanding of the types of documentation available for use, and will provide an informed approach to applying signal engineering instructions and procedures. You will be able to read and interpret the documentation available, and will know about the conventions, symbols and abbreviations used, in adequate depth to provide a sound basis for carrying out the activities to the required specification.

Learning outcome

The learner will:

1 Be able to establish information for signal engineering maintenance and/or fault finding

Assessment criteria

The learner can:

1.1 Identify and source the required details for the maintenance and/or fault finding activities

1.2 Source and interpret relevant information on technical requirements

1.3 Ensure that the information is current, authorised and contains all essential data

1.4 Identify and deal promptly with information, which is inadequate, contradictory and/or ambiguous

1.5 Identify and deal promptly and effectively with any problems occurring with the requirements and their interpretation

Learning outcome

The learner will:

2 Know how to establish information for signal engineering maintenance and/or fault finding

Assessment criteria

The learner can:

1.1 Describe how to source and interpret technical information for maintenance and/or fault finding activities

1.2 Describe your organisation's procedures for documentation care and control and the requirements for the retention of records

1.3 Explain how to ensure that documents are current and authorised and accurately reflect the required level of detail

1.4 Describe how to interpret the relevant conventions, symbols, terminology and abbreviations used in site and equipment diagrams, engineering diagrams and specifications including an understanding of Signaling terminology

1.5 Explain the relevant methods and techniques covering maintenance and/or fault finding of Signaling equipment and how to interpret them

1.6 Describe how to identify, evaluate and respond to problems occurring with the information and its interpretation

1.7 Describe the relevant reporting lines and procedures that are approved by your organisation

1.8 Explain the limits of your own authority and responsibility, and those of others involved

Unit 216 Establish information for signal engineering maintenance and/or fault finding

Supporting Information

Unit Range Description

The learner can:

1.1 Establish the required maintenance technical information for one of the following types of Signaling equipment:
- 1.1a points
- 1.1b train control (such as signals or other method of authorising train movements)
- 1.1c train detection (such as track circuits or axle counters)
- 1.1d power supplies
- 1.1e balises
- 1.1f ETCS
- 1.1g other industry specific signally equipment

1.2 Obtain and extract information from the following sources as applicable to the equipment being maintained
- 1.2a drawings
- 1.2b defect history
- 1.2c fault reports (such as customer, monitoring centre)
- 1.2d handbooks
- 1.2e maintenance specifications
- 1.2f instructions
- 1.2g schedules
- 1.2h procedures

Unit 217 Reinstate the work area after signal engineering activities

Unit level:	Level 2
GLH:	30

Unit aim:

This standard identifies the competences you need to reinstate the work area after installing, maintaining, rectifying or testing Signaling equipment and systems. It includes the safe storage of reusable materials and equipment. The Signaling equipment in this standard can be for over ground or underground rail transportation systems and can be applicable for the new European Train Control System (ETCS).

You will ensure that the work area is left in a condition that meets your organisations procedures. This will include ensuring that any waste material, plant, tools and test equipment that cannot be removed is marked for later collection and secured where it will not interfere with the safe operation of the railway.

Your responsibilities will require you to comply with organisational policy and procedures for the activities undertaken, and to report any problems with reinstating the work area procedure that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You will be expected to work to instructions, alone or in conjunction with others, taking full responsibility for your own actions, and for the quality and accuracy of the work that you carry out.

Your underpinning knowledge will be sufficient to provide a sound understanding of your work, and will provide an informed approach to applying procedures. You will understand the safe storage requirements for the equipment, reusable/waste materials, and will know about the procedures and potential problems, in adequate depth to provide a sound basis for carrying out the activities safely and correctly.

You will understand the safety precautions to be observed when handing the equipment and materials. You will be required to demonstrate safe working practices throughout, and will understand the responsibility you owe to yourself and others in the workplace/area.

Safety is a key theme throughout this standard and you will be able to identify all the necessary safety requirements and take the relevant action to ensure the safety of yourself, others and railway operations.

Learning outcome

The learner will:

1 Be able to reinstate the work area after signal engineering activities

Assessment criteria

The learner can:

1.1 Work safely at all times, complying with your organisation's procedures

1.2 Withdraw all possession and protection measures in line with your organisation's procedures

1.3 Confirm the work area is secured on completion of the work

1.4 Restore the work areas to a safe condition in accordance with agreed requirements and schedules

1.5 Separate equipment, components, and materials for re-use from waste items

1.6 Store reusable materials and equipment in an appropriate location

1.7 Identify, mark and secure any waste items that cannot be removed immediately in such a way that the safe operation of the railway is maintained

1.8 Check that all plant, tools, and test equipment that cannot be removed are secured and stored where they do not interfere with the safe operation of the railway

1.9 Dispose of waste materials in line with your organisation's procedures

1.10 Deal promptly and effectively with problems within your control and report those that cannot be resolved

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Learning outcome

The learner will:

2 Know how to reinstate the work area after signal engineering activities

Assessment criteria

The learner can:

2.1 List the relevant health and safety legislation, regulations and safe working practices and procedures as appropriate to the activity such as the Safe System of Work Planner (SSOWP)

2.2 Describe the relevant railway possession and protection arrangements for the work site and equipment to provide a safe system of work and how to check these have been withdrawn

2.3 Explain your organisation's procedures for restoring the work area

2.4 Describe the work area security requirements

2.5 Explain your organisation's procedures for storing material and equipment

2.6 Describe the types of materials and equipment to be stored

2.7 Describe the different types, methods and procedures for the disposal of waste items and hazardous substances as approved by your organisation

2.8 Explain the relevant reporting lines and procedures that are approved by your organisation

2.9 Describe the limits of your own authority and responsibility and those of others involved such as the Safe Work Leader (SWL)

Unit 217 Reinstate the work area after signal engineering activities

Supporting Information

Unit Range Description

The learner can:

1.1 Follow the health and safety legislation, regulations and safe working practices and procedures, from the following as applicable to the work location and activities:

2.1 Identify the access requirements related to two of the following types of site locations:

- 2.1a trackside
- 2.1b internal (such as signal box, equipment room)
- 2.1c areas to which the public have access
- 2.1d confined spaces
- 2.1e elevated structures

3.1 Safely store tools and equipment, including the following as applicable to the work activities:

- 3.1a tools
- 3.1b test equipment
- 3.1c materials
- 3.1d consumables
- 3.1e plant
- 3.1f communications equipment

4.1 Assist in the completion of the relevant records, to include one of the following, and pass it to the appropriate people:

- 4.1a job card
- 4.1b maintenance log and action report
- 4.1c company reporting procedures
- 4.1d other handover records

Unit 218 Assist with establishing compliance with specifications for Signaling equipment

Unit level:	Level 2
GLH:	30

Unit aim:

This standard identifies the competences you need to assist in the tests and checks of Signaling systems and equipment, including the use of correct tools and test equipment in accordance with your organisation's procedures to establish compliance with specifications. The Signaling equipment in this standard can be for over ground or underground rail transportation systems and can be applicable for the new European Train Control System (ETCS).

You will be required to use the appropriate tools and equipment throughout the test and checking activities, and to apply a range of methods and techniques to test and check the equipment, and to make connections as appropriate to the equipment installed. Where appropriate, you may also assist in working with computers or electronic controllers, making connections, testing hardware and loading and updating software. The testing and checking activities will include making checks and adjustments, in line with your permitted authority, and assisting others to ensure that the Signaling equipment functions to the required specification.

Your responsibilities will require you to comply with organisational policy and procedures for the testing and checking activities undertaken, and to report any problems with the activities, tools or equipment used that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You must check that all tools, equipment and materials used in the testing and checking activities are removed from the work area on completion of the work, and that the relevant job/task documentation is completed accurately and legibly. You will be expected to work to instructions in conjunction with others, taking personal responsibility for your own actions, and for the quality and accuracy of the work that you carry out.

The test and checking activity may be carried out as a team effort, but you must demonstrate a significant personal contribution to the activities, in order to satisfy the requirements of the standard, and you must demonstrate competence in all the areas required by the standard.

Your underpinning knowledge will be sufficient to provide a sound basis for your work, and will enable you to adopt an informed approach to applying procedures for the testing and checking of Signaling equipment. You will have an understanding of the equipment being tested, and its necessary checking requirements, in adequate depth to provide a sound basis for carrying out the process safely and effectively.

You will understand the safety precautions required when carrying out the testing and checking activities, especially those for ensuring the safe isolation of services. You will be required to demonstrate safe working practices throughout, and will understand your responsibility for taking the necessary safeguards to protect

yourself and others in the workplace.

Safety is a key theme throughout this standard and you will be able to identify all the necessary safety requirements and take the relevant action to ensure the safety of yourself, others and railway operations.

Learning outcome

The learner will:

1 Be able to assist with establishing compliance with specifications for Signaling equipment

Assessment criteria

The learner can:

1.1 Work safely at all times, complying with your organisation's procedures

1.2 Follow all relevant diagrams, specifications and procedures for the equipment being checked or tested, including any previous compliance information, if applicable

1.3 Identify the tests/checks to be carried out, the sequence in which they are to be performed and the methods to be used

1.4 Select and use all the correct tools and inspection equipment and check that they are in a useable condition and calibrated

1.5 Carry out the checks and tests in an appropriate sequence, within appropriate timescales and using approved methods and procedures

1.6 Report any instances where the test and/or checks cannot be completed

1.7 Take suitable precautions to ensure your activities do not interfere with the operational system

1.8 Ensure all testing and checking equipment and tools are removed or stored in line you're your organisation's procedures

1.9 Report completion of compliance activities in line with your organisation's procedures

1.10 Deal promptly and effectively with problems within your control and report those which cannot be resolved

Learning outcome

The learner will:

2 Know how to assist with establishing compliance with specifications for Signaling equipment

Assessment criteria

The learner can:

2.1 Describe the relevant health and safety legislation, regulations and safe working practices and procedures as appropriate to the activity such as the Safe System of Work Planner (SSOWP)

2.2 Describe how to locate and safely access the site

2.3 Explain the isolation and lock-off procedure or permit-to-work procedure that applies to the system (such as electrical isolation, locking off switchgear, placing of warning notices, proving the isolation has been achieved and secured)

2.4 List the classification of different voltage levels and the authority requirements for working on them

2.5 Explain what constitutes a hazardous voltage/current and how to recognise victims of electric shock

2.6 Describe how to reduce the risks of an electric shock (such as insulated tools, rubber mating and isolating transformers)

2.7 State the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the testing activities

2.8 Identify hazards associated with carrying out Signaling test activities (such as stored energy, radio frequency radiation, electrical supplies, electrical/electronic interfaces, using damaged or badly maintained tools and equipment, not following laid-down procedures), and how to minimise these and reduce any risks

2.9 Describe the activities which may compromise system functionality and integrity including the operational constraints to carrying out testing/checking activities

2.10 Explain how to source and follow engineering diagrams and specifications relevant to the activity

2.11 Describe how to locate and identify the equipment to be tested and/or checked

2.12 Describe the methods, techniques and procedures for assisting with tests and checks to establish compliance

2.13 Explain the operational constraints and authorisation procedures for carrying out tests and checks

2.14 Describe how to select the correct tools and confirm that they are calibrated

2.15 Describe your organisation's procedures for the use, care and control of inspection tools and equipment

2.16 Describe the procedures and precautions to be adopted to eliminate electrostatic discharge (ESD) hazards when working with and handling electronic devices

2.17 Describe how to use test equipment so as to ensure true and accurate measurements are taken

2.18 Describe the correct mode of operation of the equipment being tested and/or checked

2.19 Describe the relevant reporting lines and procedures that are approved by your organisation

2.20 Describe the limits of your own authority and responsibility and those of others involved such as the Safe Work Leader (SWL)

Unit 218 Assist with establishing compliance with specifications for Signaling equipment

Supporting Information

Unit Range Description

The learner can:

1.1 Follow the health and safety legislation, regulations and safe working practices and procedures, from the following as applicable to the work location and activities:
- 1.1a your organisation's safety management system
- 1.1b relevant sections of the HASWA
- 1.1c COSHH
- 1.1d safe work plans (such as SSOWP)
- 1.1e SWL
- 1.1f track access restrictions
- 1.1g track work instructions
- 1.1h track possession
- 1.1i task risk control sheets
- 1.1j current rule book
- 1.1k regulations for working under OHLE and in the vicinity of DC lines (where appropriate)
- 1.1l equipment disconnections
- 1.1m manual handling regulations
- 1.1n RIDDOR
- 1.1o safety sign regulations
- 1.1p PPE

2.1 Identify the access requirements related to two of the following types of site testing locations:
- 2.1a trackside
- 2.1b internal (such as signal box, equipment room)
- 2.1c areas to which the public have access
- 2.1d confined spaces
- 2.1e elevated structures

3.1 Assist in the testing of one of the following types of Signaling equipment:
- 3.1a points
- 3.1b train control (such as signals or other method of authorising train movements)
- 3.1c train detection (such as track circuits or axle counters)
- 3.1d power supplies
- 3.1e balises
- 3.1f ETCS
- 3.1g other industry specific Signaling equipment

4.1 Use the following types of tools and equipment as applicable to the equipment being tested:
- 4.1a calibrated hand tools

4.1b un-calibrated hand tools
4.1c calibrated test leads/loads
4.1d computerised test equipment
4.1e test recording equipment
4.1f other specific Signaling testing equipment

5.1 Assist in the following checks as applicable to the type of Signaling equipment being tested:
5.1a inspection
5.1b wire count
5.1c security
5.1d profile
5.1e labelling
5.1f correlation
5.1g compliance to diagrams
5.1h physical condition
5.1i other industry specific Signaling checks

6.1 Assist in the following tests as applicable to the type of Signaling equipment being tested:
6.1a continuity
6.1b insulation
6.1c earth arrangements
6.1d interference
6.1e correspondence
6.1f function
6.1g other industry specific Signaling tests

7.1 Ensure that testing activities comply with one of the following:
7.1a infrastructure guidelines and standard operating procedures
7.1b equipment manufacturer's documents
7.1c BS, ISO and/or BS EN standards
7.1d SMTH
7.1e other industry specific Signaling standards/specifications

8.1 Assist in completion of the relevant test records, to include one of the following, and pass it to the appropriate people:
8.1a job card
8.1b SMTH
8.1c test certificates
8.1d test checklists
8.1e test log and action report
8.1f marked-up engineering drawings
8.1g company reporting procedures
8.1h other industry specific test/compliance records

Unit 219 Assist in the installation of Signaling equipment

Unit level:	Level 2
GLH:	30

Unit aim:

This standard identifies the competences you need to assist in the installation of Signaling systems and equipment under direction, including the use of correct tools and equipment in accordance with your organisation's procedures. The Signaling equipment in this standard can be for over ground or underground rail transportation systems and can be applicable for the new European Train Control System (ETCS).

You will be required to use the appropriate tools and equipment throughout the installation activities, and to apply a range of installation methods and techniques to position, level and align the equipment, and to make connections as appropriate to the equipment installed. Where appropriate, you may also assist in working with computers or electronic controllers, making connections, installing hardware and loading and updating software. The installation activities will include making checks and adjustments, in line with your permitted authority, and assisting others to ensure that the installed equipment functions to the required specification.

Your responsibilities will require you to comply with organisational policy and procedures for the installation activities undertaken, and to report any problems with the activities, tools or equipment used that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You must check that all tools, equipment and materials used in the installation activities are removed from the work area on completion of the work, and that the relevant job/task documentation is completed accurately and legibly. You will be expected to work to instructions in conjunction with others, taking personal responsibility for your own actions, and for the quality and accuracy of the work that you carry out.

The installation activity may be carried out as a team effort, but you must demonstrate a significant personal contribution to the installation activities, in order to satisfy the requirements of the standard, and you must demonstrate competence in all the areas required by the standard.

Your underpinning knowledge will be sufficient to provide a sound basis for your work, and will enable you to adopt an informed approach to applying procedures for the installation of Signaling equipment. You will have an understanding of the equipment being installed, and its installation requirements, in adequate depth to provide a sound basis for carrying out the installation process safely and effectively.

You will understand the safety precautions required when carrying out the installation activities, especially those for ensuring the safe isolation of services. You will be required to demonstrate safe working practices throughout, and will understand your responsibility for taking the necessary safeguards to protect

yourself and others in the workplace.

Safety is a key theme throughout this standard and you will be able to identify all the necessary safety requirements and take the relevant action to ensure the safety of yourself, others and railway operations.

Learning outcome

The learner will:

1 Be able to assist in the installation of Signaling equipment

Assessment criteria

The learner can:

1.1 Work safely at all times, complying with your organisation's procedures

1.2 Follow all relevant diagrams, specifications and procedures for the installation being carried out

1.3 Carry out all installation activities within the limits of your own authority, responsibility and competence, including as appropriate integrity checks

1.4 Use the correct tools and equipment for the installation and check that they are in a safe, usable condition and calibrated

1.5 Install, position, secure and label the equipment, components and cables in accordance with the installation specifications and standards

1.6 Run, secure and terminate wires and cables correctly

1.7 Identify and correctly label wires and cables in accordance with installation requirements

1.8 Ensure that the installation is complete and that all components are free from damage, including checking that all necessary connections to the equipment are complete and all waste items are dealt with in line with your organisation's procedures

1.9 Deal promptly and effectively with problems within your control and report those which cannot be resolved

Learning outcome

The learner will:

2 Know how to assist in the installation of Signaling equipment

Assessment criteria

The learner can:

1.1 Describe the relevant health and safety legislation, regulations and safe working practices and procedures as appropriate to the activity such as the Safe System of Work Planner (SSOWP)

1.2 Describe how to locate and safely access the site

1.3 Describe how to check authorisation is in place, and locate and identify the equipment, components and cables to be worked on

1.4 Explain the isolation and lock-off procedure or permit-to-work procedure that applies to the system (such as electrical isolation, locking off switchgear, placing of warning notices, proving the isolation has been achieved and secured)

1.5 List the classification of different voltage levels and the authority requirements for working on them

1.6 Explain what constitutes a hazardous voltage/current and how to recognise victims of electric shock

1.7 Describe how to reduce the risks of an electric shock (such as insulated tools, rubber mating and isolating transformers)

1.8 State the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the installation activities

1.9 Identify hazards associated with carrying out Signaling installation activities (such as stored energy, radio frequency radiation, electrical supplies, electrical/electronic interfaces, using damaged or badly maintained tools and equipment, not following laid-down procedures), and how to minimise these and reduce any risks

1.10 Describe the relevant methods, techniques and procedures for installation activities

1.11 Describe how to follow relevant technical information, standards, diagrams, instructions, specifications and schedules for installation of Signaling equipment

1.12 Describe your organisation's procedures for the use, care and control of tools and equipment

1.13 Explain the procedures and precautions to be adopted to eliminate electrostatic discharge (ESD) hazards when working with and handling electronic devices

1.14 Explain how to select the correct tools for the activity, including how to confirm that they are calibrated and stored correctly after use

1.15 Describe how to identify the various types of connectors used and the correct tools and equipment to make the connections correctly

1.16 Describe the different types of mounting, connecting and cable supporting systems used in the installation of Signaling equipment

1.17 Describe the relevant reporting lines and procedures that are approved by your organisation

1.18 Describe the limits of your own authority and responsibility and those of others involved such as the Safe Work Leader (SWL)

Unit 219 Assist in the installation of Signaling equipment

Supporting Information

Unit Range Description

The learner can:

1.1 Follow the health and safety legislation, regulations and safe working practices and procedures, from the following as applicable to the work location and activities:
- 1.1a your organisation's safety management system
- 1.1b relevant sections of the HASWA
- 1.1c COSHH
- 1.1d safe work plans (such as SSOWP)
- 1.1e SWL
- 1.1f track access restrictions
- 1.1g track work instructions
- 1.1h track possession
- 1.1i task risk control sheets
- 1.1j current rule book
- 1.1k regulations for working under OHLE and in the vicinity of DC lines (where appropriate)
- 1.1l equipment disconnections
- 1.1m manual handling regulations
- 1.1n RIDDOR
- 1.1o safety sign regulations
- 1.1p PPE

2.1 Identify the access requirements related to two of the following types of site installation locations:
- 2.1a trackside
- 2.1b internal (such as signal box, equipment room)
- 2.1c areas to which the public have access
- 2.1d confined spaces
- 2.1e elevated structures

3.1 Identify the access requirements related to two of the following types of site installation locations:
- 3.1a trackside
- 3.1b internal (such as signal box, equipment room)
- 3.1c areas to which the public have access
- 3.1d confined spaces
- 3.1e elevated structures

4.1 Use the following types of approved/calibrated tools and equipment as applicable to the equipment being installed:
- 4.1a power tools
- 4.1b hand tools

4.1c wire and cable strippers
4.1d IDC tools (such as punch down tool)
4.1e crimping tools
4.1f torque wrenches
4.1g measuring equipment
4.1h levelling equipment

5.1 Make two of the following types of terminations/connections during the installation:
5.1a crimping
5.1b mechanical
5.1c fluid power
5.1d soldering
5.1e IDC
5.1f optical
5.1g other specific type of termination/connection

6.1 Ensure that installation activities comply with one of the following:
6.1a infrastructure guidelines and standard operating procedures
6.1b work authorisations
6.1c installation charts/diagrams
6.1d equipment manufacturer's documents
6.1e BS, ISO and/or BS EN standards
6.1f other industry specific Signaling standards/specifications

7.1 Assist in the completion of the relevant installation records, to include one of the following, and pass it to the appropriate people:
7.1a job card
7.1b installation log and action report
7.1c completion certificates
7.1d company reporting procedures
7.1e other industry specific installation records

Unit 220 Assist in the planned maintenance of Signaling equipment

Unit level:	Level 2
GLH:	30

Unit aim:

This standard identifies the competences you need to assist in the planned maintenance of Signaling systems and equipment under direction, including the use of correct tools and equipment in accordance with your organisation's procedures. The Signaling equipment in this standard can be for over ground or underground rail transportation systems and can be applicable for the new European Train Control System (ETCS).

