Level 2 Diploma in Work-based Land-based Engineering Operations (QCF) (0059)

www.cityandguilds.com

Learner guide and logbook

501/0302/7

Version 4
September 2017

About City & Guilds
City & Guilds is the UK's leading provider of vocational qualifications, offering over 500 awards across a wide range of industries, and progressing from entry level to the highest levels of professional achievement. With over 8500 centres in 100 countries, City & Guilds is recognised by employers worldwide for providing qualifications that offer proof of the skills they need to get the job done.

City & Guilds Group
The City & Guilds Group includes City & Guilds, ILM (the Institute of Leadership & Management, which provides management qualifications, learning materials and membership services) and City & Guilds Centre for Skills Development. City & Guilds also manages the Engineering Council Examinations on behalf of the Engineering Council.

Equal opportunities
City & Guilds fully supports the principle of equal opportunities and we are committed to satisfying this principle in all our activities and published material. A copy of our equal opportunities policy statement is available on the City & Guilds website.

Copyright

Publications
Publications are available from www.cityandguilds.com

For general information please contact Customer Support.

Contents

This page is intentionally blank

Level 2 Diploma in Work-based Land-based Engineering Operations (0059)

What is it all about?

You are about to start a programme of work-based training and assessment leading to a nationally recognised qualification, based on the National Occupational Standards for the industry. This learner guide has been written in order to provide you with information and support as you work through to achieving your qualification. As you make progress you will be able to demonstrate that you have the necessary practical skills and the knowledge to do your work effectively and efficiently.

Introduction

This document contains the information that centres need to offer the following qualifications:

Qualification title and level	City & Guilds qualification number	Ofqual accreditation number
Level 2 Diploma in Work-based Land-based Engineering Operations	0059-21, 22, 23, 24, 25	501/0302/7

Please note that this qualification handbook and assessor guidance details the information for all the routes within the qualification. The following routes are available:

0059-21 Level 2 Diploma in Work-based Land-based Engineering Operations (Agriculture)

0059-22 Level 2 Diploma in Work-based Land-based Engineering Operations (Arboriculture/forestry)

0059-23 Level 2 Diploma in Work-based Land-based Engineering Operations (Ground care)

0059-24 Level 2 Diploma in Work-based Land-based Engineering Operations (Fixed plant and storage)

0059-25 Level 2 Diploma in Work-based Land-based Engineering Operations (Construction Plant Maintenance)

Guided Learning Hours and Credit

Depending on the route chosen, the GLH and credit totals will vary. However, the overall GLH for this qualification is 893 and the credit value is 109, as listed on the National Database of Accredited Qualifications (NDAQ).

What is the Qualifications and Credit Framework?

OFQUAL have introduced the Qualifications and Credit Framework (QCF) to increase flexibility for learners and employers. It allows learners to build towards a qualification, rather than having to do all of it at the same time. Qualifications may be built up from individual units according to rules of combination. The qualifications and rules of combination (structures) are set out in this handbook. The units are derived from the National Occupational Standards, which are compiled by Lantra SSC, the Sector Skills Council for the Land-based industry.

Delivery and assessment of this qualification is similar to the previous NVQs but there are some administrative changes that centres will need to put in place, such as access to unique learner numbers.

Each unit has been assigned a number of credits and the units will be assessed in the workplace and build up to a Diploma.

The Qualification

The Level 2 Diploma in Work-based Land-based Engineering Operations (0059) is a programme of workplace training and assessment leading to a nationally recognised qualification. It aims to:

- meet the needs of learners who work or want to work in the land-based machinery/engineering sector
- allow learners to learn, develop and practise the skills required for employment and/or career progression in the land-based machinery/engineering sector
- replace the following qualification:
  NPTC Level 2 NVQ in Land-based Service Engineering (4025) which expires on 31 December 2010 (QAN 100/2465/7)

Level 2 Diploma in Work-based Land-based Engineering Operations (0059)

This qualification will form part of the Apprenticeship framework for Land-based Engineering Operations. It is a work-related, competence-based qualification. It reflects the skills and knowledge needed to do a job effectively, and shows that a learner is competent in the area of work the qualification represents. The different routes available within this qualification are Agricultural, Arboriculture/forestry, Ground care and Fixed plant and storage.

Who will be involved?

The learner

You will need to:

- negotiate and agree an assessment programme with your assessor
- negotiate and develop a personal action plan with dates for review and assessment
- collect the evidence which proves your competence in your job
- organise and reference the evidence in a portfolio
- judge the evidence against the standards of competence to see whether it is adequate to present for assessment
- present the evidence for assessment; this may include:-
    - attending an assessment interview
    - being available to discuss your evidence with the internal and /or external verifier if requested

Later in this guide we will explain how you can identify and collect evidence and how you can prepare for being assessed in your daily work.

The assessor

- will have experience in your area of work, must be occupationally competent and may be your immediate supervisor or manager or a visiting assessor from a training centre who will visit you a minimum of 3 times to observe you at work
- will be experienced in assessing
- will themselves have achieved a higher qualification or have significant and current experience in the area of assessment. Therefore you may have more than 1 assessor
- can advise you on the planning and organisation of your evidence
- is responsible for making the decisions about your evidence and judging when you are competent.

The internal verifier

- is appointed by the centre where you are registered
- is responsible for maintaining the quality of assessment within the centre by checking the assessment decisions made by assessors
- will have experience in your area of work and must be occupationally competent
- will themselves have achieved a higher qualification or have significant and current experience in the area of assessment to allow them to act as an internal verifier.

The external verifier

- is appointed by City & Guilds to ensure that all assessments undertaken in your centre are fair, valid, consistent and that your centre meets the required national standard
- will make regular visits to your centre to observe assessments and examine portfolios of evidence
- makes regular reports to City & Guilds confirming what happens with assessment practice in your centre.

The expert witness
Wherever possible, the evidence which you produce should be witnessed. For example your assessor, line manager or colleagues may witness an activity or authenticate a document as being your own work.

Witness status
Witnesses fall into three main categories of experience:
1. Occupational expert and D32/D33 or A1/A2 assessor who is familiar with the standards
2. D32/D33 or A1/A2 assessor without occupational competence
3. Occupational expert who is familiar with the standards.

In some circumstances it may be possible to accept witness testimony from a non-occupational expert, e.g. for evidence for a non-vocationally specific skill such as dealing with clients, validating a competition result. In these cases, the following two categories of witness may be valid:
4. Occupational expert who is not familiar with the standards
5. Non-expert not familiar with the standards, e.g. a customer.

Why do you need witnesses?
It is important to demonstrate that the evidence was produced by you under the circumstances described. The witness is therefore able to observe and report on your performance on tasks which produce evidence towards the work-based qualification. The job of the expert witness is to report to the assessor their observations of your performance. The assessor will then judge whether the evidence is sufficient.

How do you involve a witness?
The key to this is planning. In many cases someone, for example a colleague, may naturally be involved with your work and so be able to witness and authenticate evidence. However, if the work is usually unobserved, you might arrange for someone to be present (where practical) to observe your performance. Alternatively where you are working directly with or for a customer, you might ask the customer to act as a witness.

What do they have to do?
After observing your work, the witness will need to write a short statement describing what you actually did. The witness should be aware of assessment criteria for the activity and the evidence requirements which are explained in the qualification handbook. As you will be aware of the standards and the evidence you require, you may decide to write out the statement yourself and ask you witness to read it and sign if they agree with it.

You may also provide statements for yourself, e.g. to justify why you produced a product in a particular way, but this would usually need to be augmented by supplementary evidence such as a work sheet or witness statement from a customer.