You will be required to use the appropriate tools and equipment throughout the maintenance activities, and to apply a range of methods and techniques to maintain the equipment. Where appropriate, you may also assist in working with computers or electronic controllers, making connections, maintaining hardware and loading and updating software. The maintenance activities will include making checks and adjustments, in line with your permitted authority, and assisting others to ensure that the maintained equipment functions to the required specification.

Your responsibilities will require you to comply with organisational policy and procedures for the planned maintenance activities undertaken, and to report any problems with the activities, tools or equipment used that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You must check that all tools, equipment and materials used in the maintenance activities are removed from the work area on completion of the work, and that the relevant job/task documentation is completed accurately and legibly. You will be expected to work to instructions in conjunction with others, taking personal responsibility for your own actions, and for the quality and accuracy of the work that you carry out.

The maintenance activity may be carried out as a team effort, but you must demonstrate a significant personal contribution to the activities, in order to satisfy the requirements of the standard, and you must demonstrate competence in all the areas required by the standard.

Your underpinning knowledge will be sufficient to provide a sound basis for your work, and will enable you to adopt an informed approach to applying procedures for the maintenance of Signaling equipment. You will have an understanding of the equipment being maintained, in adequate depth to provide a sound basis for carrying out the process safely and effectively.

You will understand the safety precautions required when carrying out the maintenance activities, especially those for ensuring the safe isolation of services. You will be required to demonstrate safe working practices throughout, and will understand your responsibility for taking the necessary safeguards to protect yourself and others in the workplace.

Safety is a key theme throughout this standard and you will be able to identify all the necessary safety requirements and take the relevant action to ensure the safety of yourself, others and railway operations.

Learning outcome

The learner will:

1 Be able to assist in the planned maintenance of Signaling equipment

Assessment criteria

The learner can:

1.1 Work safely at all times, complying with your organisation's procedures

1.2 Identify the area of work and the equipment which is to be maintained

1.3 Follow the relevant maintenance schedules or procedures to carry out the required work

1.4 Carry out the maintenance activities within the limits of your own authority

1.5 Carry out the maintenance activities in the specified sequence and in an agreed timescale ensuring that the work does not interfere with any operational railway systems

1.6 Select and use the correct tools and equipment including measuring instruments and check that they are in a safe usable condition and calibrated

1.7 Ensure waste items and tools are removed or stored in line with your organisation's procedures

1.8 Deal promptly and effectively with problems within your control and report those which cannot be resolved

Learning outcome

The learner will:

2 Know how to to assist in the planned maintenance of Signaling equipment

Assessment criteria

The learner can:

1.1 Describe the relevant health and safety legislation, regulations and safe working practices and procedures as appropriate to the activity such as the Safe System of Work Planner (SSOWP)

1.2 Describe how to locate and safely access the site

1.3 Describe how to check authorisation is in place for maintenance activities

1.4 Explain the isolation and lock-off procedure or permit-to-work procedure that applies to the system (such as electrical isolation, locking off switchgear, placing of warning notices, proving the isolation has been achieved and secured)

1.5 List the classification of different voltage levels and the authority requirements for working on them

1.6 Explain what constitutes a hazardous voltage/current and how to recognise victims of electric shock

1.7 Describe how to reduce the risks of an electric shock (such as insulated tools, rubber mating and isolating transformers)

1.8 State the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the maintenance activities

1.9 Identify hazards associated with carrying out signal maintenance activities (such as stored energy, radio frequency radiation, electrical supplies, electrical/electronic interfaces, using damaged or badly maintained tools and equipment, not following laid-down procedures), and how to minimise these and reduce any risks

1.10 Describe how to locate and identify the equipment to be worked on

1.11 Describe how to follow maintenance schedules, procedures, instructions specifications, site and equipment diagrams

1.12 Describe the methods, techniques and procedures for the maintenance of Signaling systems and equipment

1.13 Describe the types of operational constraints that could occur when carrying out Signaling maintenance activities

1.14 Describe your organisation's procedures relating to maintenance records and documentation including how to access and version control

1.15 Describe your organisation's procedures for the use, care and control of tools and equipment including calibration

1.16 Explain the procedures and precautions to be adopted to eliminate electrostatic discharge (ESD) hazards when working with and handling electronic devices

1.17 Explain how to check the maintenance activity to ensure compliance with the original specification

1.18 Describe the types of damage or disturbance that could occur to operational equipment when undertaking a maintenance activity

1.19 Describe your organisation's procedures for disposing/storing of waste items

K20 Describe the relevant reporting lines and procedures that are approved by your organisation

K21 Describe the limits of your own authority and responsibility and those of others involved such as the Safe Work Leader (SWL)

Unit 220 Assist in the planned maintenance of Signaling equipment

Supporting Information

Unit Range Description

The learner can:

1.1 Follow the health and safety legislation, regulations and safe working practices and procedures, from the following as applicable to the work location and activities:

- 1.1a your organisation's safety management system
- 1.1b relevant sections of the HASWA
- 1.1c COSHH
- 1.1d safe work plans (such as SSOWP)
- 1.1e SWL
- 1.1f track access restrictions
- 1.1g track work instructions
- 1.1h track possession
- 1.1i task risk control sheets
- 1.1j current rule book
- 1.1k regulations for working under OHLE and in the vicinity of DC lines (where appropriate)
- 1.1l equipment disconnections
- 1.1m manual handling regulations
- 1.1n RIDDOR
- 1.1o safety sign regulations
- 1.1p PPE

2.1 Identify the access requirements related to two of the following types of site equipment locations:

- 2.1a trackside
- 2.1b internal (such as signal box, equipment room)
- 2.1c areas to which the public have access
- 2.1d confined spaces
- 2.1e elevated structures

3.1 Assist in the planned maintenance of one of the following types of Signaling equipment:

- 3.1a points
- 3.1b train control (such as signals or other method of authorising train movements)
- 3.1c train detection (such as track circuits or axle counters)
- 3.1d power supplies
- 3.1e balises
- 3.1f ETCS
- 3.1g other industry specific Signaling equipment

4.1 Use the following types of tools and equipment as applicable to the equipment being maintained:

4.1a hand tools
4.1b wire and cable strippers
4.1c IDC tools (such as punch down tool)
4.1d crimping tools
4.1e multi-meters
4.1f measuring equipment
4.1g test equipment
4.1h power tools
4.1i other specific Signaling maintenance tools/equipment

5.1 Carry out the following maintenance activities as applicable to the equipment being maintained:

5.1a other specific Signaling maintenance activity
5.1b visual and aural checks
5.1c electrical measurements and adjustments
5.1d mechanical measurements and adjustments
5.1e routine servicing
5.1f cleaning
5.1g lubricating

6.1 Assist in the completion the relevant maintenance records, to include one of the following, and pass it to the appropriate people:

6.1a job card
6.1b SMTH
6.1c maintenance log and action report
6.1d company reporting procedures
6.1e other industry specific maintenance records

Unit 221 Assist in the removal of Signaling equipment

Unit level:	Level 2
GLH:	30

Unit aim:

This standard identifies the competences you need to assist in the planned maintenance of Signaling systems and equipment under direction, including the use of correct tools and equipment in accordance with your organisation's procedures. The Signaling equipment in this standard can be for over ground or underground rail transportation systems and can be applicable for the new European Train Control System (ETCS).

You will be required to use the appropriate tools and equipment throughout the maintenance activities, and to apply a range of methods and techniques to maintain the equipment. Where appropriate, you may also assist in working with computers or electronic controllers, making connections, maintaining hardware and loading and updating software. The maintenance activities will include making checks and adjustments, in line with your permitted authority, and assisting others to ensure that the maintained equipment functions to the required specification.

Your responsibilities will require you to comply with organisational policy and procedures for the planned maintenance activities undertaken, and to report any problems with the activities, tools or equipment used that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You must check that all tools, equipment and materials used in the maintenance activities are removed from the work area on completion of the work, and that the relevant job/task documentation is completed accurately and legibly. You will be expected to work to instructions in conjunction with others, taking personal responsibility for your own actions, and for the quality and accuracy of the work that you carry out.

The maintenance activity may be carried out as a team effort, but you must demonstrate a significant personal contribution to the activities, in order to satisfy the requirements of the standard, and you must demonstrate competence in all the areas required by the standard.

Your underpinning knowledge will be sufficient to provide a sound basis for your work, and will enable you to adopt an informed approach to applying procedures for the maintenance of Signaling equipment. You will have an understanding of the equipment being maintained, in adequate depth to provide a sound basis for carrying out the process safely and effectively.

You will understand the safety precautions required when carrying out the maintenance activities, especially those for ensuring the safe isolation of services. You will be required to demonstrate safe working practices throughout, and will understand your responsibility for taking the necessary safeguards to protect yourself and others in the workplace.

Safety is a key theme throughout this standard and you will be able to identify all the necessary safety requirements and take the relevant action to ensure the safety of yourself, others and railway operations.

Learning outcome

The learner will:

1 Be able to assist in the removal of Signaling equipment

Assessment criteria

The learner can:

1.1 Work safely at all times, complying with your organisation's procedures

1.2 Identify any necessary changes to safety requirements on arriving at site, including prompt reporting to the relevant person(s)

1.3 Correctly locate and identify the equipment to be removed

1.4 Follow all relevant diagrams and specifications

1.5 Establish and, where appropriate, mark component/equipment orientation for re-assembly

1.6 Ensure that any stored energy or substances are released safely and correctly

1.7 Label relevant wiring and components and note the configuration settings

1.8 Remove the required equipment using approved tools and techniques

1.9 Take suitable precautions to prevent damage to equipment during removal

1.10 Provide appropriate electrostatic protection for electronic equipment, where appropriate

1.11 Store or discard the removed equipment in accordance with your organisation's procedures

1.12 Deal promptly and effectively with problems within your control and report those which cannot be resolved

Learning outcome

The learner will:

2 Know how to assist in the removal of Signaling equipment

Assessment criteria

The learner can:

2.1 Describe the relevant health and safety legislation, regulations and safe working practices and procedures as appropriate to the activity such as the Safe System of Work Planner (SSOWP)

2.2 Describe how to locate and safely access the site

2.3 Describe how to locate and identify the equipment to be removed

2.4 Explain the isolation and lock-off procedure or permit-to-work procedure that applies to the system (such as electrical isolation, locking off switchgear, placing of warning notices, proving the isolation has been achieved and secured)

2.5 List the classification of different voltage levels and the authority requirements for working on them

2.6 Explain what constitutes a hazardous voltage/current and how to recognise victims of electric shock

2.7 Describe how to reduce the risks of an electric shock (such as insulated tools, rubber mating and isolating transformers)

2.8 State the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the removal activities

2.9 Describe the importance of ensuring any stored energy or substances are released safely and correctly

2.10 Identify hazards associated with carrying out Signaling removal activities (such as radio frequency radiation, electrical supplies, electrical/electronic interfaces, using damaged or badly maintained tools and equipment, not following laid-down procedures), and how to minimise these and reduce any risks

2.11 Describe the importance of marking the component/equipment orientation for re-assembly and how to undertake this

2.12 Describe the relevant methods, techniques and procedures for the removal activities

2.13 Describe how to source and follow the relevant technical information, standards, diagrams, instructions, specifications and schedules for the removal of Signaling equipment

2.14 Describe your organisation's procedures for the use, care and control of tools and equipment including calibration

2.15 Explain the procedures and precautions to be adopted to eliminate electrostatic discharge (ESD) hazards when working with and handling electronic devices

2.16 Describe how to select the correct tools for the activity, including how to confirm that they are calibrated and stored correctly after use

2.17 Describe how to identify the various types of connectors used and the correct tools and equipment to make the disconnections correctly

2.18 Describe the different types of mounting, connecting and cable supporting systems used by the Signaling equipment

2.19 Describe how to label and store removed equipment for re-use, repair or disposal

2.20 Describe the relevant reporting lines and procedures that are approved by your organisation

2.20 Describe the limits of your own authority and responsibility and those of others involved (Safe Work Leader)

Unit 221 Assist in the removal of Signaling equipment

Supporting Information

Unit Range Description

1. Follow the health and safety legislation, regulations and safe working practices and procedures, from the following as applicable to the work location and activities:
   1.1. your organisation's safety management system
   1.2. relevant sections of the HASWA
   1.3. COSHH
   1.4. safe work plans (such as SSOWP)
   1.5. SWL
   1.6. track access restrictions
   1.7. track work instructions
   1.8. track possession
   1.9. task risk control sheets
   1.10. current rule book
   1.11. regulations for working under OHLE and in the vicinity of DC lines (where appropriate)
   1.12. equipment disconnections
   1.13. manual handling regulations
   1.14. RIDDOR
   1.15. safety sign regulations
   1.16. PPE
2. Identify the access requirements related to two of the following types of equipment site locations:
   2.1. trackside
   2.2. internal (such as signal box, equipment room)
   2.3. areas to which the public have access
   2.4. confined spaces
   2.5. elevated structures
3. Assist in the replacement of one of the following types of Signaling equipment:
   3.1. points
   3.2. train control (such as signals or other method of authorising train movements)
   3.3. train detection (such as track circuits or axle counters)
   3.4. power supplies
   3.5. balises
   3.6. ETCS
   3.7. other industry specific Signaling equipment
4. Use the following types of approved/calibrated tools and equipment as applicable to the equipment being replaced:
   4.1. power tools
   4.2. hand tools
   4.3. wire and cable strippers/cutters
   4.4. IDC tools (such as punch down tool)

4.5. crimping tools
4.6. soldering irons
4.7. torque wrenches
4.8. measuring equipment
4.9. levelling equipment

5. Make two of the following types of connections during the replacement:
   5.1. crimping
   5.2. mechanical
   5.3. fluid power
   5.4. soldering
   5.5. IDC
   5.6. optical
   5.7. other specific type of termination/connection
6. Ensure that replacement activities comply with one of the following:
   6.1 infrastructure guidelines and standard operating procedures
   6.2 equipment manufacturer's documents
   6.3 BS, ISO and/or BS EN standards
   6.4 other industry specific Signaling standards/specifications
7. Assist in the completion of the relevant records, to include one of the following, and pass it to the appropriate people:
   7.1. job card
   7.2. installation log and action report
   7.3. company reporting procedures
   7.4. other industry specific removal/installation records

Unit 222 Assist in the replacement of Signaling equipment

Unit level:	Level 2
GLH:	30

Unit aim:

This standard identifies the competences you need to assist in the removal of Signaling systems and equipment under direction as part of maintenance or fault finding activities, including the use of correct tools and equipment in accordance with your organisation's procedures. The Signaling equipment in this standard can be for over ground or underground rail transportation systems and can be applicable for the new European Train Control System (ETCS).

You will be required to use the appropriate tools and equipment throughout the removal activities, and to apply a range of disconnection methods and techniques to safely remove the equipment, and to make safe any connections as appropriate to the equipment removed. Where appropriate, you may also assist in working with computers or electronic controllers, making dis-connections and removing hardware. The removal activities will include making sure that any removed Signaling equipment is moved and stored safely before it is repaired, refitted or disposed of.

Your responsibilities will require you to comply with organisational policy and procedures for the removal activities undertaken, and to report any problems with the activities, tools or equipment used that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You must check that all tools, equipment and materials used in the activities are removed from the work area on completion of the work, and that the relevant job/task documentation is completed accurately and legibly. You will be expected to work to instructions in conjunction with others, taking personal responsibility for your own actions, and for the quality and accuracy of the work that you carry out.

The removal activity may be carried out as a team effort, but you must demonstrate a significant personal contribution to the activities, in order to satisfy the requirements of the standard, and you must demonstrate competence in all the areas required by the standard.

Your underpinning knowledge will be sufficient to provide a sound basis for your work, and will enable you to adopt an informed approach to applying procedures for the removal of Signaling equipment. You will have an understanding of the equipment being removed and its disconnection requirements, in adequate depth to provide a sound basis for carrying out the removal process safely and effectively.

You will understand the safety precautions required when carrying out the removal activities, especially those for ensuring the safe isolation of services. You will be required to demonstrate safe working practices throughout, and will understand your responsibility for taking the necessary safeguards to protect yourself and others in the workplace.

Safety is a key theme throughout this standard and you will be able to identify all the necessary safety requirements and take the relevant action to ensure the safety of yourself, others and railway operations.

Learning outcome

The learner will:

1 Be able to assist in the replacement of Signaling equipment

Assessment criteria

The learner can:

1.1 Work safely at all times, complying with your organisation's procedures

1.2 Identify any necessary changes to safety requirements on arriving at site, including prompt reporting to the relevant person(s)

1.3 Obtain the required equipment and ensure that it is in a suitable condition for replacement and fit for purpose

1.4 Follow all relevant diagrams and specifications

1.5 Replace the equipment in the correct sequence using appropriate tools and techniques

1.6 Take suitable precautions to prevent damage to equipment during the replacement activity

1.7 Make any necessary settings or adjustments to the equipment to ensure it will function correctly

1.8 Ensure that the replacement is complete and that all components are free from damage including checking that all necessary connections to the equipment are complete

1.9 Observe sufficient operations of the equipment to confirm it is functioning correctly

1.10 Deal promptly and effectively with problems within your control and report those that cannot be resolved

Learning outcome

The learner will:

2 Know how to assist in the replacement of Signaling equipment

Assessment criteria

The learner can:

2.1 Describe the relevant health and safety legislation, regulations and safe working practices and procedures as appropriate to the activity such as the Safe System of Work Planner (SSOWP)

2.2 Describe how to locate and safely access the site

2.3 Describe how to locate and identify the equipment to be replaced

2.4 Explain the isolation and lock-off procedure or permit-to-work procedure that applies to the system (such as electrical isolation, locking off switchgear, placing of warning notices, proving the isolation has been achieved and secured)

2.5 List the classification of different voltage levels and the authority requirements for working on them

2.6 Explain what constitutes a hazardous voltage/current and how to recognise victims of electric shock

2.7 Describe how to reduce the risks of an electric shock (such as insulated tools, rubber mating and isolating transformers)

2.8 State the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the activities

2.9 Identify hazards associated with carrying out Signaling replacement activities (such as stored energy, radio frequency radiation, electrical supplies, electrical/electronic interfaces, using damaged or badly maintained tools and equipment, not following laid-down procedures), and how to minimise these and reduce any risks

2.10 Describe the relevant methods, techniques and procedures for removal and installation activities

2.11 Describe how to source and follow relevant technical information, standards, diagrams, instructions, specifications and schedules for replacement of Signaling equipment

2.12 Describe your organisation's procedures for the use, care and control of tools and equipment

2.13 Describe the procedures and precautions to be adopted to eliminate electrostatic discharge (ESD) hazards when working with and handling electronic devices

2.14 Describe how and when damage may occur to equipment during replacement

2.15 Describe how to select the correct tools for the activity, including how to confirm that they are calibrated and stored correctly after use

2.16 Describe how to identify the various types of connectors used and the correct tools and equipment to make the disconnection and connections correctly

2.17 Describe the different types of mounting, connecting and cable supporting systems used in the replacement of the Signaling equipment

2.18 Describe the correct mode of operation of the equipment relevant to the activity

2.19 Describe the relevant reporting lines and procedures that are approved by your organisation

2.20 Describe the limits of your own authority and responsibility and those of others involved (Safe Work Leader)

Unit 222 Assist in the replacement of Signaling equipment

Supporting Information

Unit Range Description

1.1 Follow the health and safety legislation, regulations and safe working practices and procedures, from the following as applicable to the work location and activities:

- 1.1a your organisation's safety management system
- 1.1b relevant sections of the HASWA
- 1.1c COSHH
- 1.1d safe work plans (such as SSOWP)
- 1.1e SWL
- 1.1f track access restrictions
- 1.1g track work instructions
- 1.1h track possession
- 1.1i task risk control sheets
- 1.1j current rule book
- 1.1k regulations for working under OHLE and in the vicinity of DC lines (where appropriate)
- 1.1l equipment disconnections
- 1.1m manual handling regulations
- 1.1n RIDDOR
- 1.1o safety sign regulations
- 1.1p PPE

2.1 Identify the access requirements related to two of the following types of site equipment locations:

- 2.1a trackside
- 2.1b internal (such as signal box, equipment room)
- 2.1c areas to which the public have access
- 2.1d confined spaces
- 2.1e elevated structures

3.1 Assist in the removal of one of the following types of Signaling equipment:

- 3.1a points
- 3.1b train control (such as signals or other method of authorising train movements)
- 3.1c train detection (such as track circuits or axle counters)
- 3.1d power supplies
- 3.1e balises
- 3.1f ETCS
- 3.1g other industry specific Signaling equipment

4.1 Use the following types of approved/calibrated tools and equipment as applicable to the equipment being removed:

4.1a power tools
4.1b hand tools
4.1c wire and cable strippers/cutters
4.1d IDC tools
4.1e termination tools
4.1f wrenches
4.1g soldering irons
4.1h manual handling equipment

5.1 Disconnect the following types of terminations/connections during the removal of the equipment as applicable to the type of equipment:
5.1a mechanical
5.1b fluid power
5.1c soldered
5.1d electronic
5.1e IDC
5.1f optical
5.1g other specific type of termination/connection

6.1 Ensure that removal activities comply with one of the following:
6.1a infrastructure guidelines and standard operating procedures
6.1b equipment manufacturer's documents
6.1c BS, ISO and/or BS EN standards
6.1d other industry specific Signaling standards/specifications

7.1 Assist in the completion of the relevant removal records, to include one of the following, and pass it to the appropriate people:
7.1a job card
7.1b equipment logs and action report
7.1c company reporting procedures
7.1d other industry specific equipment records

Unit 223 Determine requirements for the safe access to work locations for telecoms engineering

Unit level:	Level 2
GLH:	30
Unit aim:	This standard identifies the competences you need to determine the requirements for the safe access to work locations prior to undertaking a telecoms engineering activity. These activities could involve the maintenance, fault finding, installation or testing of telecoms equipment. The type of work locations that the activities will take place in could be from a range of different sites such as trackside, internal and public, each requiring different access requirements. The telecoms equipment in this standard can be for over ground or underground rail transportation systems. The purpose of this standard is to define the competence requirements for you to access telecoms engineering work locations safely, effectively and in line with relevant processes and procedures. The level and extent of responsibility shall include your own safety and that of others who you may accompany. You will be expected to refer to others for authorisation when required, be responsible for the implementation of instructions, and work within set procedures and processes. Your actions shall not compromise the safety of others. You will be able to identify and agree the necessary safety requirements. You will ensure the implementation of the necessary safety requirements, protection and disconnection arrangements and that they remain in place throughout the duration of the telecoms engineering activity. Your underpinning knowledge will provide a good understanding of the relevant processes and procedures for the safe access to a work location prior to undertaking a telecoms engineering activity. Safety is a key theme throughout this standard and you will be able to identify all the necessary safety requirements and take the relevant action to ensure the safety of yourself, others and railway operations.

Learning outcome

The learner will:

1 Be able to determine requirements for the safe access to work locations for telecoms engineering

Assessment criteria

The learner can:

1.1 Work safely at all times, complying with your organisation's procedures

1.2 Confirm the location of the activity and determine the access requirements

1.3 Check that the requirements for safe access meet your organisation's procedures

1.4 Advise other people as required of the requirements for safe access

1.5 Take action to ensure the requirements for safe access to work are implemented and remain in place for the duration of the activity

1.6 Establish and maintain communication with relevant person(s)

1.7 Deal effectively with problems within the limits of your own authority and report those that cannot be resolved

Learning outcome

The learner will:

2 Know how to determine requirements for the safe access to work locations for telecoms engineering

Assessment criteria

The learner can:

2.1 List the relevant health and safety legislation, regulations and safe working practices and procedures as appropriate to the activity such as Safe System of Work Planner (SSOWP)

2.2 Describe the methods and techniques for conducting safety assessments, including assessment of risk

2.3 Explain how to locate and safely access the work area/site

2.4 Explain how to source and interpret information and document systems relating to the work area/site and activity

2.5 Describe the relevant railway possession and protection arrangements for the work site and equipment to provide a safe system of work and how to check these are in place

2.6 Explain how to secure the work area/site/system for maintenance/fault finding/installation/testing purposes

2.7 Explain how to identify, agree and implement safe access

2.8 Describe the relevant reporting lines and procedures that are approved by your organisation

2.9 Describe the limits of you own authority and responsibility and those of others involved such as the Safe Work Leader (SWL)

Unit 223 Determine requirements for the safe access to work locations for telecoms engineering

Supporting Information

Unit Range Description

1. Follow the health and safety legislation, regulations and safe working practices and procedures, from the following as applicable to the work location:
   - 1.1. your organisation's safety management system
   - 1.2. relevant sections of the HASWA
   - 1.3. COSHH
   - 1.4. safe work plans (such as SSOWP)
   - 1.5. SWL
   - 1.6. track access restrictions
   - 1.7. track work instructions
   - 1.8. track possession
   - 1.9. task risk control sheets
   - 1.10. current rule book
   - 1.11. regulations for working under OHLE and in the vicinity of DC lines (where appropriate)
   - 1.12. equipment disconnections
   - 1.13. manual handling regulations
   - 1.14. RIDDOR
   - 1.15. safety sign regulations
   - 1.16. PPE
2. Identify the types of documentation from the following that applies to the access requirements as applicable to the work location:
   - 2.1. signing in and off site register
   - 2.2. site briefing attendance
   - 2.3. site access authorisation card
   - 2.4. personal track safety certificate
3. Identify the access requirements related to two of the following types of site locations:
   - 3.1. trackside
   - 3.2. internal (such as signal box, equipment room)
   - 3.3. areas to which the public have access
   - 3.4. confined spaces
   - 3.5. elevated structures
4. Agree and implement the necessary safety requirements to ensure safe access from the following as applicable to the activity:
   - 4.1. protection and possession
   - 4.2. isolation

4.3. traction supply OHLE and DC

4.4. establishment of a communication system

Unit 224 Establish information for telecoms engineering installation

Unit level:	Level 2
GLH:	30
Unit aim:	This standard identifies the competences you need to establish information for telecoms engineering installation tasks which is technical and detailed and could be from a variety of sources such as design drawings, installation plans, handbooks, installation standards and equipment specific requirements prior to undertaking telecom installation activities. The telecoms equipment in this standard can be for over ground or underground rail transportation systems. You will be able to source and interpret the information required to undertake the allocated installation tasks in accordance with your organisation's procedures. You will be required to extract the necessary data from the various specifications and related documentation, in order to establish and carry out the work requirements, and to make valid decisions about the work activities based on the information extracted. Your responsibilities will require you to comply with organisational policy and procedures for obtaining and using the documentation applicable to the activity. You will be expected to report any problems with the use and interpretation of the data that you cannot personally resolve, or that are outside your permitted authority, to the relevant people. You will be expected to work to instructions, with a minimum of supervision, and to take personal responsibility for your own actions and for the quality and accuracy of the work that you carry out. Your underpinning knowledge will provide a good understanding of the types of documentation available for use, and will provide an informed approach to applying telecom engineering instructions and procedures. You will be able to read and interpret the documentation available, and will know about the conventions, symbols and abbreviations used, in adequate depth to provide a sound basis for carrying out the activities to the required specification.

Learning outcome

The learner will:

1 Be able to establish information for telecoms engineering installation

Assessment criteria

The learner can:

1.1 Identify and interpret the sources of information required for installation activities

1.2 Source and interpret relevant information on technical requirements

1.3 Ensure that the information is current, authorised and contains all essential data

1.4 Identify and deal promptly with information, which is inadequate, contradictory and/or ambiguous

1.5 Identify and deal promptly and effectively with any problems occurring with the requirements and their interpretation

Learning outcome

The learner will:

2 Know how to establish information for telecoms engineering installation

Assessment criteria

The learner can:

2.1 Describe how to source and interpret technical information for the installation activity

2.2 Describe your organisation's procedures for documentation care and control and the requirements for the retention of records

2.3 Explain how to ensure that documents are current and authorised and reflect the required level of detail accurately

2.4 Explain the customer/contractual requirements such as service level agreements

2.5 Describe how to interpret the conventions, symbols, terminology and abbreviations used in site and equipment diagrams, engineering drawings and specifications including an understanding of telecoms terminology

2.6 Explain the relevant methods and techniques covering the installation of telecoms equipment and how to interpret them

2.7 Describe how to identify, evaluate and respond to problems occurring with the information and its interpretation

2.8 Describe the relevant reporting lines and procedures that are approved by your organization

Unit 224 Establish information for telecoms engineering installation

Supporting Information

Unit Range Description

1. Establish the required installation technical information for one of the following types of telecom equipment:
   - 1.1. transmission systems
   - 1.2. bearer circuits
   - 1.3. telecoms bearers carrying Signaling circuits
   - 1.4. SCADA
   - 1.5. operational telephones
   - 1.6. switches and systems (telephone exchanges & concentrators)
   - 1.7. railway operational information systems
   - 1.8. PA and CCTV
   - 1.9. operational CCTV (such as OPO/DOO)
   - 1.10. GSM-R
   - 1.11. other industry specific telecom equipment
2. Obtain and extract information from the following sources as applicable to the equipment being installed:
   - 2.1. design drawings
   - 2.2. installation plans
   - 2.3. handbooks
   - 2.4. installation standards
   - 2.5. equipment specific requirements
   - 2.6. manufactures instructions
   - 2.7. schedules
   - 2.8. procedures

Unit 225 Establish information for telecoms engineering maintenance and/or fault finding

Unit level:	Level 2
GLH:	30
Unit aim:	This standard identifies the competences you need to establish information for telecoms engineering maintenance tasks which is technical and detailed and could be from a variety of sources such as drawings, defect history, fault reports, handbooks, maintenance specifications, instructions, procedures and schedules prior to undertaking maintenance and/or fault finding activities. The telecoms equipment in this standard can be for over ground or underground rail transportation systems. You will be able to source and interpret the information required to undertake the allocated maintenance and/or fault finding tasks in accordance with your organisation's procedures. You will be required to extract the necessary data from the various specifications and related documentation, in order to establish and carry out the work requirements, and to make valid decisions about the work activities based on the information extracted. Your responsibilities will require you to comply with organisational policy and procedures for obtaining and using the documentation applicable to the activity. You will be expected to report any problems with the use and interpretation of the data that you cannot personally resolve, or that are outside your permitted authority, to the relevant people. You will be expected to work to instructions, with a minimum of supervision, and to take personal responsibility for your own actions and for the quality and accuracy of the work that you carry out. Your underpinning knowledge will provide a good understanding of the types of documentation available for use, and will provide an informed approach to applying telecom engineering instructions and procedures. You will be able to read and interpret the documentation available, and will know about the conventions, symbols and abbreviations used, in adequate depth to provide a sound basis for carrying out the activities to the required specification.

Learning outcome

The learner will:

1 Be able to establish information for telecoms engineering maintenance and/or fault finding

Assessment criteria

The learner can:

1.1 Identify and interpret the required details for the maintenance and/or fault finding activities

1.2 Source and interpret relevant information on technical requirements

1.3 Confirm the information is current, authorised and contains all essential data

1.4 Identify and deal promptly with information, which is inadequate, contradictory and/or ambiguous

1.5 Identify and deal promptly and effectively with any problems occurring with the requirements and their interpretation

Learning outcome

The learner will:

2 Know how to establish information for telecoms engineering maintenance and/or fault finding

Assessment criteria

The learner can:

2.1 Describe how to source and interpret sources of technical information for maintenance and/or fault finding activities

2.2 Describe your organisation's procedures for documentation care and control and the requirements for the retention of records

2.3 Explain how to ensure that documents are current and authorised and reflect the required level of detail accurately

2.4 Explain the customer/contractual requirements such as service level agreements

2.5 Describe how to interpret the relevant conventions, symbols, terminology and abbreviations used in site and equipment diagrams, engineering diagrams and specifications including an understanding of telecoms terminology

2.6 Explain the relevant methods and techniques covering maintenance and/or fault finding of telecoms equipment and how to interpret them

2.7 Describe how to identify, evaluate and respond to problems occurring with the information and its interpretation

2.8 Describe the relevant reporting lines and procedures that are approved by your organisation

2.9 Explain the limits of your own authority and responsibility, and those of others involved

Unit 225 Establish information for telecoms engineering maintenance and/or fault finding

Supporting Information

Unit Range Description

1.1 Establish the required maintenance technical information for one of the following types of telecom equipment:

- 1.1a transmission systems
- 1.1b bearer circuits
- 1.1c telecoms bearers carrying Signaling circuits
- 1.1d SCADA
- 1.1e operational telephones
- 1.1f switches and systems (such as telephone exchanges & concentrators)
- 1.1g railway operational information systems
- 1.1h PA and CCTV
- 1.1i operational CCTV (such as OPO/DOO)
- 1.1j GSM-R
- 1.1k other industry specific telecom equipment

2.1 Obtain and extract information from the following sources as applicable to the equipment being maintained:

- 2.1a defect history
- 2.1b fault repots (such as customer, monitoring centre)
- 2.1c handbooks
- 2.1d maintenance specifications
- 2.1e instructions
- 2.1f schedules
- 2.1g procedures

Unit 226 Reinstate the work area after telecoms engineering activities

Unit level:	Level 2
GLH:	30

Unit aim:

This standard identifies the competences you need to reinstate the work area after installing, maintaining, rectifying or testing telecoms equipment and systems. It includes the safe storage of reusable materials and equipment. The telecoms equipment in this standard can be for over ground or underground rail transportation systems.

You will ensure that the work area is left in a condition that meets your organisations procedures. This will include ensuring that any waste material, plant, tools and test equipment that cannot be removed is marked for later collection and secured where it will not interfere with the safe operation of the railway.

Your responsibilities will require you to comply with organisational policy and procedures for the activities undertaken, and to report any problems with reinstating the work area procedure that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You will be expected to work to instructions, alone or in conjunction with others, taking full responsibility for your own actions, and for the quality and accuracy of the work that you carry out.

Your underpinning knowledge will be sufficient to provide a sound understanding of your work, and will provide an informed approach to applying procedures. You will understand the safe storage requirements for the equipment, reusable/waste materials, and will know about the procedures and potential problems, in adequate depth to provide a sound basis for carrying out the activities safely and correctly.

You will understand the safety precautions to be observed when handing the equipment and materials. You will be required to demonstrate safe working practices throughout, and will understand the responsibility you owe to yourself and others in the workplace/area.

Safety is a key theme throughout this standard and you will be able to identify all the necessary safety requirements and take the relevant action to ensure the safety of yourself, others and railway operations.

Learning outcome

The learner will:

1 Be able to reinstate the work area after telecoms engineering activities

Assessment criteria

The learner can:

1.1 Work safely at all times, complying with your organisation's procedures

1.2 Withdraw all possession and protection measures in line with your organisation's procedures

1.3 Confirm the work area is secured on completion of the work

1.4 Restore the work areas to a safe condition in accordance with agreed requirements and schedules

1.5 Separate equipment, components, and materials for re-use from waste items

1.6 Store reusable materials and equipment in an appropriate location

1.7 Identify, mark and secure any waste items that cannot be removed immediately in such a way that the safe operation of the railway is maintained

1.8 Check that all plant, tools, and test equipment that cannot be removed are secured and stored where they do not interfere with the safe operation of the railway

1.9 Dispose of waste materials in line with your organisation's procedures

1.10 Deal promptly and effectively with problems within your control and report those that cannot be resolved

Learning outcome

The learner will:

2 Know how to reinstate the work area after telecoms engineering activities

Assessment criteria

The learner can:

2.1 List the relevant health and safety legislation, regulations and safe working practices and procedures as appropriate to the activity such as the Safe System of Work Planner (SSOWP)

2.2 Describe the relevant railway possession and protection arrangements for the work site and equipment to provide a safe system of work and how to check these have been withdrawn

2.3 Explain your organisation's procedures for restoring the work area

2.4 Describe the work area security requirements

2.5 Explain your organisation's procedures for storing material and equipment

2.6 Explain the types of materials and equipment to be stored

2.7 Describe the different types, methods and procedures for the disposal of waste items and hazardous substances as approved by your organisation

2.8 Explain the relevant reporting lines and procedures that are approved by your organisation

2.9 Describe the limits of your own authority and responsibility and those of others involved such as the Safe Work Leader (SWL)

Unit 226 Reinstate the work area after telecoms engineering activities

Supporting Information

Unit Range Description

1.1 Follow the health and safety legislation, regulations and safe working practices and procedures, from the following as applicable to the work location and activities:

- 1.1a your organisation's safety management system
- 1.1b relevant sections of the HASWA
- 1.1c COSHH
- 1.1d safe work plans (such as SSOWP)
- 1.1e SWL
- 1.1f track access restrictions
- 1.1g track work instructions
- 1.1h track possession
- 1.1i task risk control sheets
- 1.1j current rule book
- 1.1k regulations for working under OHLE and in the vicinity of DC lines (where appropriate)
- 1.1l equipment disconnections
- 1.1m manual handling regulations
- 1.1n RIDDOR
- 1.1o safety sign regulations
- 1.1p PPE

2.1 Identify the access requirements related to two of the following types of site locations:

- 2.1a trackside
- 2.1b internal (such as signal box, equipment room)
- 2.1c areas to which the public have access
- 2.1d confined spaces
- 2.1e elevated structures

3.1 Safely store tools and equipment, including the following as applicable to the work activities:

- 3.1a tools
- 3.1b test equipment
- 3.1c materials
- 3.1d consumables
- 3.1e plant
- 3.1f communications equipment

4.1 Assist in the completion of the relevant records, to include one of the following, and pass it to the appropriate people:

- 4.1a job card
- 4.1b maintenance log and action report

4.1c company reporting procedures

4.1d other handover records

Unit 227 Assist in the tests and checks of telecoms equipment

Unit level:	Level 2
GLH:	30

Unit aim:

This standard identifies the competences you need to assist in the tests and checks of operational telecoms systems and equipment under direction, including the use of correct tools and test equipment in accordance with your organisation's procedures. The telecoms equipment in this standard can be for over ground or underground rail transportation systems.

You will be required to use the appropriate tools and equipment throughout the test and checking activities, and to apply a range of methods and techniques to test and check the equipment, and to make connections as appropriate to the equipment installed. Where appropriate, you may also assist in working with computers or electronic controllers, making connections, testing hardware and loading and updating software. The testing and checking activities will include making checks and adjustments, in line with your permitted authority, and assisting others to ensure that the telecom equipment functions to the required specification.

Your responsibilities will require you to comply with organisational policy and procedures for the testing and checking activities undertaken, and to report any problems with the activities, tools or equipment used that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You must check that all tools, equipment and materials used in the testing and checking activities are removed from the work area on completion of the work, and that the relevant job/task documentation is completed accurately and legibly. You will be expected to work to instructions in conjunction with others, taking personal responsibility for your own actions, and for the quality and accuracy of the work that you carry out.

The test and checking activity may be carried out as a team effort, but you must demonstrate a significant personal contribution to the activities, in order to satisfy the requirements of the standard, and you must demonstrate competence in all the areas required by the standard.

Your underpinning knowledge will be sufficient to provide a sound basis for your work, and will enable you to adopt an informed approach to applying procedures for the testing and checking of telecoms equipment. You will have an understanding of the equipment being tested, and its necessary checking requirements, in adequate depth to provide a sound basis for carrying out the process safely and effectively.

You will understand the safety precautions required when carrying out the testing and checking activities, especially those for ensuring the safe isolation of services. You will be required to demonstrate safe working practices throughout, and will understand your responsibility for taking the necessary safeguards to protect yourself and others in the workplace.

Safety is a key theme throughout this standard and you will be able to identify all the necessary safety requirements and take the relevant action to ensure the safety of yourself, others and railway operations.

Learning outcome

The learner will:

1 Be able to assist with tests and checks of telecoms equipment

Assessment criteria

The learner can:

1.1 Work safely at all times, complying with your organisation's procedures

1.2 Follow all relevant diagrams, specifications and procedures for the equipment being checked or tested, including any previous compliance information, if applicable

1.3 Identify the tests/checks to be carried out, the sequence in which they are to be performed and the methods to be used

1.4 Select and use all the correct tools and inspection equipment and check that they are in a useable condition and calibrated

1.5 Carry out the checks and tests in an appropriate sequence, within appropriate timescales and using approved methods and procedures

1.6 Report any instances where the test and/or checks cannot be completed

1.7 Take suitable precautions to ensure your activities do not interfere with the operational system

1.8 Ensure all testing and checking equipment and tools are removed or stored in line you're your organisation's procedures

1.9 Report completion of compliance activities in line with your organisation's procedures

1.10 Deal promptly and effectively with problems within your control and report those which cannot be resolved

Learning outcome

The learner will:

2 Know how to assist with tests and checks of telecoms equipment

Assessment criteria

The learner can:

2.1 Describe the relevant health and safety legislation, regulations and safe working practices and procedures as appropriate to the activity such as the Safe System of Work Planner (SSOWP)

2.2 Describe how to locate and safely access the site

2.3 Explain the isolation and lock-off procedure or permit-to-work procedure that applies to the system (such as electrical isolation, locking off switchgear, placing of warning notices, proving the isolation has been achieved and secured)

2.4 List the classification of different voltage levels and the authority requirements for working on them

2.5 Explain what constitutes a hazardous voltage/current and how to recognise victims of electric shock

2.6 Describe how to reduce the risks of an electric shock (such as insulated tools, rubber mating and isolating transformers)

2.7 State the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the testing activities

2.8 Identify hazards associated with carrying out telecom test activities (such as stored voltages, radio frequency radiation, electrical supplies, electrical/electronic interfaces, using damaged or badly maintained tools and equipment, not following laid-down procedures), and how to minimise these and reduce any risks

2.9 Describe the activities which may compromise system functionality and integrity including the operational constraints to carrying out testing/checking activities

2.10 Explain how to source and follow engineering diagrams and specifications relevant to the activity

2.11 Describe how to locate and identify the equipment to be tested and/or checked

2.12 Describe the methods, techniques and procedures for assisting with tests and checks to establish compliance

2.13 Explain the operational constraints and authorisation procedures for carrying out tests and checks

2.14 Describe how to select the correct tools and confirm that they are calibrated

2.15 Describe your organisation's procedures for the use, care and control of inspection tools and equipment

2.16 Describe the procedures and precautions to be adopted to eliminate electrostatic discharge (ESD) hazards when working with and handling electronic devices

2.17 Describe how to use test equipment so as to ensure true and accurate measurements are taken

2.18 Describe the correct mode of operation of the equipment being tested and/or checked

2.19 Describe the relevant reporting lines and procedures that are approved by your organisation

2.20 Describe the limits of your own authority and responsibility and those of others involved such as the Safe Work Leader (SWL)

Unit 227 Assist in the tests and checks of telecoms equipment

Supporting Information

Unit Range Description

1.1 Follow the health and safety legislation, regulations and safe working practices and procedures, from the following as applicable to the work location and activities:

- 1.1a your organisation's safety management system
- 1.1b relevant sections of the HASWA
- 1.1c COSHH
- 1.1d safe work plans (such as SSOWP)
- 1.1e SWL
- 1.1f track access restrictions
- 1.1g track work instructions
- 1.1h track possession
- 1.1i task risk control sheets
- 1.1j current rule book
- 1.1k regulations for working under OHLE and in the vicinity of DC lines (where appropriate)
- 1.1l equipment disconnections
- 1.1m manual handling regulations
- 1.1n RIDDOR
- 1.1o safety sign regulations
- 1.1p PPE

2.1 Identify the access requirements related to two of the following types of site testing locations:

- 2.1a trackside
- 2.1b internal (such as signal box, equipment room)
- 2.1c areas to which the public have access
- 2.1d confined spaces
- 2.1e elevated structures

3.1 Assist in the testing of one of the following types of telecom equipment:

- 3.1a transmission systems
- 3.1b bearer circuits
- 3.1c telecoms bearers carrying Signaling circuits
- 3.1d SCADA
- 3.1e operational telephones
- 3.1e operational telephones
- 3.1f switches and systems (such as telephone exchanges & concentrators)
- 3.1g railway operational information systems
- 3.1h PA and CCTV
- 3.1i operational CCTV (such as OPO DOO)

3.1j GSM-R

3.1k other industry specific telecom equipment

4.1 Use the following types of tools and equipment as applicable to the equipment being tested:

4.1a calibrated hand tools

4.1b un-calibrated hand tools

4.1c calibrated test leads/loads

4.1d computerised test equipment

4.1e test recording equipment

4.1f other specific telecom test equipment

5.1 Assist in the following tests as applicable to the type of telecom equipment being tested:

5.1a bandwidth

5.1b power

5.1c interference

5.1d attenuation

5.1e frequency

5.1f image quality

5.1g alignment

5.1h day/night settings

5.1i OTDR

5.1j psophometric

5.1k insertion loss measurement

5.1l data error rate

5.1m voltage

5.1n current

5.1o resistance

5.1p continuity

5.1q other industry specific telecoms tests

6.1 Ensure that testing activities comply with one of the following:

6.1a infrastructure guidelines and standard operating procedures

6.1b equipment manufacturer's documents

6.1c BS, ISO and/or BS EN standards

6.1d TMTH

6.1e other industry specific telecom standards/specifications

7.1 Assist in completion of the relevant test records, to include one of the following, and pass it to the appropriate people:

7.1a job card

7.1b TMTH

7.1c test log and action report

7.1d company reporting procedures

7.1e other industry specific test records

Unit 228 Assist in the installation of telecoms equipment

Unit level:	Level 2
GLH:	30

Unit aim:

This standard identifies the competences you need to assist in the installation of operational telecoms systems and equipment under direction, including the use of correct tools and equipment in accordance with your organisation's procedures. The telecoms equipment in this standard can be for over ground or underground rail transportation systems.