A Witness Status List and a Witness Statement Form have been included in the portfolio builder pack for you to photocopy and use.

You must ensure that each witness is recorded with a sample signature in the Witness Status List. Only the approved assessor is qualified to judge the evidence. The job of the expert witness is to report to the assessor their observations of the learner's performance.

How will my competence be assessed?
Occupational competence can be described as the consistent demonstration of skill, knowledge and understanding, to the standard specified by the assessment criteria for each unit of the work-based qualification. Each unit relates to competence in a different area of activity within a job.

Assessment of your competence will be based upon realistic work place situations, performing purposeful and recognisable tasks which will require a combination of skills and related knowledge.

What is evidence?
Evidence is what you will need to provide in order to prove your competence, your ability to do the job and so meet the standards. You can draw on past experience to provide such evidence as well as collecting evidence from your current job. Your evidence will need to be filed and indexed in a portfolio. You will need to map your evidence to the assessment criteria and present it for assessment when you think each unit is complete.

Most assessment for your work-based qualification will be carried out by your assessor judging the evidence about tasks you have carried out. There are five basic sources of evidence and you may collect evidence from all of them:

Performance at work
Observation in the workplace is an essential source of evidence. Your assessor may watch you working and assess your performance against the unit.

Assessment guidance and examples of evidence have been provided for each assessment criteria in the unit. Evidence may also be provided by witness statements, work records, job sheets, or a diary of your work. In this case, you need to match the evidence provided by witnesses against the unit. Although evidence can be provided by witnesses, no unit of your work-based qualification can be signed off as complete without the involvement of a qualified assessor to judge the evidence presented.

Performance of specially set tasks
You may be asked to undertake a particular activity, e.g. a simulated task, project or case study, sometimes in a college or other training environment.

Questioning
Questioning may be written or oral, usually occurring as a result of an observed assessment.
Your assessor will ask you questions to make sure you have the necessary knowledge and understanding to carry out your job activities to the required standard.

Historical evidence
You may have done things in the past which are applicable to your work-based qualification. These may be used as evidence, provided that they are sufficiently current and relevant to the qualification standard, e.g. a relevant qualification. This is sometimes known as Accreditation of Prior Learning (APL).

Simulation
Simulation should only be used where it is difficult to collect evidence through a real work situation, the real work environment or within an acceptable time frame. Simulations will usually deal with contingencies such as unexpected problems, emergencies or other incidents, which will not necessarily occur frequently.

Background evidence and previous experience
It is useful to include a copy of your CV, a copy of your previous or current job description, any previous certificates which relate to this qualification.
You can also include performance evidence from previous experiences and achievement

- CV
- Job descriptions
- Certificates
- Records of achievement
- Accounts of experience
- Case studies or projects from previous work
- Licences
- Records of courses attended
- Staff appraisals
- Products
- Endorsements
- Employer references

If you wish to bring forward a large amount of evidence from past experience, please discuss this with your assessor to help you plan the presentation of this evidence.

Observed performance and products of performance
Work is a natural source of evidence and if your work includes the activities described in the assessment criteria for any of the units of the work-based qualification, then your assessor can readily observe you to judge your competence. If the activity covered by a unit is rare and is not likely to occur during the assessment period, then your assessor may advise you to use an alternative source of evidence or arrange a simulated activity for you.

Often there are products from work activities which maybe used as a valuable source of evidence, for example:

- Letters relating to work
- Completed Forms
- Job Sheets
- Plans
- Diaries
- Completed projects, case studies or assignments that are part of your work
- Finished or end products
- Witness statements about your work
- Contact with clients
- Memos
- Reports
- Logbooks
- Checklists
- Tape recordings
- Visual aids/photographs/videos
- Authenticated reports from appropriate personnel, e.g. line managers
- Staff appraisals
- References received
- Witness Statements from clients

Supplementary evidence
In addition to direct observation of your work activities and judging the evidence provided by products of this work and witness testimony, it will be necessary for your assessor to seek supplementary evidence. This may be done by asking you to:

- provide answers to oral or written questions
- attend a professional discussion
- complete written tests
- provide a written personal account to support other evidence.

Publications and resources

City & Guilds provides the following publications and resources specifically for this qualification.

To access these documents, go to the City & Guilds website www.cityandguilds.com Click on 'Qualifications' and then click on 'Land-based Engineering'. The documents can be found under 0059 NPTC Level 2 Diploma in Work-based Land-based Engineering Operations (QCF).

Description	How to access
Qualification handbook and assessor guidance This provides the structures of the qualifications and guidance for assessors on the evidence requirements for each unit.	www.cityandguilds.com
Learner guide and logbook This provides guidance for learners and evidence summary sheets for the units within the qualification. It is expected that centres will use these forms. If centres devise or customise alternative forms, including paper-based or electronic methods, they must be approved by the external verifier before they are used by learners and assessors at the centre.	www.cityandguilds.com
Portfolio builder pack for learners and assessors This has a series of recording forms that may be helpful for centres and learners to use. The forms are generic and may be used for any City & Guilds work-based qualification.	www.cityandguilds.com
Information guide for centres	www.cityandguilds.com
Product briefing sheet	www.cityandguilds.com

Level 2 Diploma in Work-based Land-based Engineering Operations 0059-21 to 25

Unit specifications

All units available are listed below. The rule of combination for the qualification is detailed separately.

Accreditation unit reference	City & Guilds unit number	Unit Title	Level	Credit Value
R/601/5311	201	Monitor and Maintain Health and Safety in a Land-based Engineering Work Area	2	10
L/600/3433	202	Land-based Engineering Operations – Applying Mechanical Principles	2	5
R/600/3434	203	Land-based Engineering Operations – Understand how to Use, Service And Maintain Tools and Equipment	2	5
F/600/3431	204	Land-based Engineering Operations – Material Preparation, Shaping and Assembling	2	10
F/600/3428	205	Land-based Engineering Operations – Carry Out Servicing and Maintenance on Land-based Equipment	2	10
A/600/3427	206	Land-based Engineering Operations – Perform Thermal Joining and Cutting Processes	2	10
T/600/3426	207	Land-based Engineering Operations – Service and Repair Cooling and Lubrication	2	5
K/600/3424	208	Land-based Engineering Operations – Service and Repair Engines and Components	2	10
H/600/3423	209	Service and Repair of Clutches, Fluid Flywheels and Torque Converters on Land-based Equipment	2	5
Y/600/3421	210	Service and Repair Mechanical Transmissions on Land-based Equipment	2	10
R/600/3420	211	Service and Repair Braking Systems on Land-based Equipment	2	5
D/600/3419	212	Service and Repair Wheeled and Tracked Steering Systems on Land-based Equipment	2	5
K/600/3410	213	Service and Repair Tyres and Tracks on Land-based	2	5
T/600/3409	214	Service and Repair Land-based Cutting and Mowing Equipment	2	5
M/600/3408	215	Service And Repair Land-based Harvesting and Processing Equipment	2	10
K/600/3407	216	Service and Repair Land-based Soil Preparation and Plant Establishment Equipment	2	10

H/600/3406	217	Service and Repair Land-based Transport Handling and Storage Equipment	2	10
J/600/3401	218	Service and Repair Pneumatic Systems and Components For Land-based Equipment	2	5
Y/600/3404	219	Service and Repair Electrical Systems on Land-based Equipment	2	10
L/600/3402	220	Service and Repair Hydraulic Systems and Components on Land-based Equipment	2	10
F/502/1689	221	Maintain and develop personal performance	2	2
T/502/1690	222	Establish and maintain effective working relationships with others	2	2
D/616/2005	223	Operating plant or machinery for non-operational activities in the work place	2	10
H/616/2006	224	Service and repair construction plant equipment	2	10
K/616/2007	225	Service and repair earthmoving equipment and material handling equipment	2	10