You will be required to use the appropriate tools and equipment throughout the installation activities, and to apply a range of installation methods and techniques to position, level and align the equipment, and to make connections as appropriate to the equipment installed. Where appropriate, you may also assist in working with computers or electronic controllers, making connections, installing hardware and loading and updating software. The installation activities will include making checks and adjustments, in line with your permitted authority, and assisting others to ensure that the installed equipment functions to the required specification.

Your responsibilities will require you to comply with organisational policy and procedures for the installation activities undertaken, and to report any problems with the activities, tools or equipment used that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You must check that all tools, equipment and materials used in the installation activities are removed from the work area on completion of the work, and that the relevant job/task documentation is completed accurately and legibly. You will be expected to work to instructions in conjunction with others, taking personal responsibility for your own actions, and for the quality and accuracy of the work that you carry out.

The installation activity may be carried out as a team effort, but you must demonstrate a significant personal contribution to the installation activities, in order to satisfy the requirements of the standard, and you must demonstrate competence in all the areas required by the standard.

Your underpinning knowledge will be sufficient to provide a sound basis for your work, and will enable you to adopt an informed approach to applying procedures for the installation of telecoms equipment. You will have an understanding of the equipment being installed, and its installation requirements, in adequate depth to provide a sound basis for carrying out the installation process safely and effectively.

You will understand the safety precautions required when carrying out the installation activities, especially those for ensuring the safe isolation of services. You will be required to demonstrate safe working practices throughout, and will understand your responsibility for taking the necessary safeguards to protect yourself and others in the workplace.

Safety is a key theme throughout this standard and you will be able to identify all the necessary safety requirements and take the relevant action to ensure the safety of yourself, others and railway operations.

Learning outcome

The learner will:

1 Be able to assist in the installation of telecoms equipment

Assessment criteria

The learner can:

1.1 Work safely at all times, complying with your organisation's procedures

1.2 Follow all relevant diagrams, specifications and procedures for the installation being carried out

1.3 Carry out all installation activities within the limits of your own authority, responsibility and competence

1.4 Use the correct tools and equipment for the installation and check that they are in a safe, usable condition and calibrated

1.5 Install, position and secure the equipment and components in accordance with the specification

1.6 Run, secure and terminate wires and cables correctly

1.7 Identify and correctly label wires and cables in accordance with installation requirements

1.8 Ensure that the installation is complete and that all components are free from damage, including checking that all necessary connections to the equipment are complete and all waste items are dealt with in line with your organisation's procedures

1.9 Deal promptly and effectively with problems within your control and report those which cannot be resolved

Learning outcome

The learner will:

2 Know how to assist in the installation of telecoms equipment

Assessment criteria

The learner can:

2.1 Describe the relevant health and safety legislation, regulations and safe working practices and procedures as appropriate to the activity such as the Safe System of Work Planner (SSOWP)

2.2 Describe how to locate and safely access the site

2.3 Describe how to locate and identify the equipment, components and cables to be worked on

2.4 Explain the isolation and lock-off procedure or permit-to-work procedure that applies to the system (such as electrical isolation, locking off switchgear, placing of warning notices, proving the isolation has been achieved and secured)

2.5 List the classification of different voltage levels and the authority requirements for working on them

2.6 Explain what constitutes a hazardous voltage/current and how to recognise victims of electric shock

2.7 Describe how to reduce the risks of an electric shock (such as insulated tools, rubber mating and isolating transformers)

2.8 State the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the installation activities

2.9 Identify hazards associated with carrying out telecom installation activities (such as stored voltages, radio frequency radiation, electrical supplies, electrical/electronic interfaces, using damaged or badly maintained tools and equipment, not following laid-down procedures), and how to minimise these and reduce any risks

2.10 Describe the relevant methods, techniques and procedures for installation activities

2.11 Describe how to follow relevant technical information, standards, diagrams, instructions, specifications and schedules for installation of telecoms equipment

2.12 Describe your organisation's procedures for the use, care and control of tools and equipment

2.13 Explain the procedures and precautions to be adopted to eliminate electrostatic discharge (ESD) hazards when working with and handling electronic devices

2.14 Describe how to select the correct tools for the activity, including how to confirm that they are calibrated and stored correctly after use

2.15 Explain how to identify the various types of connectors used and the correct tools and equipment to make the connections correctly

2.16 List the different types of mounting, connecting and cable supporting systems used in the installation of telecoms equipment

2.17 Describe the relevant reporting lines and procedures that are approved by your organisation

2.18 Describe the limits of your own authority and responsibility and those of others involved such as the Safe Work Leader (SWL)

Unit 228 Assist in the installation of telecoms equipment

Supporting Information

Unit Range Description

1. Follow the health and safety legislation, regulations and safe working practices and procedures, from the following as applicable to the work location and activities:
   - 1.1. your organisation's safety management system
   - 1.2. relevant sections of the HASWA
   - 1.3. COSHH
   - 1.4. safe work plans (such as SSOWP)
   - 1.5. SWL
   - 1.6. track access restrictions
   - 1.7. track work instructions
   - 1.8. track possession
   - 1.9. task risk control sheets
   - 1.10. current rule book
   - 1.11. regulations for working under OHLE and in the vicinity of DC lines (where appropriate)
   - 1.12. equipment disconnections
   - 1.13. manual handling regulations
   - 1.14. RIDDOR
   - 1.15. safety sign regulations
   - 1.16. PPE
2. Identify the access requirements related to two of the following types of site installation locations:
   - 2.1. trackside
   - 2.2. internal (such as signal box, equipment room)
   - 2.3. areas to which the public have access
   - 2.4. confined spaces
   - 2.5. elevated structures
3. Assist in the installation of one of the following types of telecom equipment:
   - 3.1. transmission systems
   - 3.2. bearer circuits
   - 3.3. telecoms bearers carrying Signaling circuits
   - 3.4. SCADA
   - 3.5. operational telephones
   - 3.6. switches and systems (such as telephone exchanges & concentrators)
   - 3.7. railway operational information systems
   - 3.8. PA and CCTV
   - 3.9. operational CCTV (such as OPO/DOO)
   - 3.10. GSM-R
   - 3.11. other industry specific telecom equipment

4. Use the following types of approved/calibrated tools and equipment as applicable to the equipment being installed:
    - 4.1. power tools
    - 4.2. hand tools
    - 4.3. wire and cable strippers
    - 4.4. IDC tools (such as punch down tool)
    - 4.5. crimping tools
    - 4.6. torque wrenches
    - 4.7. measuring equipment
    - 4.8. levelling equipment
5. Make two of the following types of connections during the installation:
    - 5.1. crimping
    - 5.2. mechanical
    - 5.3. soldering
    - 5.4. IDC
    - 5.5. optical
    - 5.6. other specific type of termination/connection
6. Ensure that installation activities comply with one of the following:
    - 6.1 infrastructure guidelines and standard operating procedures
    - 6.2 equipment manufacturer's documents
    - 6.3 BS, ISO and/or BS EN standards
    - 6.4 other industry specific telecom standards/specifications
7. Assist in the completion of the relevant installation records, to include one of the following, and pass it to the appropriate people:
    - 7.1. job card
    - 7.2. installation log and action report
    - 7.3. company reporting procedures
    - 7.4. other industry specific installation records

Unit 229 Assist in the planned maintenance of telecoms equipment

Unit level:	Level 2
GLH:	30

Unit aim:

This standard identifies the competences you need to assist in the planned maintenance of operational telecoms systems and equipment under direction, including the use of correct tools and equipment in accordance with your organisation's procedures. The telecoms equipment in this standard can be for over ground or underground rail transportation systems.

You will be required to use the appropriate tools and equipment throughout the maintenance activities, and to apply a range of methods and techniques to maintain the equipment. Where appropriate, you may also assist in working with computers or electronic controllers, making connections, maintaining hardware and loading and updating software. The maintenance activities will include making checks and adjustments, in line with your permitted authority, and assisting others to ensure that the maintained equipment functions to the required specification.

Your responsibilities will require you to comply with organisational policy and procedures for the planned maintenance activities undertaken, and to report any problems with the activities, tools or equipment used that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You must check that all tools, equipment and materials used in the maintenance activities are removed from the work area on completion of the work, and that the relevant job/task documentation is completed accurately and legibly. You will be expected to work to instructions in conjunction with others, taking personal responsibility for your own actions, and for the quality and accuracy of the work that you carry out.

The maintenance activity may be carried out as a team effort, but you must demonstrate a significant personal contribution to the activities, in order to satisfy the requirements of the standard, and you must demonstrate competence in all the areas required by the standard.

Your underpinning knowledge will be sufficient to provide a sound basis for your work, and will enable you to adopt an informed approach to applying procedures for the maintenance of telecoms equipment. You will have an understanding of the equipment being maintained, in adequate depth to provide a sound basis for carrying out the process safely and effectively.

You will understand the safety precautions required when carrying out the maintenance activities, especially those for ensuring the safe isolation of services. You will be required to demonstrate safe working practices throughout, and will understand your responsibility for taking the necessary safeguards to protect yourself and others in the workplace.

Safety is a key theme throughout this standard and you will be able

to identify all the necessary safety requirements and take the relevant action to ensure the safety of yourself, others and railway operations.

Learning outcome

The learner will:

1 Be able to assist in the planned maintenance of telecoms equipment

Assessment criteria

The learner can:

1.1 Work safely at all times, complying with your organisation's procedures

1.2 Identify the area of work and the equipment which is to be maintained

1.3 Follow the relevant maintenance schedules or procedures to carry out the required work

1.4 Carry out the maintenance activities within the limits of your own authority

1.5 Carry out the maintenance activities in the specified sequence and in an agreed timescale ensuring that the work does not interfere with any operational railway systems

1.6 Select and use the correct tools and equipment including measuring instruments and check that they are in a safe usable condition and calibrated

1.7 Ensure waste items and tools are removed or stored in line with your organisation's procedures

1.8 Deal promptly and effectively with problems within your control and report those which cannot be resolved

Learning outcome

The learner will:

2 Know how to assist in the planned maintenance of telecoms equipment

Assessment criteria

The learner can:

2.1 Describe the relevant health and safety legislation, regulations and safe working practices and procedures as appropriate to the activity such as the Safe System of Work Planner (SSOWP)

2.2 Describe how to locate and safely access the site

2.3 Describe how to check authorisation is in place for maintenance activities

2.4 Explain the isolation and lock-off procedure or permit-to-work procedure that applies to the system (such as electrical isolation, locking off switchgear, placing of warning notices, proving the isolation has been achieved and secured)

2.5 List the classification of different voltage levels and the authority requirements for working on them

2.6 Explain what constitutes a hazardous voltage/current and how to recognise victims of electric shock

2.7 Describe how to reduce the risks of an electric shock (such as insulated tools, rubber mating and isolating transformers)

2.8 State the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the maintenance activities

2.9 Identify hazards associated with carrying out telecom maintenance activities (such as stored voltages, radio frequency radiation, electrical supplies, electrical/electronic interfaces, using damaged or badly maintained tools and equipment, not following laid-down procedures), and how to minimise these and reduce any risks

2.10 Describe how to locate and identify the equipment to be worked on

2.11 Describe how to follow maintenance schedules, procedures, instructions specifications, site and equipment diagrams

2.12 Describe the methods, techniques and procedures for the maintenance of telecoms systems and equipment

2.13 Describe the types of operational constraints that could occur when carrying out telecoms maintenance activities

2.14 Describe your organisation's procedures relating to maintenance records and documentation including how to access and version control

2.15 Describe your organisation's procedures for the use, care and control of tools and equipment including calibration

2.16 Explain the procedures and precautions to be adopted to eliminate electrostatic discharge (ESD) hazards when working with and handling electronic devices

2.17 Explain how to check the maintenance activity to ensure compliance with the original specification

2.18 Describe the types of damage or disturbance that could occur to operational equipment when undertaking a maintenance activity

2.19 Describe your organisation's procedures for disposing/storing of waste items

2.20 Describe the relevant reporting lines and procedures that are approved by your organisation

2.21 Describe the limits of your own authority and responsibility and those of others involved such as the Safe Work Leader (SWL)

Unit 229 Assist in the planned maintenance of telecoms equipment

Supporting Information

Unit Range Description

1. Follow the health and safety legislation, regulations and safe working practices and procedures, from the following as applicable to the work location and activities:
   - 1.1. your organisation's safety management system
   - 1.2. relevant sections of the HASWA
   - 1.3. COSHH
   - 1.4. safe work plans (such as SSOWP)
   - 1.5. SWL
   - 1.6. track access restrictions
   - 1.7. track work instructions
   - 1.8. track possession
   - 1.9. task risk control sheets
   - 1.10. current rule book
   - 1.11. regulations for working under OHLE and in the vicinity of DC lines (where appropriate)
   - 1.12. equipment disconnections
   - 1.13. manual handling regulations
   - 1.14. RIDDOR
   - 1.15. safety sign regulations
   - 1.16. PPE
2. Identify the access requirements related to two of the following types of site equipment locations:
   - 2.1. trackside
   - 2.2. internal (such as signal box, equipment room)
   - 2.3. areas to which the public have access
   - 2.4. confined spaces
   - 2.5. elevated structures
3. Assist in the planned maintenance of one of the following types of telecom equipment:
   - 3.1. transmission systems
   - 3.2. bearer circuits
   - 3.3. telecoms bearers carrying Signaling circuits
   - 3.4. SCADA
   - 3.5. operational telephones
   - 3.6. switches and systems (such as telephone exchanges & concentrators)
   - 3.7. railway operational information systems
   - 3.8. PA and CCTV
   - 3.9. operational CCTV (such as OPO/DOO)

3.10. GSM-R
3.11. other industry specific telecom equipment

4. Use the following types of tools and equipment as applicable to the equipment being maintained:
   4.1. power tools
   4.2. hand tools
   4.3. wire and cable strippers
   4.4. IDC tools (such as punch down tool)
   4.5. crimping tools
   4.6. multi-meters
   4.7. measuring equipment
   4.8. test equipment
   4.9. other specific telecoms maintenance tools/equipment
5. Carry out the following maintenance activities as applicable to the equipment being maintained:
   5.1. visual and aural checks
   5.2. electrical measurements and adjustments
   5.3. mechanical measurements and adjustments
   5.4. routine servicing
   5.5. cleaning
   5.6. lubricating
   5.7. other specific telecom maintenance activity
6. Assist in the completion the relevant maintenance records, to include one of the following, and pass it to the appropriate people:
   6.1. job card
   6.2. TMTH
   6.3. maintenance log and action report
   6.4. company reporting procedures
   6.5. other industry specific maintenance records

Unit 230 Assist in the removal of telecoms equipment

Unit level:	Level 2
GLH:	30

Unit aim:

This standard identifies the competences you need to assist in the removal of operational telecoms systems and equipment under direction as part of maintenance or fault finding, including the use of correct tools and equipment in accordance with your organisation's procedures. The telecoms equipment in this standard can be for over ground or underground rail transportation systems.

You will be required to use the appropriate tools and equipment throughout the removal activities, and to apply a range of disconnection methods and techniques to safely remove the equipment, and to make safe any connections as appropriate to the equipment removed. Where appropriate, you may also assist in working with computers or electronic controllers, making dis-connections and removing hardware. The removal activities will include making sure that any removed telecoms equipment is moved and stored safely before it is repaired, refitted or disposed of.

Your responsibilities will require you to comply with organisational policy and procedures for the removal activities undertaken, and to report any problems with the activities, tools or equipment used that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You must check that all tools, equipment and materials used in the activities are removed from the work area on completion of the work, and that the relevant job/task documentation is completed accurately and legibly. You will be expected to work to instructions in conjunction with others, taking personal responsibility for your own actions, and for the quality and accuracy of the work that you carry out.

The removal activity may be carried out as a team effort, but you must demonstrate a significant personal contribution to the activities, in order to satisfy the requirements of the standard, and you must demonstrate competence in all the areas required by the standard.

Your underpinning knowledge will be sufficient to provide a sound basis for your work, and will enable you to adopt an informed approach to applying procedures for the removal of telecoms equipment. You will have an understanding of the equipment being removed and its disconnection requirements, in adequate depth to provide a sound basis for carrying out the removal process safely and effectively.

You will understand the safety precautions required when carrying out the removal activities, especially those for ensuring the safe isolation of services. You will be required to demonstrate safe working practices throughout, and will understand your responsibility for taking the necessary safeguards to protect yourself and others in the workplace.

Safety is a key theme throughout this standard and you will be able to identify all the necessary safety requirements and take the relevant action to ensure the safety of yourself, others and railway operations.

Learning outcome

The learner will:

1 Be able to assist in the removal of telecoms equipment

Assessment criteria

The learner can:

1.1 Work safely at all times, complying with your organisation's procedures

1.2 Identify any necessary changes to safety requirements on arriving at site, including prompt reporting to the relevant person(s)

1.3 Locate and identify the equipment to be removed

1.4 Follow all relevant diagrams and specifications

1.5 Establish and, where appropriate, mark component/equipment orientation for re-assembly

1.6 Ensure that any stored energy or substances are released safely and correctly

1.7 Label relevant wiring and components and note the configuration settings

1.8 Remove the required equipment using approved tools and techniques

1.9 Take suitable precautions to prevent damage to equipment during removal

1.10 Provide appropriate electrostatic protection for electronic equipment, where appropriate

1.11 Store or discard the removed equipment in accordance with your organisation's procedures

1.12 Deal promptly and effectively with problems within your control and report those which cannot be resolved

Learning outcome

The learner will:

2 Know how to assist in the removal of telecoms equipment

Assessment criteria

The learner will know:

2.1 Describe the relevant health and safety legislation, regulations and safe working practices and procedures as appropriate to the activity such as the Safe System of Work Planner (SSOWP)

2.2 Describe how to locate and safely access the site

2.3 Describe how to locate and identify the equipment, components and cables to be removed

2.4 Explain the isolation and lock-off procedure or permit-to-work procedure that applies to the system (such as electrical isolation, locking off switchgear, placing of warning notices, proving the isolation has been achieved and secured)

2.5 List the classification of different voltage levels and the authority requirements for working on them

2.6 Explain what constitutes a hazardous voltage/current and how to recognise victims of electric shock

2.7 Describe how to reduce the risks of an electric shock (such as insulated tools, rubber mating and isolating transformers)

2.8 State the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the removal activities

2.9 Identify hazards associated with carrying out telecom removal activities (such as stored voltages, radio frequency radiation, electrical supplies, electrical/electronic interfaces, using damaged or badly maintained tools and equipment, not following laid-down procedures), and how to minimise these and reduce any risks

2.10 Describe the importance of marking the component/equipment orientation for re-assembly and how to undertake this

2.11 Describe the relevant methods, techniques and procedures for the removal activities

2.12 Describe how to source and follow the relevant technical information, standards, diagrams, instructions, specifications and schedules for the removal of telecoms equipment

2.13 Describe your organisation's procedures for the use, care and control of tools and equipment

2.14 Explain the procedures and precautions to be adopted to eliminate electrostatic discharge (ESD) hazards when working with and handling electronic devices

2.15 Describe how to select the correct tools for the activity, including how to confirm that they are calibrated and stored correctly after use

2.16 Describe how to identify the various types of connectors used and the correct tools and equipment to make the disconnections correctly

2.17 Describe the different types of mounting, connecting and cable supporting systems used by the telecoms equipment

2.18 Describe how to label and store removed equipment for re-use, repair or disposal

2.19 Describe the relevant reporting lines and procedures that are approved by your organisation

2.20 Describe the limits of your own authority and responsibility and those of others involved (Safe Work Leader)

Unit 230 Assist in the removal of telecoms equipment

Supporting Information

Unit Range Description

1. Follow the health and safety legislation, regulations and safe working practices and procedures, from the following as applicable to the work location and activities:
   1.1. your organisation's safety management system
   1.2. relevant sections of the HASWA
   1.3. COSHH
   1.4. safe work plans (such as SSOWP)
   1.5. SWL
   1.6. track access restrictions
   1.7. track work instructions
   1.8. track possession
   1.9. task risk control sheets
   1.10. current rule book
   1.11. regulations for working under OHLE and in the vicinity of DC lines (where appropriate)
   1.12. equipment disconnections
   1.13. manual handling regulations
   1.14. RIDDOR
   1.15. safety sign regulations
   1.16. PPE
2. Identify the access requirements related to two of the following types of telecom site locations:
   2.1. trackside
   2.2. internal (such as signal box, equipment room)
   2.3. areas to which the public have access
   2.4. confined spaces
   2.5. elevated structures
3. Assist in the removal of one of the following types of telecom equipment:
   3.1. transmission systems
   3.2. bearer circuits
   3.3. telecoms bearers carrying Signaling circuits
   3.4. SCADA
   3.5. operational telephones
   3.6. switches and systems (such as telephone exchanges & concentrators)
   3.7. railway operational information systems
   3.8. PA and CCTV
   3.9. operational CCTV (such as OPO/DOO)
   3.10. GSM-R
   3.11. other industry specific telecom equipment
4. Use the following types of approved/calibrated tools and equipment as applicable to the equipment being removed:

4.1. power tools
4.2. hand tools
4.3. wire and cable strippers/cutters
4.4. IDC tools
4.5. termination tools
4.6. wrenches
4.7. soldering irons
4.8. manual handling equipment

5. Disconnect the following types of connections during the removal of the equipment as applicable to the type of equipment:
   5.1. mechanical
   5.2. soldered
   5.3. electronic
   5.4. IDC
   5.5. optical
   5.6. other specific type of termination/connection
6. Ensure that removal activities comply with one of the following:
   6.1 infrastructure guidelines and standard operating procedures
   6.2 equipment manufacturer's documents
   6.3 BS, ISO and/or BS EN standards
   6.4 other industry specific telecom standards/specifications
7. Assist in the completion of the relevant removal records, to include one of the following, and pass it to the appropriate people:
   7.1. job card
   7.2. equipment logs and action report
   7.3. company reporting procedures
   7.4. other industry specific equipment records

Unit 231 Assist in the replacement of telecoms equipment

Unit level:	Level 2
GLH:	30

Unit aim:

This standard identifies the competences you need to assist in the replacement of operational telecoms systems and equipment under direction, including the use of correct tools and equipment in accordance with your organisation's procedures. Replacement of the equipment can be as a result of maintenance or fault finding activities. The telecoms equipment in this standard can be for over ground or underground rail transportation systems.

You will be required to use the appropriate tools and equipment throughout the replacement activities, and to apply a range of removal and installation methods and techniques to replace the equipment, and to make connections as appropriate to the equipment installed. Where appropriate, you may also assist in working with computers or electronic controllers, making connections, installing hardware and loading and updating software. The replacement activities will include making checks and adjustments, in line with your permitted authority, and assisting others to ensure that the replaced equipment functions to the required specification.

Your responsibilities will require you to comply with organisational policy and procedures for the replacement activities undertaken, and to report any problems with the activities, tools or equipment used that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You must check that all tools, equipment and materials used in the replacement activities are removed from the work area on completion of the work, and that the relevant job/task documentation is completed accurately and legibly. You will be expected to work to instructions in conjunction with others, taking personal responsibility for your own actions, and for the quality and accuracy of the work that you carry out.

The replacement activity may be carried out as a team effort, but you must demonstrate a significant personal contribution to the activities, in order to satisfy the requirements of the standard, and you must demonstrate competence in all the areas required by the standard.

Your underpinning knowledge will be sufficient to provide a sound basis for your work, and will enable you to adopt an informed approach to applying procedures for the replacement of telecoms equipment. You will have an understanding of the equipment being removed, and its installation requirements, in adequate depth to provide a sound basis for carrying out the process safely and effectively.

You will understand the safety precautions required when carrying out the replacement activities, especially those for ensuring the safe isolation of services. You will be required to demonstrate safe working practices throughout, and will understand your

responsibility for taking the necessary safeguards to protect yourself and others in the workplace.

Safety is a key theme throughout this standard and you will be able to identify all the necessary safety requirements and take the relevant action to ensure the safety of yourself, others and railway operations.

Learning outcome

The learner will:

1 Be able to assist in the replacement of telecoms equipment

Assessment criteria

The learner can:

1.1 Work safely at all times, complying with your organisation's procedures

1.2 Identify any necessary changes to safety requirements on arriving at site, including prompt reporting to the relevant person(s)

1.3 Obtain the required equipment and ensure that it is in a suitable condition for replacement and fit for purpose

1.4 Follow all relevant diagrams and specifications

1.5 Replace the equipment in the correct sequence using appropriate tools and techniques

1.6 Take suitable precautions to prevent damage to equipment during the replacement activity

1.7 Make any necessary settings or adjustments to the equipment to ensure it will function correctly

1.8 Ensure that the replacement is complete and that all components are free from damage including checking that all necessary connections to the equipment are complete

1.9 Observe sufficient operations of the equipment to confirm it is functioning correctly

1.10 Deal promptly and effectively with problems within your control and report those that cannot be resolved

Learning outcome

The learner will:

2 Know how to assist in the replacement of telecoms equipment

Assessment criteria

The learner will know:

1.1 Describe the relevant health and safety legislation, regulations and safe working practices and procedures as appropriate to the activity such as the Safe System of Work Planner (SSOWP)

1.2 Describe how to locate and safely access the site

1.3 Describe how to locate and identify the equipment to be replaced

1.4 Explain the isolation and lock-off procedure or permit-to-work procedure that applies to the system (such as electrical isolation, locking off switchgear, placing of warning notices, proving the isolation has been achieved and secured)

1.5 List the classification of different voltage levels and the authority requirements for working on them

1.6 Explain what constitutes a hazardous voltage/current and how to recognise victims of electric shock

1.7 Describe how to reduce the risks of an electric shock (such as insulated tools, rubber mating and isolating transformers)

1.8 State the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the activities

1.9 Identify hazards associated with carrying out telecom replacement activities (such as stored voltages, radio frequency radiation, electrical supplies, electrical/electronic interfaces, using damaged or badly maintained tools and equipment, not following laid-down procedures), and how to minimise these and reduce any risks

1.10 Describe the relevant methods, techniques and procedures for removal and installation activities

1.11 Describe how to source and follow relevant technical information, standards, diagrams, instructions, specifications and schedules for replacement of telecoms equipment

1.12 Describe your organisation's procedures for the use, care and control of tools and equipment

1.13 Describe the procedures and precautions to be adopted to eliminate electrostatic discharge (ESD) hazards when working with and handling electronic devices

1.14 Describe how and when damage may occur to equipment during replacement

1.15 Describe how to select the correct tools for the activity, including how to confirm that they are calibrated and stored correctly after use

1.16 Describe how to identify the various types of connectors used and the correct tools and equipment to make the disconnection and connections correctly

1.17 Describe the different types of mounting, connecting and cable supporting systems used in the replacement of the telecoms equipment

1.18 Describe the relevant reporting lines and procedures that are approved by your organisation

1.19 Describe the limits of your own authority and responsibility and those of others involved (Safe Work Leader)

Unit 231 Assist in the replacement of telecoms equipment

Supporting Information

Unit Range Description

1. Follow the health and safety legislation, regulations and safe working practices and procedures, from the following as applicable to the work location and activities:
   - 1.1. your organisation's safety management system
   - 1.2. relevant sections of the HASWA
   - 1.3. COSHH
   - 1.4. safe work plans (such as SSOWP)
   - 1.5. SWL
   - 1.6. track access restrictions
   - 1.7. track work instructions
   - 1.8. track possession
   - 1.9. task risk control sheets
   - 1.10. current rule book
   - 1.11. regulations for working under OHLE and in the vicinity of DC lines (where appropriate)
   - 1.12. equipment disconnections
   - 1.13. manual handling regulations
   - 1.14. RIDDOR
   - 1.15. safety sign regulations
   - 1.16. PPE
2. Identify the access requirements related to two of the following types of telecom equipment site locations:
   - 2.1. trackside
   - 2.2. internal (such as signal box, equipment room)
   - 2.3. areas to which the public have access
   - 2.4. confined spaces
   - 2.5. elevated structures
3. Assist in the replacement of one of the following types of telecom equipment:
   - 3.1. transmission systems
   - 3.2. bearer circuits
   - 3.3. telecoms bearers carrying Signaling circuits
   - 3.4. SCADA
   - 3.5. operational telephones
   - 3.6. switches and systems (such as telephone exchanges & concentrators)
   - 3.7. railway operational information systems
   - 3.8. PA and CCTV
   - 3.9. operational CCTV (such as OPO/DOO)

3.10. GSM-R
3.11. other industry specific telecom equipment

4. Use the following types of approved/calibrated tools and equipment as applicable to the equipment being replaced:
   4.1. power tools
   4.2. hand tools
   4.3. wire and cable strippers/cutters
   4.4. IDC tools (such as punch down tool)
   4.5. crimping tools
   4.6. soldering irons
   4.7. torque wrenches
   4.8. measuring equipment
   4.9. levelling equipment
5. Make two of the following types of connections during the replacement:
   5.1. crimping
   5.2. mechanical
   5.3. soldering
   5.4. IDC
   5.5. optical
   5.6. other specific type of termination/connection
6. Ensure that replacement activities comply with one of the following:
   6.1 infrastructure guidelines and standard operating procedures
   6.2equipment manufacturer's documents
   6.3 BS, ISO and/or BS EN standards
   6.4other industry specific telecom standards/specifications
7. Assist in the completion of the relevant records, to include one of the following, and pass it to the appropriate people:
   7.1. job card
   7.2. installation log and action report
   7.3. company reporting procedures
   7.4. other industry specific removal/installation records

Unit 232 Plan railway electrification engineering activities

Unit level:	Level 2
GLH:	30

Learning outcome

The learner will:

1 Be able to plan electrification engineering activities

Assessment criteria

The learner can:

1.1 Source and interpret information required for the activity

1.2 Identify health and safety issues and safe working practices and procedures that must be followed

1.3 Identify the activities to be carried out and determine their sequence

1.4 Establish what resources are required

1.5 Identify any special requirements and incorporate them in the plan

1.6 Identify where technical documentation, equipment, tools, materials, components and/or personnel are not available and deal with the deficiency in line with own organisation's procedures

1.7 Estimate the timescales required

1.8 Prepare and record the plan

1.9 Ensure all required documentation is complete, accurate, formatted and processed in accordance own organisation's procedures

1.10 Deal effectively with problems within the limits of own authority and report those that cannot be resolved

1.11 Discuss and agree with the relevant person(s) effective and efficient alternatives where planned activities cannot be achieved

Learning outcome

The learner will:

2 Know how to plan electrification engineering activities

Assessment criteria

The learner can:

2.1 Describe the relevant health and safety legislation, regulations and safe working practices and procedures as appropriate to the activity

2.2 Describe how to source and interpret the types of information required for the activity

2.3 Explain the importance of planning the activities in the specified sequence and agreed timescale

2.4 Describe the types of resources required

2.5 Explain how to estimate the timescales required

2.6 Describe how to prepare and record the plan

2.7 Describe how to deal with a deficiency of technical documentation, equipment, tools, materials, components and/or personnel

2.8 Describe how to identify, evaluate and respond to activities that cannot be achieved

2.9 Describe the relevant reporting lines and procedures that are approved by own organisation

2.10 Explain the limits of own authority and responsibility and those of others involved in the activity

Unit 233 Assist with maintenance on railway electrification equipment and components

Unit level:	Level 2
GLH:	40

Learning outcome

The learner will:

1 Be able to assist with maintenance on electrification equipment and components

Assessment criteria

The learner can:

1.1 Set up a safe system of work for the activity and work to the system

1.2 Follow the relevant maintenance schedules and instructions

1.3 Carry out the maintenance activities within limits of own authority

1.4 Report instances where the maintenance activities cannot be fully met or where there are identified defects outside the planned schedule

1.5 Dispose of waste materials in line with the organisation's procedures

Learning outcome

The learner will:

2 Know how to assist with maintenance on electrification equipment and components

Assessment criteria

The learner can:

2.1 Describe the relevant health and safety working practices appropriate to the activity and organisation

2.2 Describe how to follow the organisation's maintenance schedules and instructions

2.3 Describe methods and techniques for carrying out maintenance activities

2.4 Explain the importance of carrying out maintenance activities in the specified sequence and agreed timescale

2.5 Describe the actions that can be taken when defects arise

2.6 Describe the organisation's procedures for waste disposal

2.7 Describe the organisation's reporting lines and procedures

2.8 Describe the limits of own authority and responsibility and that of those involved in maintaining electrification equipment and components

Unit 234 Assist in preparing resources for railway electrification engineering activities

Unit level:	Level 2
GLH:	30

Learning outcome

The learner will:

1 Be able to assist in preparing resources for electrification engineering activities

Assessment criteria

The learner can:

1.1 Set up a safe system of work and work to the system

1.2 Identify the resources to be used

1.3 Ensure sufficient resources are available

1.4 Prepare resources for engineering activities

1.5 Take action when changes to the planned use of resources arise

1.6 Take responsibility for the care and use of the resources within the limits of own authority

Learning outcome

The learner will:

2 Know how to assist in preparing resources for electrification engineering activities

Assessment criteria

The learner can:

2.1 Describe the relevant health and safety working practices appropriate to the activity and organisation

2.2 List the types of resources available, including:

- Documentation
- Tools and equipment
- Materials
- Assets and components
- Communications equipment

- Personnel

2.3 Describe how to obtain up-to-date information on engineering activities and the resources required

2.4 Describe how to obtain up-to-date documentation on the resources to be used

2.5 Describe own organisation's procedures for the care and use of resources, including tools and equipment, identification and calibration

2.6 Describe how to follow the relevant schedules and instructions

2.7 Describe how the planned use of resources could alter and the implications that may follow

2.8 Describe the relevant reporting lines and procedures that are approved by own organisation

2.9 Describe the limits of own authority and responsibility and those of others involved in the activity

Unit 235 Assist in preventative and corrective maintenance of traction cabling systems

Unit level:	Level 2
GLH:	40

Learning outcome

The learner will:

1 Be able to assist in preventative and corrective maintenance of traction cabling systems

Assessment criteria

The learner can:

1.1 Work safely at all times, complying with own organisation's procedures

1.2 Follow the relevant maintenance schedules, specifications and instructions to carry out the required activities

1.3 Carry out the activities within the limits of your own authority

1.4 Carry out the activities in the specified sequence and in an agreed timescale

1.5 Confirm that the systems are functioning as defined by the specification

1.6 Complete relevant documentation accurately and pass them on to the appropriate person(s), if applicable

1.7 Dispose of waste materials in line with own organisation's procedures

Unit 236 Establish the operational condition of electrification and plant assets

Unit level:	Level 2
GLH:	40
Unit aim:	This unit is for those individuals who are required to undertake preventative maintenance on electrification and plant assets.

Learning outcome

The learner will:

1 Be able to establish the operational condition of electrification and plant assets

Assessment criteria

The learner can:

1.1 Work safely at all times, complying with your organisation's procedures
1.2 Source and interpret the relevant specifications for the asset(s) being checked
1.3 Identify, analyse and determine the sequence of the activities to be undertaken
1.4 Identify the equipment and components to be checked
1.5 Carry out the activities within the limits of own authority
1.6 Carry out the activities in the specified sequence and in an agreed timescale
1.7 Confirm the operational condition of the asset(s)
1.8 Complete relevant documentation accurately and pass to the appropriate person(s), if applicable
1.9 Identify where the operational condition of the asset(s) may affect the functional integrity and safety of the operational system
1.10 Report any instances where the activities cannot be fully completed
1.11 Complete relevant records accurately and pass them on to the appropriate person(s), if applicable

Learning outcome

The learner will:

2 Know how to establish the operational condition of electrification and plant assets

Assessment criteria

The learner can:

2.1 Describe the relevant health and safety working practices appropriate to the activity and organisation

2.2 Describe how to source and interpret your organisation's approved specifications and instructions

2.3 Describe how to identify discrepancies in specifications, including version control

2.4 Describe how to identify and analyse the activities to be undertaken

2.5 Describe how to identify the equipment and components to be checked

2.6 Explain your organisation's methods and techniques for establishing the operational condition of the asset(s)

2.7 Describe the importance of carrying out activities in the specified sequence and agreed timescale

2.8 Describe the implications of when activities cannot be completed

2.9 Describe the types of conditions and activities that would impact on the functional integrity and safety of the operational system

2.10 Describe the organisation's reporting lines and procedures

2.11 Describe the limits of own authority and responsibility and that of others involved in the activity

Unit 237 Assist in the installation of traction and rolling stock equipment

Unit level:	Level 2
GLH:	50

Unit aim:

This standard identifies the competences you need to assist in the installation of traction and rolling stock equipment in accordance with approved procedures. You will be required to assist in the installation of a range of equipment, all of which encompass an integrated system involving two of the following interactive technologies: mechanical, electrical, electronic, fluid power or process controller. Typical systems will include equipment such as wheel sets, bogies, traction motors, engines, transmission, compressors, electrical/electronic control or communication systems, environmental systems, and devices such as doors with fluid power and electrical mechanisms attached. The term traction and rolling stock used in this standard applies to passenger, freight and on-track machinery (OTM). Where it is relevant these standards also apply to traction and rolling stock that has been fitted with the European Train Control System (ETCS).

This standard does not involve maintenance/repair type activities, such as removal and replacement of items of equipment that are simple, self-contained items requiring minimal installation. It does, however, include the connection of sub-assemblies where these have been broken down for transportation purposes.

You will be required to use the appropriate tools and equipment throughout the installation activities, and to apply a range of installation methods and techniques to position, level and align the equipment, and to make connections to sensors and actuators which could be electrical, fluid power, water/coolant or fuel supply, as appropriate to the equipment installed. Where appropriate, you may also assist in working with computers or electronic controllers, making connections, installing hardware and loading and updating software. The installation activities will include making checks and adjustments, in line with your permitted authority, and assisting others to ensure that the installed equipment functions to the required specification.

Your responsibilities will require you to comply with organisational policy and procedures for the installation activities undertaken, and to report any problems with the activities, tools or equipment used that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You must check that all tools, equipment and materials used in the installation activities are removed from the work area on completion of the work, and that the relevant job/task documentation is completed accurately and legibly. You will be expected to work to instructions, alone or in conjunction with others, taking personal responsibility for your own actions, and for the quality and accuracy of the work that you carry out.

The installation activity may be carried out as a team effort, but you must demonstrate a significant personal contribution to the installation activities, in order to satisfy the requirements of the

standard, and you must demonstrate competence in all the areas required by the standard.

Your underpinning knowledge will be sufficient to provide a sound basis for your work, and will enable you to adopt an informed approach to applying procedures for the installation of traction and rolling stock equipment. You will have an understanding of the equipment being installed, and its installation requirements, in adequate depth to provide a sound basis for carrying out the installation process safely and effectively.

You will understand the safety precautions required when carrying out the installation activities, especially those for ensuring the safe isolation of services. You will be required to demonstrate safe working practices throughout, and will understand your responsibility for taking the necessary safeguards to protect yourself and others in the workplace.