Rules of combination for the Level 2 Level 2 Diploma in Work-based Land-based Engineering Operations (0059)

0059-21 Level 2 Diploma in Work-based Land-based Engineering Operations (Agricultural)	
Rules for achievement of qualification	All learners must complete all mandatory units (201-207 and 219-222), plus a minimum of 20 credits from (208-213), 4 units out of the 6 units listed within the group must be achieved. Plus a minimum of 10 credits from (214-218), 2 units out of the 5 units listed within the group must be achieved.. A total of 109 credits are required. Learners completing the Apprenticeship should complete the following additional module: 500

0059-22 Level 2 Diploma in Work-based Land-based Engineering Operations (Arboriculture/forestry)	
Rules for achievement of qualification	All learners must complete all mandatory units (201-207 and 219-222), plus a minimum of 20 credits from (208-213) 4 units out of the 6 units listed within the group must be achieved, plus a minimum of 10 credits from (214-218) 2 units out of the 5 units listed within the group must be achieved. A total of 109 credits are required. Learners completing the Apprenticeship should complete the following additional module: 500

0059-23 Level 2 Diploma in Work-based Land-based Engineering Operations (Ground care)	
Rules for achievement of qualification	All learners must complete all mandatory units (201-207 and 219-222), plus a minimum of 20 credits from (208-213) 4 units out of the 6 units listed within the group must be achieved., plus a minimum of 10 credits from (214, 216-218), 2 units out of the 5 units listed within the group must be achieved. A total of 109 credits are required. Learners completing the Apprenticeship should complete the following additional module: 500

0059-24 NPTC 2 Diploma in Work-based Land-based Engineering Operations (Fixed plant and storage)	
Rules for achievement of qualification	All learners must complete all mandatory units (201-207, 210 and 217-222), plus a minimum of 15 credits from optional units (208, 209, 211 and 215). A total of 119 credits are required. Learners completing the Apprenticeship

	should complete the following additional module: 500

0059-25 Level 2 Diploma in Work-based Land-based Engineering Operations (Plant Construction Maintenance)	
Rules for achievement of qualification	All learners must complete all mandatory units (201-208, 221 223) plus 30 credits from (209 – 213, 218 – 220, 224, 225)

Test Specification

0059-500

NPTC Level 2 Diploma in Work-based Land-based Engineering Operations

Duration:50 minutes
Pass mark: 11/50%
Base mark: 22

Unit Number	Unit Title	No. of questions
201	Monitor and maintain health and safety within Land-based engineering.	**8**
202	Land-based engineering operations – Applying mechanical principles	**7**
203	Land-based engineering operations – Understand how to use, service and maintain tools and equipment	**7**
	Total	**22**

Learners completing the Level 2 Diploma in Work-based Environmental Conservation as part of the Apprenticeship framework

Learners who are completing the NPTC Level 2 Diploma in Work-based Land-based Engineering Operations as part of the Apprenticeship framework are required to undertake an independent assessment in the form of a multiple choice test. This test covers the underpinning knowledge elements of the units included within the test. The test is specific to the qualification route chosen and may be taken on-demand. Test specifications for the different routes are available below.

Paper based versions of the tests are available until September 2011. From September 2011 onwards, the test will be available via GOLA. An updated handbook will be available once the GOLA test is available.

Centres will be required to provide Lantra SSC with evidence that the multiple choice test has been achieved before certification takes place.

Appeals and Equal opportunities

Centres must have their own auditable, appeals procedure. If a learner is not satisfied with the examination conditions or a learner feels that the opportunity for examination is being denied, the Centre Manager should, in the first instance, address the problem. If, however, the problem cannot be

resolved, City & Guilds will arbitrate and an external verifier may be approached to offer independent advice. All appeals must be clearly documented by the Centre Manager and made available to the external verifier or City & Guilds if advice is required.

Should occasions arise when centres are not satisfied with any aspect of the external verification process, they should contact Verification Services at City & Guilds.

Access to the qualification is open to all, irrespective of gender, race, creed, age or special needs. The Centre Manager should ensure that no learner is subjected to unfair discrimination on any grounds in relation to access to assessment and to the fairness of the assessment. QCA requires City & Guilds to monitor centres to check whether equal opportunities policies are being adhered to.

For learners with particular requirements, centres should refer to City & Guilds' policy document *The application of reasonable adjustments and special considerations in vocational qualifications*, which is available from www.cityandguillds.com

The units

As units are signed off as completed, the record of units achieved proforma should be updated

How to use the Evidence Recording Sheets

There is a column alongside the assessment criteria. In this Qualification handbook this column is used for assessor guidance. In the Learner's Guide this column is used for recording the evidence. Records of direct observation may be written directly into this column or, if the evidence is on a separate document, the reference of where the evidence can be found should be entered here. If the evidence is cross reference to elsewhere in the Learner Guide and Logbook then the reference to where it may be found should be inserted. For underpinning knowledge criteria, the answers may be written in directly or completed on a separate page which can be referenced in the normal way.
Below is an example of how a recording sheet may look, with entries by the learner, the supervisor and the assessor. Although several people may enter information here, it remains the responsibility of the assessor to judge the evidence presented is sufficient, authentic and valid.

Exemplar unit

TITLE	Maintain and develop personal performance	Learner's name Tom Goodboy
LEVEL	2	
CREDIT LEVEL	2	
UAN	F/502/1689	
The aim of this unit is to provide the learner with the knowledge and skills to be able to agree and develop their own personal performance with an appropriate person. The learner will maintain and develop personal performance with regard to: (i) working to targets and completing specific tasks (ii) quality of work Evidence from a staff appraisal or review is appropriate, where targets are set and agreed. Relationship to National Occupational Standards : CU5.1		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	For inserting direct evidence or referencing to where the evidence can be found
1. Maintain personal performance	1.1 Identify current competence and areas for development using relevant techniques and processes	Current competence was identified via self assessment and discussion at appraisal interview on 25th June 2008. Identified that updating on current legislation and first aid training are required. See evidence ref 1
	1.2 Carry out work in accordance with responsibilities and organisational requirements	Tom is carrying out his duties to the high standard required by the company. He understands company policies and procedures for setting out work, the standard of work required and meeting targets agreed with customers. He arrives on site with required PPE and clean company uniform, giving a good impression of the company to customers. AB 25th September 2008. Visited Tom on site at 36 High Street. He was fully aware of what the job entailed. His work site was tidy and the customer was very satisfied with the work accomplished so far. ANO

Exemplar unit

2. Develop personal performance	2.1 Agree personal performance and targets with an appropriate person	Personal targets set on 25th June 2008. See evidence ref 1
	2.2 Review performance and progress regularly and use the outcome to plan future development activities	Performance is reviewed every 3 months. See update 30th September 2008. Evidence ref 2
	2.3 Seek advice from an appropriate person if clarification is required concerning specific tasks	Tom asked about access to neighbouring land when working on the boundary at 46 Church Lane on 14th July 2008. AB Tom asked for clarification of the order of work at 25 Common Lane on 30th August 2008 AB
	2.4 Seek constructive feedback and advice from others and use it to help maintain and improve performance	Feedback from June has been acted on. Tom has improved his timekeeping since his appraisal. He is working in a more methodical way since our discussion, so that his work area is tidier and safer for Tom and the customers. It also gives a better impression of the company. Although Tom works well on his own initiative, Tom seeks feedback from me if ever he is unsure what is required of him. Alan Boss 20th October 2008
3. Know how to develop personal performance	3.1 State own limits of responsibility in relation to specific tasks and activities	I have to arrive at the customer's address at the specified time and behave in a manner that gives a good impression to customers. I have to work tidily and steadily and do the jobs in the right order and do them how Joe and Alan have shown me. I have to avoid causing any unnecessary damage to the site and clear up any mess promptly. On longer jobs, I have to make sure I am not leaving hazards unguarded overnight.