Learning outcome

The learner will:

1 Be able to assist in the installation of traction and rolling stock equipment

Assessment criteria

The learner can:

1.1 Work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines

1.2 Follow all relevant instruction documentation for the installation being carried out

1.3 Use the correct tools and equipment for the installation operations, and check that they are in a safe and usable condition

1.4 Assist in the installation, positioning and securing of the equipment, using appropriate methods and techniques

1.5 Assist in checking the installation, and make any adjustments in accordance with the specification

1.6 Deal promptly and effectively with problems within your control and report those that cannot be solved

1.7 Dispose of waste items in a safe and environmentally acceptable manner

1.8 Assist in the completion of installation documentation

Learning outcome

The learner will:

2 Know how to assist in the installation of traction and rolling stock equipment

Assessment criteria

The learner can:

2.1 Describe the health and safety requirements of the area in which the installation activity is to take place, and the responsibility these requirements place on you

2.2 Explain the isolation and lock-off procedure or permit-to-work procedure that applies to the installation activities (such as electrical isolation, locking off switchgear, placing of maintenance warning notices, proving the isolation has been achieved and secured)

2.3 Describe the specific health and safety precautions to be applied during the installation procedure, and their effects on others

2.4 Describe the hazards associated with installing traction and rolling stock equipment, and with the tools and equipment used, and how they can be minimised

2.5 List the classification of different voltage levels and the authority requirements for working on them

2.6 Describe the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the installation

2.7 Explain what constitutes a hazardous voltage/current and how to recognise victims of electric shock

2.8 Explain how to reduce the risks of an electric shock (such as insulated tools, rubber mating and isolating transformers)

2.9 Describe how to obtain and interpret information from job instructions and other documentation used in the installation activities (such as installation drawings, specifications, manufacturers' manuals, regulations, symbols and terminology)

2.10 Describe the basic principles of how the system functions, and its operating sequence

2.11 Describe methods of preparing the traction and rolling stock for positioning the equipment, and the tools and equipment used for this

2.12 Describe the various mechanical fasteners and locking devices that will be used, and their correct method of installation

2.13 Describe methods of lifting, handling and supporting the equipment during the installation activities

2.14 Describe methods of levelling and aligning the equipment, and the types of tools, instruments and techniques used

2.15 Describe methods of connecting to mechanical power transmission devices (such as shafts, couplings belt and chain drives)

2.16 Describe the different types of cabling used in the installation activities, and their methods of termination

2.17 Describe the different types of wiring enclosures that are used (to include conduit, trunking and traywork systems)

2.18 Describe the installation and termination of a range of electrical components (such as plugs, switches, sockets, lighting and fittings)

2.19 Describe why electrical bonding is critical, and why it must be both mechanically and electrically secure

2.20 Describe the care, handling and application of multimeters and other electrical measuring instruments

2.21 Describe methods of assembling and installing pipework, hoses and fittings

2.22 Describe how to recognise a range of fluid power components

2.23 Describe the recognition of contaminants and the problems they can create, and the effects and likely symptoms of contamination in the system

2.24 Describe the recognition of sensors, instrumentation and associated peripherals (such as pressure, flow, temperature)

2.25 Describe the recognition of electronic systems and associated peripheral devices (such as input/output (I/O) devices)

2.26 Describe how to conduct any necessary checks to ensure the equipment integrity, functionality, accuracy and quality of the installation (including the fitting of guards to all moving parts, and covers on electrical connections)

2.27 Describe how to recognise installation defects (such as leaks, poor seals, misalignment, ineffective fasteners, foreign object damage)

2.28 Describe the problems that can occur with the installation operations, and how these can be overcome

2.29 Describe the fault-finding techniques to be used if the equipment fails to operate correctly

2.30 Describe the recording documentation to be completed for the activities undertaken

2.31 Describe the extent of your own responsibility and to whom you should report if you have problems that you cannot resolve

Unit 237 Assist in the installation of traction and rolling stock equipment

Supporting Information

Unit Range Description

1 Carry out all of the following during the installation of the traction and rolling stock equipment:

- 1.1 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations
- 1.2 confirm that authorisation to carry out the installation activities has been given
- 1.3 check that safe access and working arrangements for the installation area have been provided
- 1.4 confirm that services have been safely isolated, ready for the installation (such as mechanical, electricity, air or fluids)
- 1.5 check that all required installation consumables are available
- 1.6 leave the work area in a safe condition and free from foreign object debris

2 Assist in the installation of a traction and rolling stock system, which includes installing equipment for two of the following interactive technologies:

installing mechanical equipment/components:

assist in carrying out all of the following:

- 2.1 installing mechanical equipment (such as bogies, transmission, engines, pumps)
- 2.2 levelling equipment
- 2.3 aligning and securing sub-assemblies and units
- 2.4 connecting units (such as shafts, couplings, drives)

Plus one of the following:

- 2.5 setting and adjusting drive mechanisms (such as shafts, couplings, drives)
- 2.6 setting and adjusting operating mechanisms (such as levers, linkages, cams and followers)
- 2.7 setting and adjusting control mechanisms (such as clutches, brakes, end stops)

installing electrical and electronic equipment/components:

assist in carrying out all of the following:

- 2.8 installing electrical/electronic equipment (such as traction motors, switch gear, distribution panels, inverters, luminaires, line replaceable units (LRU's))
- 2.9 attaching suitable cable identification (such as colour coding or numbering systems)
- 2.10 installing wiring enclosures/cable protection systems (such as conduit, trunking and tray work)
- 2.11 installing, routeing and securing wires and cables (such as PVC, armoured cables, data cables)
- 2.12 terminating cables to electrical components

installing fluid power components:

assist in carrying out all of the following:

2.13 installing fluid power equipment (such as compressors, pumps, accumulators, storage reservoirs and receivers)

2.14 installing fluid power components (such as cylinders, valves, sensors, actuators, filters and regulators)

2.15 installing rigid and flexible pipework and hoses

2.16 connecting components to pipework, using appropriate fittings

2.17 dressing and securing piping and hoses

installing process controller components:

assist in carrying out all of the following:

2.18 installing process controllers or sequential controllers (such as PCs, data communication links)

2.19 installing and connecting wires and cables to components

2.20 installing input/output interfacing

2.21 installing peripherals (such as sensors, relays, switches)

2.22 checking and confirming that signal measurement and transmission are satisfactory

installing instrumentation and control components:

assist in carrying out all of the following:

2.23 installing instrumentation and control equipment (such as pressure, flow, level, temperature, speed, weight, vibration)

2.24 installing and connecting peripherals (such as sensors, actuators, relays, switches)

2.25 installing and connecting process pipework (as appropriate)

Plus one of the following:

2.26 connecting electrical/pneumatic supply to instruments/sensors

2.27 connecting signal transmission supply to instruments/sensors

2.28 checking and confirming that signal measurement and transmission are satisfactory

3 Apply installation methods and techniques, to include four of the following:

3.1 marking out positions of all equipment

3.2 drilling and/or preparing mounting holes

3.3 aligning and levelling equipment

3.4 securing by using mechanical fixings (threaded fasteners)

3.5 securing by using adhesives

3.6 torque loading of fasteners

3.7 applying fastener locking devices

3.8 shimming and packing

3.9 fitting anti-vibration mountings

3.10 moving and positioning equipment, using appropriate lifting and handling equipment

4 Use two of the following groups of instruments during the installation activities:

4.1 alignment devices (such as plumb lines, levels, inclinometers, laser equipment)

4.2 linear measuring devices (such as tapes, dial test indicators, micrometers, verniers, feeler gauges)

4.3 electrical measuring equipment (such as multimeter, continuity tester, insulation resistance)

4.4 fluid/power testing equipment (such as pressure or flow testing devices, speed or temperature measurement)

5 Carry out all of the following checks and adjustments as appropriate to the equipment being installed:

5.1 making visual checks of the installation, for completeness and freedom from damage

5.2 topping up fluid/oil reservoirs (as appropriate)

5.3 ensuring that all bolts are correctly torqued, and that locking devices are fitted to fasteners

5.4 ensuring that all pipe connections are correctly made, secure and leak free

5.5 ensuring that all moving parts are clear of obstructions and are guarded

5.6 making sensory checks of the system (sight, sound, smell, touch)

Plus: Assist in carrying out two of the following:

5.7 confirm that the correct data/software has been loaded

5.8 ensuring that all electrical connections are correctly made, earth bonding is secure and connections covered

5.9 testing that the system operates to the installation specification

6 Assist in dealing with two of the following conditions during the installation process:

6.1 installations with no faults

6.2 partial equipment malfunction

6.3 complete malfunction of equipment

7 Assist in using fault location methods and techniques on the installation, to include one of the following:

7.1 diagnostic aids (such as company records/history, manufacturers' manuals, fault analysis charts, troubleshooting guides)

7.2 fault finding techniques (such as six point, half-split, unit substitution)

7.3 functional testing the installation/running equipment self-diagnostics

8 Produce installations which comply with one of the following:

8.1 organisational guidelines and codes of practice

8.2 equipment manufacturer’s operation range

8.3 BS, ISO and/or BSEN standards

8.4 company standard operating procedures (SOP’s)

8.5 documents such as technical procedures, vehicle maintenance instructions, vehicle overhaul instructions, workshop overhaul standards specifications

9 Complete the relevant paperwork/records, to include one of the following, and pass it to the appropriate people:

9.1 installation records

9.2 job cards

9.3 specific company documentation

9.4 permit to work/formal risk assessment

9.5 maintenance log or report

9.6 electronic records

Unit 238 Carry out scheduled maintenance on traction and rolling stock mechanical equipment

Unit level:	Level 2
GLH:	60

Unit aim:

This standard identifies the competences you need to carry out scheduled maintenance activities on traction and rolling stock mechanical equipment, in accordance with approved procedures. You will be required to carry out scheduled maintenance on a range of mechanical equipment such as wheel sets, bogies, suspension, gearboxes, pumps, engines, and other company-specific equipment, in order to minimise downtime and ensure that the traction and rolling stock performs at the optimal level and functions to specification. The term traction and rolling stock used in this standard applies to passenger, freight and on-track machinery (OTM). Where it is relevant these standards also apply to traction and rolling stock that has been fitted with the European Train Control System (ETCS).

Your responsibilities will require you to comply with organisational policy and procedures for the maintenance activities undertaken, and to report any problems with the maintenance process, tools or equipment used that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You must ensure that all tools, equipment and materials used in the maintenance activities are removed from the work area on completion of the activities, and that all necessary job/activity documentation is completed accurately and legibly. You will be expected to work to instructions, alone or in conjunction with others, taking personal responsibility for your own actions, and for the quality and accuracy of the work that you carry out.

Your underpinning knowledge will be sufficient to provide a sound basis for your work, and will enable you to adopt an informed approach to applying scheduled maintenance procedures to traction and rolling stock mechanical equipment. You will have an understanding of the process of implementing scheduled maintenance activities, the importance of carrying them out at specific times, and of recording the outcomes and actions taken. In addition, you will be expected to report where the outcomes identify the need for further investigation or maintenance work.

You will understand the safety precautions required when carrying out the maintenance activities, especially those for isolating the equipment and informing others of the work you are carrying out. You will also understand your responsibilities for safety, and the importance of taking the necessary safeguards to protect yourself and others in the workplace.

Learning outcome

The learner will:

1 Be able to carry out scheduled maintenance on traction and rolling stock mechanical equipment

Assessment criteria

The learner can:

1.1 Work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines

1.2 Follow the relevant mechanical maintenance schedules to carry out the required work

1.3 Carry out the mechanical maintenance activities within the limits of your personal authority

1.4 Carry out the mechanical maintenance activities in the specified sequence and in an agreed time scale

1.5 Report any instances where the maintenance activities cannot be fully met or where there are identified defects outside the planned schedule

1.6 Complete relevant maintenance records accurately and pass them on to the appropriate person

1.7 Dispose of waste materials in accordance with safe working practices and approved procedures

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Learning outcome

The learner will:

2 Know how to carry out scheduled maintenance on traction and rolling stock mechanical equipment

Assessment criteria

The learner can:

2.1 Describe the health and safety requirements of the area in which the scheduled maintenance activities are to take place, and the responsibility these requirements place on you

2.2 Describe the isolation procedure or permit-to-work procedure that applies to the equipment being maintained (such as electrical isolation, locking off switchgear, placing of maintenance warning notices, proving the isolation has been achieved and secured)

2.3 Describe the specific health and safety precautions to be applied during the scheduled maintenance activities, and their effects on others

2.4 List the classification of different voltage levels and the authority requirements for working on them

2.5 Describe what constitutes a hazardous voltage/current and how to recognise victims of electric shock

2.6 Describe how to reduce the risks of an electric shock (such as insulated tools, rubber mating and isolating transformers)

2.7 Describe the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the maintenance activities

2.8 Describe the hazards associated with carrying out scheduled maintenance activities on mechanical equipment (such as handling oils/greases, stored pressure/force, misuse of tools), and how they can be minimised

2.9 Describe how to obtain and interpret information from job instructions and other documentation used in the maintenance activities (such as drawings, specifications, manufacturers' manuals, servicing schedules, symbols and terminology)

2.10 Describe the various checks to be carried out during the scheduled maintenance procedure

2.11 Describe the maintenance requirements for 'lifed', consumable and on condition components

2.12 Describe the procedure for obtaining the consumables to be used during the scheduled maintenance activity

2.13 Describe methods of checking that components are fit for purpose, and the need to replace `lifed' items

2.14 Describe how to check that any replacement components meet the required specification/operating conditions

2.15 Describe how to make appropriate sensory checks (such as sight, sound, smell and touch)

2.16 Describe the appropriate testing instructions to be adopted during the maintenance activity

2.17 Describe how to make adjustments to components/assemblies to ensure they function to specification

2.18 Describe the basic principles of how the equipment functions, its operating sequence, the working purpose of individual units/components and how they interact

2.19 Describe the different types of bearings that are used and their maintenance requirements

2.20 Describe how to complete scheduled maintenance records/logs/reports, in accordance with company policy and procedures

2.21 Describe the equipment operating and control procedures, and how to apply them in order to carry out scheduled maintenance

2.22 Describe the problems that can occur whilst carrying out the scheduled maintenance activities, and how they can be avoided

2.23 Describe the organisational procedure(s) to be adopted for the safe disposal of waste of all types of materials

2.24 Describe the extent of your own authority and to whom you should report if you have problems that you cannot resolve

Unit 238 Carry out scheduled maintenance on traction and rolling stock mechanical equipment

Supporting Information

Unit Range Description

1. Carry out all of the following during the scheduled mechanical maintenance activities:
   - 1.1. undertake the maintenance activities to cause minimal disruption to normal working
   - 1.2. use the correct issue of drawings and maintenance documentation
   - 1.3. adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations
   - 1.4. confirm with the authorised person that the equipment is ready for carrying out the scheduled maintenance
   - 1.5. ensure the safe isolation of equipment (such as mechanical, electricity, air or fluids)
   - 1.6. ensure that safe access and working arrangements have been provided for the maintenance area
   - 1.7. carry out the scheduled maintenance activities, using appropriate techniques and procedures
   - 1.8. dispose of waste items in a safe and environmentally acceptable manner,
   - 1.9. leave the work area in a safe and tidy condition
2. Carry out scheduled maintenance activities on two of the following:
   - 2.1. gearboxes
   - 2.2. drive train components
   - 2.3. mechanical structures
   - 2.4. auto couplers
   - 2.5. engines
   - 2.6. pumps
   - 2.7. doors
   - 2.8. compressors
   - 2.9. suspension
   - 2.10. bogies/underframe
   - 2.11. control valves
   - 2.12. brakes
   - 2.13. fuel tanks
   - 2.14. other specific mechanical equipment
3. Carry out ten of the following scheduled maintenance activities:
   - 3.1. removing excessive dirt and grime
   - 3.2. making sensory checks (such as sight, sound, smell, touch)
   - 3.3. checking equipment for leaks
   - 3.4. replacing ‘lifed’ consumables (such as fluids, filters, gaskets/seals, hoses)
   - 3.5. monitoring the condition/deterioration of components (such as brakes, bearings, chains, belts, gears, cams, couplings, levers, wiper blades)
   - 3.6. checking that any safety equipment or controls are operating correctly

3.7. checking the operation of instrumentation (such as gauges, sensors and indicators)
3.8. carrying out and/or checking equipment self-analysis data
3.9. making adjustments to components and connections
3.10. checking/tightening fastenings to the required torque
3.11. correct fitting of locking devices
3.12. drain and flush equipment
3.13. replenishing items (such as oils, greases, sand, coolant, water, washer fluid)
3.14. reviewing and checking equipment operation and performance
3.15. recording the results of the scheduled maintenance activity
3.16. reporting or taking action with regard to any defects that require immediate attention (such as replacing non-'lifed' components)
3.17. other specific maintenance activity

4. Maintain mechanical equipment in accordance with one of the following:
4.1. organisational guidelines and codes of practice
4.2. equipment manufacturer's operation range
4.3. BS, ISO and/or BSEN standards
4.4. company standard operating procedures (SOP's)
4.5. documents such as technical procedures, vehicle maintenance instructions, vehicle overhaul instructions, workshop overhaul standards specifications

5. Complete one of the following maintenance records, and pass it to the appropriate person:
5.1. job cards
5.2. specific company documentation
5.3. permit to work/formal risk assessment
5.4. maintenance log or report
5.5. electronic records

Unit 239 Carry out scheduled maintenance on traction and rolling stock electrical equipment

Unit level:	Level 2
GLH:	60

Unit aim:

This standard identifies the competences you need to carry out scheduled maintenance activities on traction and rolling stock electrical equipment, in accordance with approved procedures. You will be required to carry out maintenance on electrical equipment such as such as single and three-phase power supplies, traction motors, switchgear and distribution panels, control systems and equipment, and luminaries and other specific electrical equipment, in order to minimise downtime, and ensure that the equipment performs at optimal levels and functions to specification. The term traction and rolling stock used in this standard applies to passenger, freight and on-track machinery (OTM). Where it is relevant these standards also apply to traction and rolling stock that has been fitted with the European Train Control System (ETCS).

Your responsibilities will require you to comply with organisational policy and procedures for the maintenance activities undertaken, and to report any problems with these activities, or with the tools and equipment that are used, that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You must ensure that all tools, equipment and materials used in the maintenance activities are removed from the work area on completion of the activities, and that all necessary job/activities documentation is completed accurately and legibly. You will be expected to work to instructions, alone or in conjunction with others, taking personal responsibility for your own actions, and for the quality and accuracy of the work that you carry out.

Your underpinning knowledge will be sufficient to provide a sound basis for your work, and will enable you to adopt an informed approach to applying scheduled maintenance procedures to traction and rolling stock electrical equipment. You will have an understanding of the process of implementing scheduled maintenance activities, the importance of carrying them out at specific times, and of recording their outcomes and actions taken. In addition, you will be expected to report where the outcomes identify the need for further investigation or maintenance work.

You will understand the safety precautions required when carrying out the maintenance activities, especially those for isolating the equipment and informing others of the work you are carrying out. You will also understand your responsibilities for safety, and the importance of taking the necessary safeguards to protect yourself and others in the workplace.

Learning outcome

The learner will:

1 Be able to carry out scheduled maintenance on traction and rolling stock electrical equipment

Assessment criteria

The learner can:

1.1 Work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines

1.2 Follow the relevant electrical maintenance schedules to carry out the required work

1.3 Carry out the electrical maintenance activities within the limits of your personal authority

1.4 Carry out the electrical maintenance activities in the specified sequence and in an agreed time scale

1.5 Report any instances where the maintenance activities cannot be fully met or where there are identified defects outside the planned schedule

1.6 Complete relevant maintenance records accurately and pass them on to the appropriate person

1.7 Dispose of waste materials in accordance with safe working practices and approved procedures

Learning outcome

The learner will:

2 Know how to carry out scheduled maintenance on traction and rolling stock electrical equipment

Assessment criteria

The learner will know:

2.1 Describe the health and safety requirements of the area in which the scheduled maintenance activities are to take place, and the responsibility these requirements place on you

2.2 Describe the isolation procedure or permit-to-work procedure that applies to the equipment being maintained (such as electrical isolation, locking off switchgear, placing of maintenance warning notices, proving the isolation has been achieved and secured)

2.3 Describe the specific health and safety precautions to be applied during the scheduled maintenance activities, and their effects on others

2.4 List the classification of different voltage levels and the authority requirements for working on them

2.5 Describe what constitutes a hazardous voltage/current and how to recognise victims of electric shock

2.6 Describe how to reduce the risks of an electric shock (such as insulated tools, rubber mating and isolating transformers)

2.7 Describe the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the maintenance activities

2.8 Describe the hazards associated with carrying out scheduled maintenance activities on electrical equipment (such as live electrical components, stored energy, misuse of tools), and how they can be minimised

2.9 Describe how to obtain and interpret information from job instructions and other documentation used in the maintenance activities (such as drawings, specifications, manufacturers' manuals, symbols and terminology)

2.10 Describe the various checks to be carried out during the scheduled maintenance procedure

2.11 Describe the maintenance requirements for 'lifed', consumables and on condition components

2.12 Describe the procedure for obtaining the consumables to be used during the scheduled maintenance activity

2.13 Describe methods of checking that components are fit for purpose, and the need to replace `lifed' items

2.14 Describe how to check that any replacement components meet the required specification/operating conditions

2.15 Describe how to make appropriate sensory checks (such as sight, sound, smell and touch)

2.16 Describe the appropriate testing instructions to be adopted during the maintenance activity

2.17 Describe how to make adjustments to components/assemblies to ensure they function to specification

2.18 Describe the basic principles of how the equipment functions, its operating sequence, the working purpose of individual units/components, and how they interact with other systems such as ETCS

2.19 Describe how to complete scheduled maintenance records/logs/reports, in accordance with company policy and procedures

2.20 Describe the equipment operating and control procedures, and how to apply them in order to carry out scheduled maintenance

2.21 Describe the problems that can occur whilst carrying out the scheduled maintenance activities, and how they can be avoided

2.22 Describe the organisational procedure(s) to be adopted for the safe disposal of waste of all types of materials

2.23 Describe the extent of your own authority and to whom you should report if you have roblems that you cannot resolve

Unit 239 Carry out scheduled maintenance on traction and rolling stock electrical equipment

Supporting Information

Unit Range Description

1. Carry out all of the following during the scheduled electrical maintenance activities:
   - 1.1. undertake the maintenance activities to cause minimal disruption to normal working
   - 1.2. use the correct issue of maintenance documentation (such as drawings, manuals, maintenance records)
   - 1.3. adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations
   - 1.4. confirm with the authorised person that the equipment is ready for carrying out the scheduled maintenance
   - 1.5. ensure the safe isolation of equipment (such as mechanical, electricity, air or fluids)
   - 1.6. ensure that safe access and working arrangements have been provided for the maintenance area
   - 1.7. carry out the scheduled maintenance activities, using appropriate techniques and procedures
   - 1.8. dispose of waste items in a safe and environmentally acceptable manner
   - 1.9. leave the work area in a safe and tidy condition
2. Carry out scheduled maintenance activities on two of the following types of electrical equipment:
   - 2.1. single-phase power supplies
   - 2.2. control systems and components
   - 2.3. three-phase power supplies
   - 2.4. direct current power supplies
   - 2.5. wiring protection/support systems
   - 2.6. traction motors
   - 2.7. luminaires
   - 2.8. switchgear and distribution panels
   - 2.9. batteries
   - 2.10. other specific electrical equipment
3. Carry out ten of the following scheduled maintenance activities:
   - 3.1. removing excessive dirt and grime
   - 3.2. making sensory checks (such as sight, sound, smell, touch)
   - 3.3. replacing ‘lifed’ consumables (such as brushes, seals, batteries, indicators, protection devices)
   - 3.4. monitoring the condition/deterioration of components (such as cables, connectors, switches, contactors, safety devices)
   - 3.5. checking that any safety equipment or controls are operating correctly
   - 3.6. checking the operation of test/measuring equipment (such as instrumentation, sensors and indicators)
   - 3.7. carrying out and/or checking equipment self-analysis data

3.8. making adjustments to components and/or connections
3.9. checking/tightening fastenings to the required torque
3.10. correct fitting of locking devices
3.11. checking the integrity and security of earth bonding
3.12. reviewing and checking equipment operation and performance
3.13. recording the results of the scheduled maintenance activity
3.14. reporting or taking action with regard to any defects that require immediate attention (such as replacing 'non-lifed' components)
3.15. other specific maintenance activity

4. Maintain electrical equipment, in accordance with one of the following:
4.1. organisational guidelines and codes of practice
4.2. equipment manufacturer's operation range
4.3. BS, ISO and/or BSEN standards
4.4. company standard operating procedures (SOP's)
4.5. documents such as technical procedures, vehicle maintenance instructions, vehicle overhaul instructions, workshop overhaul standards specifications

5. Complete one of the following maintenance records, and pass it to the appropriate person:
5.1. job cards
5.2. specific company documentation
5.3. permit to work/formal risk assessment
5.4. maintenance log or report
5.5. electronic records

Unit 240 Carry out scheduled maintenance on traction and rolling stock communication-electronic equipment

Unit level:	Level 2
GLH:	60

Unit aim:

This standard identifies the competences you need to carry out scheduled maintenance on traction and rolling stock communication-electronic equipment, in accordance with approved procedures. You will be required to carry out scheduled maintenance activities on range of communication-electronic systems, sub-systems or assemblies. You will need to carry out the maintenance activities to minimise downtime, and to ensure that the maintained system performs at the required level and functions to specification. The term traction and rolling stock used in this standard applies to passenger, freight and on-track machinery (OTM). Where it is relevant these standards also apply to traction and rolling stock that has been fitted with the European Train Control System (ETCS).