Exemplar unit

	3.2 State who to obtain advice from in relation to specific tasks and activities	Straight forward tasks, I refer to my colleague Joe. More complex things to my supervisor Alan.
	3.3 List the correct procedures for obtaining advice	Initially I ask my colleague Joe, who has been here 5 years, then my supervisor Alan, if Joe can't help. If Alan cannot advise me he tells me where to find the advice or finds out the answer for me.
	3.4 State the risks involved in not obtaining advice where specific tasks and activities are unclear	Safety may be put at risk or the job might not be done how the company or customer wants it to be done
	3.5 Describe how to determine and agree development needs and personal targets	We do this formally at appraisal meeting and 3 monthly reviews. I fill in a self assessment form and then discuss this with Alan.
	3.6 State why personal performance should be reviewed	So that I can improve in my job and advance my career. So that the company has well trained staff that can meet customers' needs and expectations.

Exemplar unit

Learner's signature
I confirm that the evidence above is all my own work

Tom Goodboy… …….…… Date 31st October 2008.

Assessor's name **A.N.Other**…….
I confirm that the evidence for this unit is complete and meets the requirements for validity, authenticity and sufficiency.

Signed **A N Other**……..Date 31st October 2008.

Internal verifier's signature (if sampled)

……..Date……

In the example above, Alan Boss is the learner's supervisor, Anthony Other is the assessor and Tom Goodboy is the learner. All 3 can complete sections of the Learner's logbook. Supplementary evidence needs to be referenced as in previous NVQ qualifications. Eg in the example above the learner's Appraisal current skills and action plan would be referenced as Evidence 1. The update form from 30th September would be evidence ref 2.

Guidance on the unit is given at the top. Any items of scope are dealt with within the assessment criteria: they do not have to be recorded separately. Alan Boss, and anyone else except the learner and the assessor, would need to complete a line on the Witness status list.

Unit 201

TITLE	Monitor and Maintain Health and Safety in a Land-based Engineering Work Area	Learner's name
LEVEL	2	
CREDIT LEVEL	10	
UAN	R/601/5311	

The aim and purpose of this unit is to provide the learner with the knowledge and skills to monitor and maintain health and safety within a land based engineering work environment.

Relationship to National Occupational Standards: This unit directly relates to 029nLE01

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements (as appropriate to the qualification route taken)	For inserting direct evidence or referencing to where the evidence can be found
1. Be able to monitor and maintain health and safety within land-based engineering work area	1.1 Work safely, cleanly and tidily at all times, complying with health and safety and other relevant regulations and guidelines	Select and appropriately use, care for and maintain Personal and Protective Equipment provided for use at work	
		Safely move, raise and support loads manually and with the aid of equipment	
	1.2 Carry out main responsibilities of an employee in relation to health and safety in the workplace	Report and record any hazards in-line with the organisations procedures and health and safety best practice	
	1.3 Follow procedures to both prevent and deal with hazards and risks in the workplace		

Unit 201

2. Know how to monitor and maintain health and safety within the work area	2.1	Outline the responsibilities of an employer and employee in relation to health and safety in the workplace	i) the requirements of current health and safety legislation ii) communication of health and safety matters iii) reporting health and safety matters iv) recording health and safety matters v) personal health and safety responsibilities Describe the consequences of unsafe behaviour and practices in the workplace Describe responsibilities in relation to Personal Protective Equipment found in the workplace to include i) provision of PPE ii) selection and use of PPE iii) care and maintenance of PPE	
	2.2	Describe the procedures used to prevent and deal with risks and hazards in the workplace	i) fire and/or explosion ii) dust and airborne particles iii) fumes & gasses iv) corrosives v) solvents vi) irritants vii) electricity viii) stored energy Describe the organisations procedures for reporting and recording accidents and incidents Explain the difference between a hazard and a risk Describe the actions to be taken in the event of an emergency to minimise personal and third party injury risk covering:	

Unit 201

		i) shutdown of electricity ii) The presence of gas cylinders and / or equipment iii) evacuation procedures iv) the use of alarms v) the use of barriers vi) the use of warning signs vii) first aid procedures on site, first aid procedures off site Summarise health and safety precautions to be observed in the workplace to avoid risk to a third party Describe the appropriate precautions and actions to be taken to prevent and / or avoid health and safety and environmental risks covering: i) containment and removal of leaks and spillages ii) cleaning the work area iii) disposal of waste material iv) cleaning contaminated equipment v) removing fumes, dust, hazardous gasses and vapours vi) working in elevated conditions vii) working in confined conditions viii) handling / storage of pressurised and / or bottled gases ix) releasing stored energy x) secure objects in danger of falling climatic conditions	

Unit 201

	2.3	Describe processes, products, activities, tools and equipment that require recognised training and competence to prevent personal injury and harm to others		
	2.4	Describe how to safely move, raise and support loads manually and with the aid of equipment	Covering: i) Lifting ii) Jacking iii) Supporting securing	
	2.5	Identify the different types of fire extinguishers found in the workplace and state their application	To include i) solid materials ii) flammable liquids iii) flammable gasses	

Unit 201

Learner's signature
I confirm that the evidence above is all my own work

…… Date ……

Assessor's name ……
I confirm that the evidence for this unit is complete and meets the requirements for validity, authenticity and sufficiency.

Signed……Date ……

Internal verifier's signature (if sampled)

……Date……

Unit 202

TITLE	Land-based Engineering Operations – Applying Mechanical Principles	Learner's name
LEVEL	2	
CREDIT LEVEL	5	
UAN	L/600/3433	
The aim of this unit is to provide the learner with the knowledge, and skills required to apply mechanical engineering principles within land based engineering operations Relationship to National Occupational Standards: This unit directly relates to 029NLEO4		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements (as appropriate to the qualification route taken)	For inserting direct evidence or referencing to where the evidence can be found
1. Be able to apply mechanical engineering principles	1.1 Remove and refit components to suit application and manufacturers specification	i) power transmission components e.g bearings, clutches and belts ii) component securing and locking devices e.g. hardware and chemical, interference fit	
	1.2 Test and verify power transmission and securing devices	i) torque setting ii) alignment iii) rolling resistance iv) slip v) clearance fit vi) chemical bonding	
	1.3 Check components and machines for static and dynamic balance and stability		

Unit 202

	1.4 Set linkages and select components to gain optimal mechanical advantage		
2. Know how to apply mechanical engineering principles	2.1 Describe the application, installation and maintenance of bearings	i) needle ii) roller iii) taper roller iv) ball vi) floating vii) self aligning viii) sealed ix) self lubricating x) thrust and shell bearings xi) plain bushes and washers	
	2.2 Describe the use of specialist tools to install and maintain components	i) torque wrenches ii) feeler gauges iii) rolling resistance iv) measurement v) lead wire vi) engineers blue	
	2.3 Describe the construction, characteristics and fitting methods of seals		

Unit 202

	2.4 Describe how directional rotation, reciprocating movement, timing and balance are achieved	Explain the principles of transmitting drive through a range of power transmission systems i) shafts ii) belts iii) pulleys(fixed and variable) iv) chains and sprockets v) gears vi) universal and constant velocity joints vii) flexible drive viii) couplings	

Unit 202

Learner's signature
I confirm that the evidence above is all my own work

…… Date ……

Assessor's name ……
I confirm that the evidence for this unit is complete and meets the requirements for validity, authenticity and sufficiency.

Signed……Date ……

Internal verifier's signature (if sampled)

……Date……

Unit 203

TITLE	Land-based Engineering Operations – Understand how to Use, Service and Maintain, Tools and Equipment	Learner's name
LEVEL	2	
CREDIT LEVEL	5	
UAN	R/600/3434	
The aim of this unit is to provide the learner with the knowledge, understanding and skills required to select, use and maintain tools and equipment used within land based engineering operations Relationship to National Occupational Standards: This unit directly relates to 029NLEO5		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements (as appropriate to the qualification route taken)	For inserting direct evidence or referencing to where the evidence can be found
1. Be able to select, safely use, service and maintain tools and equipment	1.1 Identify, select and safely use tools and equipment	i) hand, air and electric power tools ii) fixed and portable equipment iii) taps and dies iv) reamers v) drill bits vi) measuring and marking equipment vii) specialist and test equipment viii) dismantling/reassembling ix) tools for fabrication x) supporting xi) clamping xii) compressing xiii) extracting xiv) lifting and slinging equipment	

Unit 203

2. Know how to select, use and maintain tools and equipment appropriate to the task	2.1 Compare tools and equipment available to undertake relevant tasks	and contrast the range of i) hand tools ii) power tools iii) fixed and portable equipment	
	2.2 Describe the operational techniques and maintenance of tools	i) hand tools ii) power tools iii) fixed and portable equipment iv) drill bits v) chisel vi) reamers vii) measuring tools viii) engine testing ix) fuel test equipment x) hydraulic test equipment xi) electrical test equipment xii) work securing devices	
	2.3 Describe the range of tools for thread identification and maintenance		
	2.4 Identify the different power supply requirements for power tools		
	2.5 Describe how to isolate mains electrical equipment and how to charge portable tool packs	State the relevant legislative requirements for workshop equipment i) provision and use of work equipment regulations electrical equipment ii) lifting equipment iii) compressed air equipment iv) abrasive wheels	

Unit 203

Learner's signature
I confirm that the evidence above is all my own work

…… Date ……

Assessor's name ……
I confirm that the evidence for this unit is complete and meets the requirements for validity, authenticity and sufficiency.

Signed……Date ……

Internal verifier's signature (if sampled)

……Date……

Unit 204

TITLE	Land-based Engineering Operations - Material Preparation, Shaping and Assembling	Learner's name
LEVEL	2	
CREDIT LEVEL	10	
UAN	F/600/3431	
The aim of this unit is to provide the learner with the knowledge and skills required to perform materials preparation, shaping and fixing. Relationship to National Occupational Standards: This unit directly relates to 029NLEO6		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements (as appropriate to the qualification route taken)	For inserting direct evidence or referencing to where the evidence can be found
1. Be able to perform material preparation, shaping and assembly operations	1.1 Interpret information in relation to engineering tasks from engineering drawings, sketches and instructions		
	1.2 Mark out profiles to given specifications		
	1.3 Produce profiles and process materials to given specifications and tolerances	i) to pattern ii) degrease iii) de-scale iv) clean v) harden vi) anneal vii) temper viii) polish ix) paint x) corrosion proofing	

Unit 204

	1.4 Assemble and verify components and sub assemblies	To the given specifications i) fastener types, hardware and chemical fixings ii) sealing components and gaskets iii) orientation of components iv) routing of pipes and/or wires v) fixing of pipes and wires vi) alignment and timing vii) marking the relationship of components	
2. Know how to carry out material preparation, shaping and assembly operations	2.1 Describe how to interpret an engineering drawing	i) the different views and projections ii) the symbols used iii) scales iv) datum points v) line types and their representation	
	2.2 Describe the preparation techniques and tools used for marking out, cutting, shaping and finishing	i) engineers blue ii) templates iii) jigs iv) scribers and centre punches v) datum lines vi) squares vii) filing viii) grinding ix) hot and cold bending x) cutting xi) to pattern xii) degreasing xiii) de-scaling xiv) cleaning xv) hardening xvi) annealing xvii) tempering xviii) polishing xix) painting xx) corrosion proofing	

Unit 204

	2.3 Describe hardware fastener types, their characteristics and applications	i) mechanical fastening ii) keys iii) rivets iv) pins v) dowels vi) circlips vii) snap rings viii) belt joiners ix) chemical and/or adhesive fastening	
	2.4 Identify the different materials and methods used to seal components and assemblies	Their characteristics and applications compounds i) gaskets ii) rings iii) face fits iv) thread tapes v) seals	
	2.5 Outline methods and techniques used to assemble components	i) routing and securing pipes and hoses ii) routing and securing electrical cables and harnesses iii) routing and securing operating cables iv) marking and timing components v) balancing components and assemblies vi) component protection vii) fits and tolerance viii) methods of achieving and checking alignment ix) special tooling	

Unit 204

Learner's signature
I confirm that the evidence above is all my own work

…… Date ……

Assessor's name ……
I confirm that the evidence for this unit is complete and meets the requirements for validity, authenticity and sufficiency.

Signed……Date ……

Internal verifier's signature (if sampled)

……Date……

Unit 205

TITLE	Land-based Engineering Operations – Carry Out Servicing and Maintenance on Land-based Equipment	Learner's name
LEVEL	2	
CREDIT LEVEL	10	
UAN	F/600/3428	
The aim of this unit is to provide the learner with the knowledge, understanding and skills required to carry out servicing and maintenance operations within land based engineering Relationship to National Occupational Standards: This unit directly relates to 029NLEO8		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements (as appropriate to the qualification route taken)	For inserting direct evidence or referencing to where the evidence can be found
1. Be able to perform servicing and maintenance operations on land based equipment	1.1 Prepare equipment and the working area prior to service and maintenance operations	Covering i) selecting, preparing and cleaning the work area ii) carrying out machine operational checks prior to commencing service operations iii) cleaning the machine prior to commencing work iv) protecting the machine against damage during service work v) make the machine safe prior to commencing work	

Unit 205

	1.2 Inspect equipment for conformity to manufacturer's specifications and take remedial actions	Appropriate actions covering i) unauthorised modification ii) leaks iii) loose fitments iv) rubbing and chafing v) operational checks vi) wear vii) fire hazards viii) guarding	
	1.3 Carry out service operations in line with manufacturer's schedules and standards		
	1.4 Test, clean and reinstate the machine to operational condition	as appropriate	
	1.5 Record and process information	accurately	
2. Know how to perform service and maintenance operations in land-based equipment	2.1 Outline reasons for service and maintenance operations	i) contamination ii) wear iii) conformity iv) longevity residual value	
	2.2 Describe routine service and scheduled maintenance actions to be taken	i) daily ii) weekly iii) monthly iv) annually v) scheduled operating hours vi) pre-delivery inspection and installation	

Unit 205

	2.3 Describe and differentiate between the different types of filter, their construction, function and service requirements	i) screens ii) suction filters iii) high pressure filters iv) centrifugal filters v) oil bath filters vi) water traps vii) pre cleaners viii) carbon filters ix) air filters x) ventilation filters	
	2.4 Describe how to assess and prepare machinery prior to service and maintenance operations	i) unauthorised modification ii) oil, gas, air, fuel, water leakages iii) loose and or missing fitments iv) rubbing and chafing v) wear vi) fire hazards vii) guarding viii) seizure i) selecting, preparing and cleaning the work area ii) carry out machine operational checks prior to commencing service operations iii) cleaning the machine prior to commencing work iv) protecting the machine against damage during service work v) make the machine safe prior to commencing work	