Your responsibilities will require you to comply with organisational policy and procedures for the scheduled maintenance activities undertaken, and to report any problems with these activities that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You must ensure that all tools, equipment and materials used in the maintenance activities are removed from the work area on completion of the activities, and that all necessary job/activity documentation is completed accurately and legibly. You will be expected to work to instructions, alone or in conjunction with others, taking personal responsibility for your own actions, and for the quality and accuracy of the work that you carry out.

Your underpinning knowledge will be sufficient to provide a sound basis for your work, and will provide an informed approach to applying scheduled maintenance procedures to traction and rolling stock communication-electronic systems. You will have an understanding of the process of implementing scheduled maintenance activities, the importance of carrying them out at specific times, and of recording their outcomes and actions taken. In addition, you will be expected to report where the outcomes identify the need for further investigation or maintenance work.

You will understand the safety precautions required when carrying out the scheduled maintenance activities, especially those for isolating the equipment, and for taking the necessary safeguards to protect yourself against direct or indirect electric shock. You will be required to demonstrate safe working practices throughout, and will understand the responsibility you owe to yourself and others in the workplace.

Learning outcome

The learner will:

1 Be able to carry out scheduled maintenance on traction and rolling stock communication-electronic equipment

Assessment criteria

The learner can:

1.1 Work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines

1.2 Follow the relevant communication-electronic maintenance schedules to carry out the required work

1.3 Carry out the communication-electronic maintenance activities within the limits of your personal authority

1.4 Carry out the communication-electronic maintenance activities in the specified sequence and in an agreed time scale

1.5 Report any instances where the maintenance activities cannot be fully met or where there are identified defects outside the planned schedule

1.6 Complete relevant maintenance records accurately and pass them on to the appropriate person

1.7 Dispose of waste materials in accordance with safe working practices and approved procedures

Learning outcome

The learner will:

2 Know how to carry out scheduled maintenance on traction and rolling stock communication-electronic equipment

Assessment criteria

The learner can:

2.1 Describe the health and safety requirements of the area in which the scheduled maintenance activity is to take place, and the responsibility they place on you

2.2 Describe the isolation and lock-off procedure or permit-to-work procedure that applies to the scheduled maintenance activities (such as electrical isolation, locking off switchgear, placing of maintenance warning notices, proving the isolation has been achieved and secured)

2.3 Describe isolation procedures unique to communication-electronic systems, sub-systems or assemblies

2.4 Describe the specific health and safety precautions needed to be applied during the scheduled maintenance procedure and their effects on others

2.5 List the classification of different voltage levels and the authority requirements for working on them

2.6 Describe the hazards associated with carrying out scheduled maintenance activities on communication-electronic systems, sub-systems or assemblies (such as exposure to live conductors, misuse of tools), and how they can be minimised

2.7 Describe what constitutes a hazardous voltage/current and how to recognise victims of electric shock

2.8 Describe the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the maintenance activities

2.9 Describe how to reduce the risks of an electric shock (such as insulated tools, rubber mating and isolating transformers)

2.10 Describe how the maintenance activities may affect the work of others, and the procedure for informing them of the work to be carried out

2.11 Describe the procedures and precautions to be adopted to eliminate electrostatic discharge (ESD)

2.12 Describe how to obtain and interpret information from job instructions and other documentation used in the maintenance activities (such as drawings, specifications, manufacturers' manuals, symbols and terminology)

2.13 Describe the maintenance schedules and methods to be followed in order to comply with company procedures for scheduled maintenance

2.14 Describe the various checks to be carried out during the scheduled maintenance procedure

2.15 Describe the maintenance requirements for ‘lifed’, consumable and on condition components

2.16 Describe how to make sensory checks (by sight, sound, smell or touch)

2.17 Describe company policy on repair/replacement of systems, sub-systems and assemblies during the scheduled maintenance process

2.18 Describe methods of checking that systems, sub-systems and assemblies are fit for purpose, and the need to replace `lifed' items (such as batteries)

2.19 Describe how to make adjustments to systems, sub-systems and assemblies to ensure they function correctly

2.20 Describe the generation of maintenance documentation and/or reports following the maintenance activity

2.21 Describe problems that can occur during the scheduled maintenance activity, and how they can be overcome

2.22 Describe the organisational procedure to be adopted for the safe disposal of waste of all types of materials

2.23 Describe the extent of your authority and to whom you should report if you have problems that you cannot resolve

Unit 240 Carry out scheduled maintenance on traction and rolling stock communication-electronic equipment

Supporting Information

Unit Range Description

1. Carry out all of the following during the communication-electronic maintenance activities:
   - 1.1. undertake the maintenance activities to cause minimal disruption to normal working
   - 1.2. use the correct issue of maintenance documentation (such as drawings, manuals, maintenance records)
   - 1.3. adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations
   - 1.4. confirm with the authorised person that the equipment is ready for carrying out the scheduled maintenance
   - 1.5. ensure the safe isolation of equipment
   - 1.6. ensure that safe access and working arrangements have been provided for the maintenance area
   - 1.7. carry out the scheduled maintenance activities, using appropriate techniques and procedures
   - 1.8. re-connect and return the equipment to service on completion of the maintenance activities
   - 1.9. leave the work area in a safe and tidy condition
2. Carry out scheduled maintenance activities on two communication-electronic systems, sub-systems or assemblies (at least one of which must be selected from group A):
   Any of the items below can be identified as a system, sub-system or assembly in its own right
   Group A – communication-electronic
   - 2.1. transmitters
   - 2.2. transceivers
   - 2.3. receivers
   - 2.4. aerial systems
   - 2.5. radar systems
   - 2.6. staff communication systems (such as GSMR, PA, cab to cab)
   - 2.7. train control systems (such as AWS, ATP, TPWS, ETCS)
   - 2.8. data transmission lines (such as fibre optics, coaxial, baluns, twin wire)
   - 2.9. display systems (such as crew and passenger information)
   - 2.10. driver-machine interface
   - 2.11. optical systems (such as CCTV)
   - 2.12. built-in test equipment
   - 2.13. data network systems (such as LANs, WANs)
   - 2.14. data network interfaces (such as switches, router, bridging networks)
   - 2.15. any other identifiable electronic system, subsystem or assemblies to Line Replaceable

Unit (LRU) level

Group B - associated equipment

2.16. environmental control systems (such as temperature, alarms, fire protection, fire suppression)
2.17. electromechanical systems (such as servos, motors, relays, complex switches)
2.18. power generation systems (such as AC/DC generators, batteries)
2.19. power distribution systems (such as single phase/3-phase distribution panels, shore connections)
2.20. traction supply control systems (such as inverters, rectifiers, regenerative braking)
2.21. monitoring systems (such as On Train Data Recorder (OTDR))
2.22. hybrid systems (such as ADC, DAC)

3. Carry out ten of the following scheduled maintenance activities:
   3.1. removing excessive dirt or grime
   3.2. making sensory checks (such as sight, sound, smell or touch)
   3.3. visual examination and testing of a system against the maintenance schedule
   3.4. replacing 'lifed' consumables
   3.5. monitoring the condition/deterioration of components (such as connectors, switches, contactors, fans, safety devices)
   3.6. carrying out system self-analysis checks
   3.7. making routine adjustments
   3.8. carrying out leak checks on connections (where appropriate)
   3.9. checking the condition of cables
   3.10. checking the integrity of connections
   3.11. making insulation resistance checks
   3.12. checking/tightening fastenings to the required torque
   3.13. correct fitting of locking devices
   3.14. testing the system operation
   3.15. recording the results of the scheduled maintenance activity and reporting any identified or potential defects
   3.16. reporting or taking action with regard to any defects that require immediate attention
   3.17. other specific maintenance activity
4. Maintain the equipment in accordance with one of the following:
   4.1. organisational guidelines and codes of practice
   4.2. equipment manufacturer's operation range
   4.3. BS, ISO and/or BSEN standards
   4.4. company standard operating procedures (SOP's)
   4.5. documents such as technical procedures, vehicle maintenance instructions, vehicle overhaul instructions, workshop overhaul standards specifications
5. Complete one of the following maintenance records and pass it to the appropriate people:
   5.1. job cards
   5.2. maintenance log or report
   5.3. permit to work/formal risk assessment
   5.4. specific company documentation
   5.5. electronic records

Unit 241 Carry out scheduled maintenance on traction and rolling stock fluid power equipment

Unit level:	Level 2
GLH:	60

Unit aim:

This standard identifies the competences you need to carry out scheduled maintenance activities on traction and rolling stock fluid power equipment, in accordance with approved procedures. You will be required to carry out maintenance on pneumatic, hydraulic or vacuum equipment, which will include equipment and components such as pumps, cylinders, valves, actuators, compressors, pipework and hoses, switches and sensors, in order to minimise down time, and to ensure that the equipment performs at optimal levels and functions to specification. The term traction and rolling stock used in this standard applies to passenger, freight and on-track machinery (OTM). Where it is relevant these standards also apply to traction and rolling stock that has been fitted with the European Train Control System (ETCS).

Your responsibilities will require you to comply with organisational policy and procedures for the scheduled maintenance activities undertaken, and to report any problems with these activities, or with the tools and equipment used, that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You must ensure that all the tools, equipment and materials used in the maintenance activities are removed from the work area on completion of the activities, and that all necessary job/activity documentation is completed accurately and legibly. You will be expected to work to instructions, alone or in conjunction with others, taking personal responsibility for your own actions, and for the quality and accuracy of the work that you carry out.

Your underpinning knowledge will be sufficient to provide a sound basis for your work, and will enable you to adopt an informed approach to applying scheduled maintenance procedures to traction and rolling stock fluid power equipment. You will have an understanding of the process of implementing scheduled maintenance activities, the importance of carrying them out at specific times, and of recording their outcomes and the actions taken. In addition, you will be expected to report where the outcomes identify the need for further investigation or maintenance work.

You will understand the safety precautions required when carrying out the maintenance activities, especially those for isolating the equipment, and for taking the necessary safeguards to protect yourself and others in the workplace. You will be required to demonstrate safe working practices throughout.

Learning outcome

The learner will:

1 Be able to carry out scheduled maintenance on traction and rolling stock fluid power equipment

Assessment criteria

The learner can:

1.1 Work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines

1.2 Follow the relevant fluid power maintenance schedules to carry out the required work

1.3 Carry out the fluid power maintenance activities within the limits of your personal authority

1.4 Carry out the fluid power maintenance activities in the specified sequence and in an agreed time scale

1.5 Report any instances where the maintenance activities cannot be fully met or where there are identified defects outside the planned schedule

1.6 Complete relevant maintenance records accurately and pass them on to the appropriate person

1.7 Dispose of waste materials in accordance with safe working practices and approved procedures

Learning outcome

The learner will:

2 Know how to carry out scheduled maintenance on traction and rolling stock fluid power equipment

Assessment criteria

The learner will know:

2.1 Describe the health and safety requirements of the area in which the scheduled maintenance activities are to take place, and the responsibility these requirements place on you

2.2 Describe the isolation procedure or permit-to-work procedure that applies to the equipment being maintained (such as electrical isolation, locking off switchgear, placing of maintenance warning notices, proving the isolation has been achieved and secured)

2.3 Describe the specific health and safety precautions to be applied during the scheduled maintenance activities, and their effects on others

2.4 Describe the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the maintenance activities

2.5 Describe the hazards associated with carrying out scheduled maintenance on fluid power equipment (such as handling oils/greases, stored pressure/force, misuse of tools), and how they can be minimised

2.6 Describe how to obtain and extract information from job instructions, drawings, specifications, manufacturers' manuals and other documents needed in the maintenance process

2.7 Describe the various checks to be carried out during the scheduled maintenance procedure

2.8 Describe the importance of following correct preventive contamination procedures

2.9 Describe the effects of contamination in the system

2.10 Describe the maintenance requirements for ‘lifed’, consumable and on condition components

2.11 Describe the procedure for obtaining the consumables to be used during the scheduled maintenance activity

2.12 Describe methods of checking that components are fit for purpose, and the need to replace `lifed' items

2.13 Describe how to check that any replacement components meet the required specification/operating conditions

2.14 Describe how to make appropriate sensory checks (such as sight, sound, smell and touch)

2.15 Describe the appropriate testing instructions to be adopted during the maintenance activity

2.16 Describe how to make adjustments to components/assemblies to ensure they function to specification

2.17 Describe the basic principles of how the equipment functions, its operating sequence, the working purpose of individual units/components, and how they interact with other systems such as ETCS

2.18 Describe how to complete scheduled maintenance records/logs/reports, in accordance with company policy and procedures

2.19 Describe the importance of recording an adjustments and modifications to the system and the implications if this is not carried out

2.20 Describe the equipment operating and control procedures, and how to apply them in order to carry out scheduled maintenance

2.21 Describe the problems that can occur whilst carrying out the scheduled maintenance activities, and how they can be avoided

2.22 Describe the organisational procedure(s) to be adopted for the safe disposal of waste of all types of materials

2.23 Describe the extent of your own authority and to whom you should report if you have problems that you cannot resolve

Unit 241 Carry out scheduled maintenance on traction and rolling stock fluid power equipment

Supporting Information

Unit Range Description

1. Carry out all of the following during the scheduled fluid power maintenance activities:
   - 1.1. undertake the maintenance activities to cause minimal disruption to normal working
   - 1.2. use the correct issue of maintenance documentation (such as drawings, manuals, maintenance records)
   - 1.3. adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations
   - 1.4. adhere to company specific contamination and control procedures at all times
   - 1.5. confirm with the authorised person that the equipment is ready for carrying out the scheduled maintenance
   - 1.6. ensure the safe isolation of equipment (such as mechanical, electricity, air or fluids)
   - 1.7. ensure that safe access and working arrangements have been provided for the maintenance area
   - 1.8. carry out the scheduled maintenance activities, using appropriate techniques and procedures
   - 1.9. dispose of waste items in a safe and environmentally acceptable manner
   - 1.10. leave the work area in a safe and tidy condition
2. Carry out scheduled maintenance activities on one of the following types of fluid power equipment:
   - 2.1. pneumatic equipment
   - 2.2. hydraulic equipment
   - 2.3. vacuum equipment
3. Carry out scheduled maintenance activities on four of the following:
   - 3.1. pumps
   - 3.2. compressors
   - 3.3. pipework and hoses/tubing
   - 3.4. storage devices (such as reservoirs, receivers, accumulators)
   - 3.5. control devices (such as valves, sensors, switches)
   - 3.6. power devices (such as cylinders, actuators, motors)
   - 3.7. supply devices (such as gauges, filters, dryers, regulators)
   - 3.8. other specific system components
4. Carry out ten of the following scheduled maintenance activities:
   - 4.1. removing excessive dirt and grime
   - 4.2. making sensory checks (such as sight, sound, smell, touch)
   - 4.3. draining down water traps
   - 4.4. checking equipment for leaks
   - 4.5. replacing ‘lifed’ consumables (such as gaskets/seals, filters, hoses)

4.6. monitoring the condition/deterioration of components (such as actuators, mechanical control devices, pipework, hoses)
4.7. checking that any safety equipment or controls are operating correctly (such as switches and sensors)
4.8. checking the operation of instrumentation (such as gauges and indicators)
4.9. carrying out and/or checking equipment self-analysis data
4.10. making adjustments to components and connections
4.11. checking/tightening fastenings to the required torque
4.12. correct fitting of locking devices
4.13. replenishing items (such as oils, greases or other fluids)
4.14. reviewing and checking the equipment operation and performance
4.15. recording the results of the scheduled maintenance activity
4.16. reporting or taking action with regard to any defects that require immediate attention (such as replacing non-'lifed' components)
4.17. other specific maintenance activity

5. Maintain fluid power equipment, in accordance with one of the following:
5.1. organisational guidelines and codes of practice
5.2. equipment manufacturer's operation range
5.3. BS, ISO and/or BSEN standards
5.4. company standard operating procedures (SOP's)
5.5. documents such as technical procedures, vehicle maintenance instructions, vehicle overhaul instructions, workshop overhaul standards specifications

6. Complete one of the following maintenance records, and pass it to the appropriate person:
6.1. job cards
6.2. specific company documentation
6.3. permit to work/formal risk assessment
6.4. maintenance log or report
6.5. electronic records

Unit 301 Complying with statutory regulations and organisational safety requirements in the rail industry

Unit level:	Level 3
GLH:	100

Unit aim:

This Employer Unit of Competence (EUC) has been developed by employers in the Rail Engineering Sector and is part of an overall development programme designed to meet the requirements of the Sector, the published Apprenticeship Standard and Employer Occupational Brief This EUC identifies the training and development required in order that the apprentice can demonstrate that they are competent in being able to: Deal with statutory regulations and organisational safety requirements, in accordance with approved procedures.

They will be required to comply with all relevant regulations that apply to their area of work as well as their general responsibilities as defined in the Health and Safety at Work Act.

They must also be able to identify the relevant qualified first aiders or appointed person, and know the location of the first aid facilities. They will have an understanding of the procedures to be adopted in the case of accidents involving injury and in situations where there are dangerous occurrences or hazardous malfunctions of equipment, processes or machinery.

They will also need to be fully conversant with the organisation's procedures for fire alerts and the evacuation of premises. They will be required to identify the hazards and risks that are associated with their job. Typically, these will focus on their working environment, the tools and equipment that they use, materials and substances that they use, working practices that do not follow laid down procedures, and manual lifting and carrying techniques.

Their responsibilities will require them to comply with organisational policy and procedures for the statutory regulations and organisational safety activities undertaken, and to report any problems with the safety activities that they cannot personally resolve, or that are outside their permitted authority, to the relevant people.

They will be expected to work with minimal supervision, taking personal responsibility for their own actions, and for the way in which they carry out the required rail engineering activities.

Their underpinning knowledge will provide a good understanding of their work, and will provide an informed approach to applying statutory regulations and organisational safety requirements and procedures. They will understand the safety requirements and their application, and will know about the safety requirements in adequate depth to provide a sound basis for carrying out the activities safely and correctly.