Unit 205

	2.5 Describe how to remove, dismantle, repair, reinstate and adjust service items	To manufacturer's specifications and standards i) fuel ii) transmission oil and or fluid iii) brake fluid iv) coolants v) high and low pressure oil filters vi) high and low pressure fuel filters vii) ventilation and breather filters viii) wet and dry air filters ix) check, change and/ or adjust oil and grease levels x) change and or clean ignition system components xi) change wearing/ consumable parts i) belt tensions ii) chain tensions iii) clearances iv) free play v) cables xii) linkages	

Unit 205

		Describe the methods of detecting and eliminating leakages i) fuel ii) oil iii) air iv) water v) gasses vi) crop and or product Explain the methods of evacuating air and / or water i) fuel ii) cooling iii) heating iv) braking v) hydraulic	
	2.6 Describe the methods used to carry out compliance tests on machinery related to the service work that has been performed	i) acceleration and/or deceleration ii) power iii) pressure iv) flow v) maximum speed vi) idle speed vii) engagement and or disengagement viii) starting performance ix) leak tests Describe the implications of modifying equipment beyond manufacturer's and legislative compliance i) Falling object protection system (FOPS) and/or Roll over protection system (ROPS) ii) emissions iii) noise iv) guarding v) hand arm vibration State the importance of recording and processing information accurately	

Unit 205

Learner's signature
I confirm that the evidence above is all my own work

…… Date ……

Assessor's name ……
I confirm that the evidence for this unit is complete and meets the requirements for validity, authenticity and sufficiency.

Signed……Date ……

Internal verifier's signature (if sampled)

……Date……

Unit 206

TITLE	Land-based Engineering Operations – Perform Thermal Joining and Cutting Processes	Learner's name
LEVEL	2	
CREDIT LEVEL	10	
UAN	A/600/3427	
The aim of this unit is to provide the learner with the knowledge and skills required for carrying out thermal joining and cutting processes within land based operations Relationship to National Occupational Standards: This unit directly relates to 029NLEO9		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements (as appropriate to the qualification route taken)	For inserting direct evidence or referencing to where the evidence can be found
1. Be able to perform thermal joining and cutting	1.1 Identify welding and thermal joining equipment	i) PPE ii) electric iii) gas iv) soldering	
	1.2 Identify ferrous and non-ferrous materials and their suitability	i) welding ii) bronze welding iii) soldering	
	1.3 Prepare workplace, materials and equipment to carry out a thermal joining process	Prepare materials and joints to comply with specifications	

Unit 206

	1.4 Use the correct techniques to carry out thermal joining tasks		
	1.5 Join ferrous or non-ferrous materials to the required quality and dimensions	i) butt ii) lap iii) fillet iv) single run v) multi-run vi) using the downhand technique	
	1.6 Identify faults in welded, bronze welded and soldered joints		
	1.7 Inspect and maintain equipment and change consumables used in joining processes		
	1.8 Safely set up and shut down equipment for oxy-acetylene gas heating, cutting and joining		
2. Know how to perform thermal joining and cutting techniques	2.1 Describe how to identify ferrous and non ferrous materials and their respective joining characteristics	(similar and dissimilar), when using thermal joining procedures	
	2.2 Describe material preparation and joining procedures	i) butt ii) lap iii) fillet iv) single and v) multi run joints vi) tacking vii) positioning viii) clamping	

Unit 206

	2.3 Describe the techniques for joining ferrous and non-ferrous materials using gas and electric welding and soldering methods	Describe how to control distortion, weld and heat affects	
	2.4 Describe how to select, prepare and set the relevant equipment to carry out welding and joining tasks	i) setting pressures ii) amperage iii) voltages iv) selecting electrode sizes v) nozzle sizes vi) wire speed vii) selection of fluxes for bronze welding and soldering	
		Describe the properties and purpose of flux	
		Describe the methods for removal of welding slag	
		Describe the range of techniques necessary to prepare material prior to downhand welding.	
	2.5 Describe how to detect and correctly identify faults and their causes in welded joints	i) visual inspection ii) non destruction and destruction iii) procedures including: • undercutting, • slag traps, • penetration, • cracking and • leak testing	
	2.6 Describe the precautions required when engaging in a thermal joining and cutting process:	i) fumes ii) explosions iii) fire iv) sharp edges v) airborne debris vi) personal injury	

Unit 206

	2.7 Describe how to safely set up equipment and use the correct techniques for oxy-acetylene gas heating, cutting and joining	i) clean gas nozzles and soldering equipment ii) change gas cylinders and welding wire spools	

Unit 206

Learner's signature
I confirm that the evidence above is all my own work

…… Date ……

Assessor's name ……
I confirm that the evidence for this unit is complete and meets the requirements for validity, authenticity and sufficiency.

Signed……Date ……

Internal verifier's signature (if sampled)

……Date……

Unit 207

TITLE	Land-based Engineering Operations – Service and Repair Cooling and Lubrication Systems	Learner's name
LEVEL	2	
CREDIT LEVEL	5	
UAN	T/600/3426	
The aim of this unit is to provide the learner with the knowledge and skills required when working with cooling and lubrication systems within land based engineering Relationship to National Occupational Standards: This unit directly relates to O29NLEO10		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements (as appropriate to the qualification route taken)	For inserting direct evidence or referencing to where the evidence can be found
1. Be able to perform service and repair operations on cooling and lubrication systems	1.1 Identify different types of cooling and lubrication systems and their components	i) air ii) liquid i) Splash ii) Forced iii) Two-stroke	
	1.2 Identify the different types of coolants and lubricants and select the appropriate product to comply with manufacturers specifications	Including i) Antifreeze and there dilution rates iii) coolants	
	1.3 Perform operations requiring the drainage and replacement of lubricants and coolants	i) taking samples ii) ensuring correct levels ii) flushing iii) materials to insulate hot and cold components iv) dismantle, repair and reinstate cooling and lubrication systems and their components	

Unit 207

	1.4 Prepare and test cooling and lubrication systems and their components	To be tested and perform the following tests i) pressure ii) temperature iii) sensory iv) leak component	
2. Know the construction and function of cooling and lubrication systems and their components	2.1 State the reasons and methods of the control of temperature in land-based engineering applications	Reasons i) expansion, and or contraction ii) vaporisation iii) efficiency iv) combustion longevity oil viscosity Methods i) liquid ii) forced air iii) convection/conduction iv) radiation v) heat sinks v) insulation materials	
	2.2 Describe the causes and symptoms of insufficient cooling and lubrication	Symptoms i) distortion ii) glazing iii) wear iv) seizure v) hot spots vi) friction welding vii) scoring viii) cavitation	

Unit 207

		Causes i) obstruction ii) circulation iii) air locks iv) ambient v) temperature vi) system pressure overload	
	2.3 Describe the fundamental operating principles of lubrication and cooling systems in engines	To include characteristics and properties of the coolant and lubricant i) wet/dry sump ii) drip/gravity/ immersion iii) splash iv) two-stroke v) self lubricating vi) force fed i) automatic greasing filtration	
	2.4 State the reasons for lubrication and cooling systems in engines	To include characteristics and properties of the coolant and lubricant i) friction ii) wear iii) cooling iv) particulate suspension vii) sealing wet/dry sump	
	2.5 Describe how to dismantle, repair and reinstate cooling and lubrication systems	To manufacturers specifications and standard Test i) sensory ii) pressure iii) input and output temperature iv) leak v) thermostats vi) fan speeds vii) flushing and bleeding procedures	

Unit 207

Learner's signature
I confirm that the evidence above is all my own work

…… Date ……

Assessor's name ……
I confirm that the evidence for this unit is complete and meets the requirements for validity, authenticity and sufficiency.

Signed……Date ……

Internal verifier's signature (if sampled)

……Date……

Unit 208

TITLE	Land-based Engineering Operations – Service and Repair Engines and Components	Learner's name
LEVEL	2	
CREDIT LEVEL	10	
UAN	K/600/3424	
The aim of this unit is to provide the learner with the knowledge and skills required to perform engine service and repair tasks on land based engineering equipment Relationship to National Occupational Standards: This unit directly relates to 029NLEO11		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements (as appropriate to the qualification route taken)	For inserting direct evidence or referencing to where the evidence can be found
1. Be able to perform basic service and repair procedures on engines and their components	1.1 Identify engine types and their components	i) two stroke ii) four stroke iii) spark ignition iv) compression ignition	
	1.2 Remove dismantle, repair and reinstate ancillary engine components and sub-assemblies to manufacturers' specifications and standards	Engine components i) carburettors ii) spark plugs iii) injection pumps iv) fuel delivery pumps v) injectors vi) governors vii) cold start aids viii) air filtration systems ix) exhaust systems x) turbo xi) superchargers.	

Unit 208

		Sub-assemblies i) recondition cylinder heads and valve train assemblies ii) pistons iii) rings and liner assemblies iv) engine timing components including camshaft v) balancer vi) crankshaft vii) spark ignition systems viii) fuel supply pumps and delivery systems	
2. Know the construction, function and operation of two stroke, four stroke spark and compression ignition engines and their components	2.1 Describe the types, construction and operating principles of land-based engines	i) two stroke ii) four stroke iii) spark ignition iv) compression ignition	
	2.2 Describe the function and types of engine components	i) carburettors ii) spark plugs iii) injection pumps iv) fuel delivery pumps v) injectors vi) governors vii) cold start aids viii) air filtration systems ix) exhaust systems	
	2.3 Describe engine features and their purpose within the engine construction	i) air cooled and water cooled ii) wet and dry liners iii) mono block iv) naturally aspirated and pressure charged covering v) turbo compounding and supercharging vi) balancers and vibration suppression	

Unit 208

	2.4 Describe how to remove dismantle, repair and reinstate engines and components to manufacturers' specification and standards (excluding fuel, induction and exhaust systems)	to manufacturers' specifications and standards (excluding fuel, induction and exhaust systems) covering i) two stroke ii) four stroke iii) spark ignition iv) compression ignition	
	2.5 Describe engine starting and stopping procedures	Explain the causes of excessive engine wear	
	2.6 State the major differences between direct and indirect fuel injection systems		

Unit 208

Learner's signature
I confirm that the evidence above is all my own work

…… Date ……

Assessor's name ……
I confirm that the evidence for this unit is complete and meets the requirements for validity, authenticity and sufficiency.

Signed……Date ……

Internal verifier's signature (if sampled)

……Date……

Unit 209

TITLE	Service and Repair of Clutches, Fluid Flywheels and Torque Convertors on Land-based Equipment	Learner's name
LEVEL	2	
CREDIT LEVEL	5	
UAN	H/600/3423	
The aim of this unit is to provide the learner with the knowledge and skills required to service and repair clutches, flywheels and torque convertors within land based equipment Relationship to National Occupational Standards: This unit directly relates to 029NELO12		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements (as appropriate to the qualification route taken)	For inserting direct evidence or referencing to where the evidence can be found
1. Be able to perform service and repair operations on clutches and associated devices	1.1 Carry out stall tests and assess the slip point of torque limiting clutches		
	1.2 Remove, dismantle, repair, and reinstate clutches and associated devices to manufacturer's specifications and standards		
	1.3 Identify and report reasons for clutch, fluid flywheel or torque convertor failure		

Unit 209

2. Know the construction, function and operation of clutches and associated devices	2.1 Describe the different types, construction, and functions of clutches, fluid flywheels and torque convertors	Covering five of the following: i) torque limiting/ slip clutches ii) dry single and dual clutches iii) wet single and multi disc iv) fluid flywheels and torque convertors v) centrifugal clutches vi) overrun and dog clutches vii) electro magnetic clutches viii) cone clutches ix) vibration damping	
	2.2 Explain the methods used to sequence clutch engagement and provide smooth drive take up		
	2.3 Explain how to remove, dismantle, repair, recondition and reinstate clutches, fluid flywheels and torque convertors	To manufacturer's specifications and standards	
	2.4 Describe how to assess clutch failure, wear and condition	By carrying out: i) stall tests ii) slipping torque measurements iii) component measurement iv) visual inspection	
	2.5 Identify the common causes and symptoms of clutch, fluid flywheel and torque converter failure	Covering the following: i) overload ii) incorrect adjustment iii) operator use iv) wear and tear v) contamination vi) corrosion vii) overheating	

Unit 209

Learner's signature
I confirm that the evidence above is all my own work

…… Date ……

Assessor's name ……
I confirm that the evidence for this unit is complete and meets the requirements for validity, authenticity and sufficiency.

Signed……Date ……

Internal verifier's signature (if sampled)

……Date……

Unit 210

TITLE	Service and Repair Mechanical Transmissions on Land-based Equipment	Learner's name
LEVEL	2	
CREDIT LEVEL	10	
UAN	Y/600/3421	
The aim of this unit is to provide the learner with the knowledge and skills required to service and repair mechanical transmission in land based equipment Relationship to National Occupational Standards: This unit directly relates to 029NLEO13		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements (as appropriate to the qualification route taken)	For inserting direct evidence or referencing to where the evidence can be found
1. Be able to perform service and repair operations on mechanical transmissions	1.1 Remove dismantle, repair and reinstate transmission assemblies and their components to manufacturers specifications and standards	To include three of the following: i) single and multi ratio transmissions ii) front and / or rear axle assemblies iii) belt drive assemblies iv) friction drive assemblies v) drive shaft assemblies vi) PTO drives	
	1.2 Identify and report faults in mechanical transmission assemblies and their components		

Unit 210

2. Know the type and characteristics of transmission and gearboxes	2.1 Describe the types, construction, characteristics and operating principles of transmissions and gearboxes	and their components to covering all the following i) sliding mesh ii) constant mesh iii) synchromesh iv) selectors and interlocks v) differentials vi) differential locks vii) limited slip viii) range and reduction ix) front and / or rear drive axles and their reduction units x) forward and reverse shuttle xi) PTO drives xii) drive shaft assemblies xiii) constant velocity joints xiv) belt drive assemblies xv) friction drives xvi) single and multi ratio transmissions	
	2.2 Describe the drive path through a mechanical transmission and their components with the aid of the manufacturer's schematic drawings		
	2.3 Summarise the relationship between power, speed and torque and the influence on transmission layout and component size		

Unit 210

3.	Know how to remove and reinstate transmission	3.1	Describe how to remove dismantle, repair and reinstate transmissions and their components	To manufacturer's specification and standards	
4.	Know how to identify transmission faults	4.1	Explain how to identify land-based equipment mechanical transmission faults	i) regular and irregular noise ii) lock up iii) loss of drive iv) drag v) over heating vi) vibration vii) jump out viii) non selection	

Unit 210

Learner's signature
I confirm that the evidence above is all my own work

…… Date ……

Assessor's name ……
I confirm that the evidence for this unit is complete and meets the requirements for validity, authenticity and sufficiency.