They will be able to apply the appropriate occupational behaviours required in the workplace to meet the job profile and overall company objectives, including logical approach, problem solving

orientation, quality focus, personal responsibility and resilience, clear communicator, team player, adaptability, self-motivation, willingness to learn and commitment

Learning outcome

The learner will:

1 Be able to comply with statutory regulations and organisational safety requirements in the rail industry

Assessment criteria

The learner can:

1.1 Comply with their duties and obligations as defined in the Health and Safety at Work Act

1.2 Demonstrate their understanding of their duties and obligations to health and safety by carrying out all of the following:

1.2a applying in principle their duties and responsibilities as an individual under the Health and Safety at Work Act and relevant current legislation

1.2b identifying within their organisation, appropriate sources of information and guidance on health and safety issues, to include:

1.2b(i) eye protection and personal protective equipment

1.2b(ii) COSHH regulations

1.2b(iii) risk assessments

1.2c identifying the warning signs and labels of the main groups of hazardous or dangerous substances

1.2d identifying the warning and safety signs applicable to the rail environment

1.2e complying with the appropriate statutory regulations at all times

1.3 Demonstrate the required occupational behaviours in line with the job role and company objectives

1.4 Comply with company/sector procedures in regard to safe access to work locations

1.5 Present themselves in the workplace suitably prepared for the activities to be undertaken

1.6 Apply safe working practices and procedures to include:

1.6a maintaining a tidy workplace with exits and gangways free from obstructions

1.6b using tools and equipment safely and only for the purpose intended

1.6c observing organisational safety rules, signs and hazard warnings

1.6d taking measures to protect others from harm by any work they are carrying out

1.7 Recognise and control hazards in the workplace

1.8 Identify the hazards and risks that are associated with all of the following:

1.8a their working environment

1.8b the tools and equipment that they use

1.8c materials and substances that they use

1.8d using working practices that do not follow laid down procedures

1.9 Use correct manual lifting and carrying techniques

1.10 Demonstrate two of the following methods of manual lifting and carrying techniques:

1.10a lifting alone

1.10b with assistance of others

1.10c with mechanical assistance

1.11 Follow organisational accident and emergency procedures

1.12 Comply with all emergency requirements, to include:

1.12a identifying the appropriate qualified first aiders or appointed person and the location of first aid facilities

1.12b identifying the procedures to be followed in the event of injury to self or others

1.12c following organisational procedures in the event of fire and the evacuation of premises

1.12d identifying the procedures to be followed in the event of dangerous occurrences or hazardous malfunctions

Learning outcome

The learner will:

2 Know how to comply with statutory regulations and organisational safety requirements in the rail industry

Assessment criteria

The learner can:

2.1 Describe the roles and responsibilities of themselves and others under the Health and Safety at Work Act 1974 and current legislation (such as The Management of Health and Safety at Work Regulations; Workplace Health and Safety and Welfare Regulations; Personal Protective Equipment at Work Regulations 1992; Manual Handling Operations Regulations; Provision and Use of Work Equipment Regulations; Display Screen at Work Regulations; The Electricity at Work Regulations)

2.2 Describe the specific regulations and safe working practices and procedures that apply to their work activities

2.3 Describe the warning signs for the nine main groups of hazardous substances defined by Classification, Packaging and Labelling of Dangerous Substances Regulations

2.4 Explain how to locate relevant health and safety information for their tasks and the sources of expert assistance when help is needed

2.5 Explain what constitutes a hazard in the workplace (such as moving parts of machinery, electricity, slippery and uneven surfaces, dust and fumes, handling and transporting, contaminants and irritants, material ejection, fire, working at height, environment, pressure/stored energy systems, volatile or toxic materials, unshielded processes)

2.6 Describe their responsibilities for dealing with hazards and reducing risks in the workplace (such as hazard spotting and safety inspections; the use of hazard check lists, carrying out risk assessments, COSHH assessments and safe systems of working)

2.7 Describe the risks associated with their working environment, the tools, materials and equipment that they use, spillages of oil and chemicals, not reporting accidental breakages of tools or equipment and not following laid-down working practices and procedures

2.8 Describe the importance of applying the appropriate occupational behaviours in the workplace and the implications for both the apprentice and the business if these are not adhered to

2.9 Describe first aid facilities exist within their work area and within the organisation in general and the procedures to be followed in the case of accidents involving injury

2.10 Explain what constitutes dangerous occurrences and hazardous malfunctions, and why these must be reported even when no one was injured

2.11 Describe the procedures for sounding the emergency alarms, evacuation procedures and escape routes to be used and the need to report their presence at the appropriate assembly point

2.12 Describe the organisational policy is with regard to firefighting procedures, the common causes of fire and what they can do to help prevent them

2.13 Describe the protective clothing and equipment is available for their areas of activity

2.14 Explain how to lift and carry loads safely, and the manual and mechanical aids available

2.15 Explain how to prepare and maintain safe working areas, standards and procedures to ensure good housekeeping

2.16 Describe the importance of safe storage of tools, equipment, materials and products

2.17 Describe the extent of their own authority and to whom they should report in the event of problems that they cannot resolve

Unit 302 Using and communicating technical information

Unit level:	Level 3
GLH:	50
Unit aim:	This Employer Unit of Competence (EUC) has been developed by employers in the Rail Engineering Sector and is part of an overall development programme designed to meet the requirements of the Sector, the published Apprenticeship Standard and Employer Occupational Brief This EUC identifies the training and development required in order that the apprentice can demonstrate that they are competent in being able to: Make effective use of text, numeric and graphical information by interpreting and using technical information extracted from rail engineering drawings, technical manuals, reference tables, specifications and charts, in accordance with approved procedures. You will be required to extract the necessary information from the various drawings and related documents in order to establish and carry out the requirements and to make valid decisions about the quality and accuracy of the equipment being worked on. Your responsibilities will require you to comply with organisational policy and procedures for obtaining and using the drawings and related specifications. You will be expected to report any problems with the use and interpretation of the drawings and specifications that you cannot personally resolve, or that are outside your permitted authority, to the relevant people. You will be expected to work with minimal supervision, taking personal responsibility for your own actions, and for the quality and accuracy of the work that you carry out. Your underpinning knowledge will provide a good understanding of the types of drawings and documents used within a rail engineering environment, and will provide an informed approach to applying instructions and procedures. You will be able to read and interpret the drawings and documents used and will know about the conventions, symbols and abbreviations, in adequate depth to provide a sound basis for carrying out the activities to the required specification. They will be able to apply the appropriate occupational behaviours required in the workplace to meet the job profile and overall company objectives, including logical approach, problem solving orientation, quality focus, personal responsibility and resilience, clear communicator, team player, adaptability, self-motivation, willingness to learn and commitment

Learning outcome

The learner will:

1 Be able to use and communicate technical information

Assessment criteria

The learner can:

1.1 Demonstrate the required occupational behaviours in line with the job role and company objectives

1.2 Use oral, written, electronic and IT based methods and systems for the accurate communication, reporting & recording of technical and other information

1.3 Use the approved source(s) to obtain the required data, documentation or specifications and carry out all of the following:

- 1.3a check the currency and validity of the documentation used
- 1.3b exercise care and control over the documentation at all times
- 1.3c correctly extract all necessary data in order to carry out the required tasks
- 1.3d seek out additional information where there are gaps or deficiencies in the information obtained
- 1.3e report any problems found with the data, documentation or specifications
- 1.3f make valid decisions based on the information extracted
- 1.3g return all documentation to the approved location on completion of the work

1.4 Extract and interpret the required information from the data, documentation or specifications

1.5 Extract information that includes three of the following:

- 1.5a materials or components required
- 1.5b connections to be made
- 1.5c dimensions
- 1.5d processes or treatments required
- 1.5e dismantling/assembly sequence required
- 1.5f installation requirements
- 1.5g location/orientation of parts
- 1.5h tolerances and quality requirements
- 1.5i circuit characteristics (such as pressure, flow, current, voltage, speed)
- 1.5j test points
- 1.5k inspection requirements

1.6 Use correct terms and information extracted from engineering drawings and related documentation, to include four of the following:

- 1.6a general assembly drawings
- 1.6b routing diagrams (such as piping, cables etc)
- 1.6c fluid power drawings
- 1.6d layout diagrams (such as schematic, block, physical, system)

1.6e wiring/circuit diagrams

1.6f approved sketches

1.6g installation drawings

1.6h technical illustrations

1.6i manufacturers' manuals/drawings

1.6j visual display screens

1.6k photographic images

1.7 Use information extracted from related standards, templates and certifications to include four from the following:

3.1 standard operating procedures

3.2 maintenance log/reports

3.3 reference tables/charts (such as logic tables, ladder diagrams)

3.4 fault diagnosis guides

3.5 national, international and organisational standards

3.6 test schedules

3.7 health and safety standards relating to activity (such as COSHH)

3.8 test results

3.9 environmental requirements/information

3.10 manufacturers' instructions

1.8 Use the information obtained to establish work requirements

1.9 Deal promptly and effectively with any problems within your control and report those which cannot be solved

1.10 Report any inaccuracies or discrepancies in drawings and specifications

Learning outcome

The learner will:

2 Know how to use and communicate technical information

Assessment criteria

The learner can:

2.1 Describe the information sources used for the documentation and specifications that you use in your work activities

2.2 Explain how the required documentation is obtained, and how to check that it is current and valid

2.3 Describe the importance of applying the appropriate occupational behaviours in the workplace and the implications for both the apprentice and the business if these are not adhered to

2.4 Describe how to use other sources of information to support the rail engineering activity (such as electronic component pin configuration specifications, standard reference charts for limits

and fits, tapping drill reference charts, cable current carrying capacities, thread reference tables)

2.5 Explain the procedure for reporting discrepancies, lost or damaged documentation

2.6 Describe care and control procedures for the documentation, and the importance of returning them to the designated location on completion of the work activities

2.7 Describe the basic drawing conventions that are used, and why there needs to be different types of drawings

2.8 Describe the types of drawings/diagrams used, and how they interrelate (such as isometric and orthographic, first and third angle, assembly drawings, circuit and wiring diagrams, block and schematic diagrams)

2.9 Explain why technical information is presented in different forms

2.10 Describe the meaning of common symbols and abbreviations used within the working environment/work area

2.11 Explain imperial and metric systems of measurement, tolerancing and fixed reference points

2.12 Describe the meaning of the different symbols and abbreviations found on the documentation that you use (such as surface finish, electronic components, weld symbols, linear and geometric tolerances, pressure and flow characteristics)

2.13 Describe the extent of their own responsibility, when to act on their own initiative to find, clarify and evaluate information, and to whom they should report if they have problems that they cannot resolve

Unit 503 Working efficiently and effectively as a rail engineering operative

Unit level:	Level 3
GLH:	50

Unit aim:

This Employer Unit of Competence (EUC) has been developed by employers in the Rail Engineering Sector and is part of an overall development programme designed to meet the requirements of the Sector, the Apprenticeship Standard and Employer Occupational Brief This EUC identifies the training and development required in order that the apprentice can demonstrate that they are competent in being able to: Work efficiently and effectively in the workplace, in accordance with approved procedures and practices.

Prior to undertaking the rail engineering activity, they will be required to carry out all necessary preparations within the scope of their responsibility. This may include preparing the work area and ensuring that it is in a safe condition to carry out the intended activities, ensuring they have the appropriate job specifications and instructions and that any tools, equipment, materials and other resources required are available and in a safe and usable condition. On completion of the rail engineering activity, they will be required to return their immediate work area to an acceptable condition before recommencing further work requirements. This may involve placing completed work in the correct location, returning and/or storing any tools and equipment in the correct area, identifying any waste and/or scrapped materials and arranging for their disposal, and reporting any defects or damage to tools and equipment used.

Their responsibilities will require them to comply with organisational policy and procedures for the rail engineering activities undertaken, and to report any problems with the activities, tools or equipment that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. They will be expected to take personal responsibility for their own actions and for the quality and accuracy of the work that they carry out and to identify and make recommendations where improvements could be made in their working area.

Their underpinning knowledge will provide a good understanding of their work, and will provide an informed approach to working efficiently and effectively in a rail engineering environment. They will understand the need to work efficiently and effectively, and will know about the things they need to consider when preparing and tidying up the work area, how to contribute to improvements, deal with problems, maintain effective working relationships, and agree their development objectives and targets, in adequate depth to provide a sound basis for carrying out the activities safely and correctly.

They will understand the safety precautions required when carrying out rail engineering activities. They will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

They will be able to apply the occupational behaviours required in the workplace to meet the job profile and overall company objectives, including being able to demonstrate; personal responsibility and resilience, working effectively in teams, effective communication and interpersonal skills, focus on quality and problem solving and continuous development

Learning outcome

The learner will:

1 Be able to work efficiently and effectively as a rail engineering operative

Assessment criteria

The learner can:

1.1 Work safely at all times, complying with health and safety and environmental legislation, regulations and other relevant guidelines, ensuring all the following checks and practices are applied at all times:

- 1.1a adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment (PPE) and other relevant safety regulations
- 1.1b wear the appropriate personal protective equipment for the work area and specific activity being carried out
- 1.1c use all tools and equipment safely and correctly, and only for their intended purpose including adherence to the Control of Vibration at Work Regulations (Hand and Arm)
- 1.1d ensure that the work area is maintained and left in a safe and tidy condition

1.2 Plan and prepare to carry out the rail engineering activity, ensuring all the following is applicable to the activity to be undertaken

- 1.2a the work area is free from hazards and is suitably prepared for the activities to be undertaken
- 1.2b any required safety procedures are implemented
- 1.2c any necessary personal protection equipment is obtained, and is in a usable condition
- 1.2d all necessary drawings, specifications and associated documents are obtained
- 1.2e job instructions are obtained and understood
- 1.2f the correct materials or components are obtained
- 1.2g appropriate authorisation to carry out the work is obtained

1.3 Obtain all necessary consumables, tools and equipment and check that they are in a safe and usable condition

1.4 Deal promptly and effectively with any rail engineering problems within their control, and seek help and guidance from the relevant people if they have problems that they cannot resolve

1.5 Identify and report problems affecting the rail engineering activity to include four of the following:

- 1.5a Materials
- 1.5b job specification
- 1.5c timescales
- 1.5d tools and equipment
- 1.5e Quality
- 1.5f Safety
- 1.5g Drawings
- 1.5h people
- 1.5i work activities or procedures
- 1.5j other (to be specified)

1.6 Clean, tidy up and restore the work area on completion of the rail engineering activity to include all of the following:

- 1.6a returning tools and equipment to the designated location
- 1.6b returning drawings and work instructions
- 1.6c disposing of waste materials, in line with organisational and environmental requirements
- 1.6d completing all necessary documentation accurately and legibly
- 1.6e identifying, where appropriate, any damaged or unusable tools or equipment

1.7 Contribute to the business by identifying possible opportunities for improving working practices and/or processes that will impact on one of the following:

- 1.7a standard operating procedures
- 1.7b quality
- 1.7c cost
- 1.7d time such as lead or processing time
- 1.7e waste
- 1.7f energy utilisation
- 1.7g equipment performance or condition
- 1.7h resource
- 1.7i engineering designs

Plus one from the following:

- 1.7j health and safety
- 1.7k customer service
- 1.7l training and development
- 1.7m regulatory compliance
- 1.7n supplier relationships
- 1.7o communication (internal and/or external)
- 1.7p team working
- 1.7q other improvement to be specified by the employer

1.8 Maintain effective working relationships with colleagues and supervisors

1.9 Contribute to developing their own Continuous Development Plan (CPD) relevant to their career aspirations to include all the following:

1.9a review personal training and development, as appropriate to the job role

1.9b describing the levels of skill, knowledge and understanding needed for competence in the areas of work expected of them

1.9b describing their development objectives/program, and how these were identified

1.9c providing information on their expectations and progress towards their identified objectives

1.9d using feedback and advice to improve their personal development and performance objectives

1.10 Demonstrate and apply all the following occupational behaviours in line with the job role and company objectives/values:

1.10a Act professionally demonstrating:

- dependability
- determination
- honesty and integrity
- respect for others
- acting ethically
- contributing to sustainable development

1.10b Be risk aware:

- reduce risks by checking of information
- concentration on the task
- awareness of changing circumstances on activity

1.10c Display a self-disciplined, self-motivated, proactive approach to work:

- occasionally without close supervision
- to approved industry standards and safe working practices

1.10d Work effectively and efficiently

- individually
- as part of a team

maintain effective relationships with;

- colleagues
- clients
- suppliers
- the public

1.10e Receptive to feedback:

- willing to learn new skills and adjust to change
- carry out and record CPD necessary to maintain and enhance competence.

1.10f Prepared to make a personal commitment:

- to their employer
- the industry and its professional standards

Learning outcome

The learner will:

2 Know how to work efficiently and effectively as a rail engineering operative

Assessment criteria

The learner can:

2.1 Outline the safe working practices and procedures to be followed whilst preparing and tidying up your work area

2.2 Explain the importance of applying the appropriate behaviours in the workplace and the implications for both the apprentice and the business if these are not adhered to

2.3 State how to present themselves in the workplace suitably dressed for the activities to be undertaken (such as being neat, clean and dressed in clothes appropriate to the area of activity)

2.4 Explain the importance of reporting to work on time and returning from breaks on time and the potential consequences if this is not adhered to

2.5 Outline the types of attitudes and behaviours that are likely to create conflict or negative responses

2.6 Explain the benefits of team working and understanding of team objectives.

2.7 Outline the roles of individual team members and the strengths they bring to the team.

2.8 Explain the importance of clear communication both oral and written, using appropriate language and format.

2.9 Identify the need to change communication styles to meet the needs of the target audience

2.10 Describe the need to adhere to timescales set for work, whilst maintaining appropriate quality standards and the implications if these are not adhered to.

2.11 Explain the importance of seeking additional support and guidance when required.

2.12 Explain why it is important to be open and honest and admit to any errors and/or mistakes

2.13 Explain the need to be flexible in their approach to work, responding positively to changes or amendments required by the business.

2.14 Explain the importance of taking an active and positive part in the implementation of any amendments or changes to work requirements

2.15 Describe their individual responsibility to work in an ethical manner and the organisations policies relating to ethical working and behaviours

2.16 Explain the importance of respecting others, including an awareness of diversity and inclusion.

2.17 Outline the personal protective equipment (PPE) to be worn for the rail engineering activities undertaken (such as correctly fitting overalls, safety shoes, eye protection, ear protection)

2.18 Describe the correct use of any equipment used to protect the health and safety of yourself and your colleagues

2.19 Outline how to plan and prepare to carry out the rail engineering activity (such as obtaining the appropriate drawings/documentation to be used, determining the materials required,

determining the tools and equipment required, determining a suitable sequence of operations, determining the quality checks to be made and equipment to be used)

2.20 Outline the procedure for ensuring that all documentation relating to the work being carried out is available, prior to starting the activity

2.21 Define the procedure for ensuring that all tools and equipment are available prior to undertaking the activity

2.22 Outline the checks to be carried out to ensure that tools and equipment are in full working order, prior to undertaking the activity

2.23 Outline the checks to be carried out to ensure that all materials required are correct and complete, prior to undertaking the activity

2.24 Explain how to deal effectively with problems that could arise with areas such as quality, safety, people, drawings and other documentation, tools and equipment or if material are incomplete or do not meet the requirements of the activity and the action that should be taken

2.25 Describe their role in helping to develop their own skills and knowledge (such as checking with their supervisor about the work they are expected to carry out and the standard they need to achieve; the safety points to be aware of and the skills and knowledge they will need to develop)

2.26 Outline the benefits of continuous personal development, and the training opportunities that are available in the workplace

2.27 State the importance of reviewing their training and development with trainers and supervisors, of comparing the skills, setting objectives to overcome any shortfall or address any development needs

2.28 Define their responsibilities for providing evidence of your performance and progress (such as submitting work for assessment or the completion of assignments or tests)

2.29 Describe the importance of maintaining effective working relationships within the workplace (such as listening attentively to instructions from their supervisor, making sure they ask for help and advice in a polite and courteous manner, responding positively to requests for help from others)

2.30 Describe the reason for informing others of their activities which may have impact on their work (such as the need to temporarily disconnect a shared resource like electricity or compressed air supply; making undue noise or creating sparks, fumes or arc flashes from welding)

2.31 Describe dealing with disagreements with others in ways which will help to resolve difficulties and maintain long term relationships

2.32 Describe the organisational procedures to deal with and report any problems that can affect working relationships

2.33 Describe the difficulties that can occur in working relationships, and how to resolve them

2.34 Outline the current legislation covering discrimination in the workplace on the ground of race, religion sex, age and disability

2.35 Explain the need to dispose of waste materials and consumables (such as oils and chemicals) in a safe and environmentally friendly way

2.36 Describe where tools and equipment should be stored and located, and the importance of returning all tools and documentation to their designated area on completion of your work activities

2.37 Describe when to act on their own initiative and when to seek help and advice from others

2.38 Explain the importance of leaving the work area in a safe condition on completion of your activities (such as equipment correctly isolated, cleaning the work area and removing and disposing of waste)

Appendix 1 Relationships to other qualifications

Links to other qualifications

Centres are responsible for checking the different requirements of all qualifications they are delivering and ensuring that candidates meet requirements of all units/qualifications.

Literacy, language, numeracy and ICT skills development

This [these] qualification[s] can develop skills that can be used in the following qualifications:

- Functional Skills (England) – see www.cityandguilds.com/functionalskills
- Essential Skills (Northern Ireland) – see www.cityandguilds.com/essentialskillsni
- Essential Skills Wales – see www.cityandguilds.com/esw

Appendix 2 Sources of general information

The following documents contain essential information for centres delivering City & Guilds qualifications. They should be referred to in conjunction with this handbook. To download the documents and to find other useful documents, go to the Centres and Training Providers homepage on www.cityandguilds.com.

Centre Manual - Supporting Customer Excellence contains detailed information about the processes which must be followed and requirements which must be met for a centre to achieve 'approved centre' status, or to offer a particular qualification, as well as updates and good practice exemplars for City & Guilds assessment and policy issues.

Specifically, the document includes sections on:

- The centre and qualification approval process
- Assessment, internal quality assurance and examination roles at the centre
- Registration and certification of candidates
- Non-compliance
- Complaints and appeals
- Equal opportunities
- Data protection
- Management systems
- Maintaining records
- Assessment
- Internal quality assurance
- External quality assurance.

Our Quality Assurance Requirements encompasses all of the relevant requirements of key regulatory documents such as:

- SQA Awarding Body Criteria (2007)
- NVQ Code of Practice (2006)

and sets out the criteria that centres should adhere to pre and post centre and qualification approval.

Access to Assessment & Qualifications provides full details of the arrangements that may be made to facilitate access to assessments and qualifications for candidates who are eligible for adjustments in assessment.

The **centre homepage** section of the City & Guilds website also contains useful information on such things as:

- **Walled Garden**: how to register and certificate candidates on line
- **Events:** dates and information on the latest Centre events
- **Online assessment**: how to register for e-assessments.

Centre Guide – Delivering International Qualifications contains detailed information about the processes which must be followed and requirements which must be met for a centre to achieve 'approved centre' status, or to offer a particular qualification.

Specifically, the document includes sections on:

- The centre and qualification approval process and forms
- Assessment, verification and examination roles at the centre

- Registration and certification of candidates
- Non-compliance
- Complaints and appeals
- Equal opportunities
- Data protection
- Frequently asked questions.

Appendix 3 Useful contacts

UK learners General qualification information	**E: learnersupport@cityandguilds.com**
International learners General qualification information	**E: intcg@cityandguilds.com**
Centres Exam entries, Certificates, Registrations/enrolment, Invoices, Missing or late exam materials, Nominal roll reports, Results	**E: centresupport@cityandguilds.com**
Single subject qualifications Exam entries, Results, Certification, Missing or late exam materials, Incorrect exam papers, Forms request (BB, results entry), Exam date and time change	**E: singlesubjects@cityandguilds.com**
International awards Results, Entries, Enrolments, Invoices, Missing or late exam materials, Nominal roll reports	**E: intops@cityandguilds.com**
Walled Garden Re-issue of password or username, Technical problems, Entries, Results, e-assessment, Navigation, User/menu option, Problems	**E: walledgarden@cityandguilds.com**
Employer Employer solutions, Mapping, Accreditation, Development Skills, Consultancy	**E: business@cityandguilds.com**
Publications Logbooks, Centre documents, Forms, Free literature	

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