Signed……Date ……

Internal verifier's signature (if sampled)

……Date……

Unit 211

TITLE	Service and Repair Braking Systems on Land-based Equipment	Learner's name
LEVEL	2	
CREDIT LEVEL	5	
UAN	R/600/3420	
The aim of this unit is to provide the learner with the knowledge and skills required in order to service and repair braking systems on land-based equipment. Relationship to National Occupational Standards: This unit directly relates to 029NLEO14		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements (as appropriate to the qualification route taken)	For inserting direct evidence or referencing to where the evidence can be found
1. Be able to perform service and repair operations on braking systems and their components	1.1 Identify braking systems and their components	To cover the following: Systems i) mechanical ii) hydraulic Types i)band brakes (static and/or hand-held equipment) ii) Disc brakes iii) Drum brakes Plus one of the following systems i) pneumatic ii) hydro-pneumatic Plus two of the following types i) independent ii) 2 wheel-drive iii) 4 wheel-drive iv) transmission v) parking brakes/locks	

Unit 211

	1.2 Perform tests, decontaminate, remove, dismantle, repair and reinstate braking systems to meet manufacturers, technical and legislative compliance.		
	1.3 Identify and report braking system faults	Five of the following i) spongy and / or soft pedal ii) pitting, scoring and excessive wear iii) contamination iv) uneven braking v) binding vi) grabbing vii) glazing viii) fade ix) failure x) vapour lock xi) glazing xii) vibration, noise xiii) incorrect fluids xiv) leaking seals	
2. Know the construction, function and operation of braking systems	2.1 Describe the construction and function of braking systems and their components	The following types of i) Wet and dry disc, drum and band brakes ii) Induction and exhaust brakes iii) Overrun brakes iv) Independent braking v) 2 wheel and 4 wheel braking vi) Park brakes And locks vii) Trailer braking	

Unit 211

	2.2 Describe how to remove, dismantle, repair and reinstate braking systems and their components	To manufacturer's specifications and standards i) adjust ii) bleed iii) balance iv) test braking performance	
	2.3 Describe the effects that heat can have on braking efficiency and brake components	Including all of the following: i) glazing ii) brake fade iii) wear/deterioration of braking surfaces iv) vapour lock	
	2.4 Summarise the effects of incorrect braking relationships between towing vehicle and attachments	To include i) brake advance ii) fail safe devices iii) jack-knifing Summarise how vehicle ballast, loading and weight transfer can influence braking performance	
3. Know how to recognise the faults in braking systems	3.1 Describe how to recognise faults in braking systems	Covering the following i) grabbing ii) binding iii) glazing iv) fade v) failure vi) vapour lock vii) spongy and / or soft pedal viii) uneven braking ix) vibration, noise x) contamination xi) pitting, scoring and excessive wear xii) incorrect operating fluid xiii) leaking seals	

Unit 211

Learner's signature
I confirm that the evidence above is all my own work

…… Date ……

Assessor's name ……
I confirm that the evidence for this unit is complete and meets the requirements for validity, authenticity and sufficiency.

Signed……Date ……

Internal verifier's signature (if sampled)

……Date……

Unit 212

TITLE	Service and Repair Wheeled and Tracked Steering Systems on Land-based Equipment	Learner's name
LEVEL	2	
CREDIT LEVEL	5	
UAN	D/600/3419	
The aim of this unit is to provide the learner with the knowledge and skills required to work with wheeled and tracked steering systems on land based equipment Relationship to National Occupational Standards: This unit directly relates to 029NLEO15		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements (as appropriate to the qualification route taken)	For inserting direct evidence or referencing to where the evidence can be found
1. Be able to perform service operations on wheeled or tracked steering systems	1.1 Remove dismantle, reassemble, and reinstate steering systems to meet manufacturer's/technical/legislative compliance		
	1.2 Using appropriate tools and equipment, check and set steering geometry	Covering i) steering lock ii) toe in/out iii) track rod	
	1.3 Identify and rectify the cause of steering faults		
2. Know the construction, function and operation of wheeled and tracked steering systems	2.1 Describe the working principles of mechanical, power assisted and hydrostatic steering systems, and their application	Including: i) front and/or rear axle steering ii) crab iii) pivot iv) slew v) skid steer vi) zero turn	

Unit 212

	2.2 Describe the types, construction and function of steering system components	Including: i) steering boxes ii) rack and pinion iii) steering linkages iv) centre pivot v) steering axle components, vi) steering system brake units (independent, tracked and zero turn)	
	2.3 Describe the principles and geometry of steering systems	i) Ackermann ii) caster and camber angles iii) king pin inclination iv) toe in and toe out v) 2wd/4wd	
	2.4 Describe how to remove, dismantle, reassemble and replace steering system components	To manufacturer's specification and standards	
	2.5 State the methods of checking and adjusting steering geometry	Explain how equipment balance, loading and application can influence steering performance	
	2.6 Identify the basic mechanical operating principles of auto steer and guidance systems used in land-based equipment		
3. Know the symptoms and causes of steerin faults	3.1 Describe the symptoms, characteristics and causes of common steering system faults	and how to rectify: i) steering pull ii) wheel wobble/ hake iii) lazy/sluggish steering iv) heavy steering v) steering wheel free play vi) incorrect tyre pressure and sizes	

Unit 212

Learner's signature
I confirm that the evidence above is all my own work

…… Date ……

Assessor's name ……
I confirm that the evidence for this unit is complete and meets the requirements for validity, authenticity and sufficiency.

Signed……Date ……

Internal verifier's signature (if sampled)

……Date……

Unit 213

TITLE	Service and Repair Tyres and Tracks on Land-based Equipment	Learner's name
LEVEL	2	
CREDIT LEVEL	5	
UAN	K/600/3410	
The aim of this unit is to provide the learner with the knowledge and skills required to perform service and repair operations on tyres, wheel assemblies and/or track and their components on land based equipment Relationship to National Occupational Standards: This unit directly relates to 029NLEO16		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements (as appropriate to the qualification route taken)	For inserting direct evidence or referencing to where the evidence can be found
1. Be able to perform service and repair operations on tyres, wheel assemblies or tracks and their components	1.1 Remove dismantle, repair and reinstate tyres and wheel assemblies or tracks, their running gear and components to manufacturer's specifications		
	1.2 Attach, adjust and remove stability and tractive aids		
	1.3 Identify and rectify faults relating to tyres, wheel assemblies or tracks and their components		

Unit 213

2. Know the types, construction and operating principles of tyres, wheel assemblies and tracks and their components	2.1 Outline the types, construction and operating principles of tyres and wheel assemblies and tracks their running gear and components	Covering: i) wheel rim types and sizes ii) tyre securing aids iii) tyre types and sizes iv) performance capabilities v) track types vi) track tensioner types vii) track running gear viii) tractive aids ix) floatation aids x) ballast types xi) wheel fixings	
	2.2 Describe the types, construction and applications of wheels, tyre tracks and tractive aids	Covering: i) size ii) ply rating iii) load index iv) speed rating v) orientation vi) ground pressure vii) tractive capability viii) pressure/tension/weight ix) ballasting	

Unit 213

	2.3 Outline the implications of weight distribution and transfer on tractive performance and stability	Covering: i) excessive slip ii) slip control iii) ground pressure iv) balance v) tyre pressures vi) dual and/or cage wheels vii) liquid ballast and weights viii) decreasing and variable loads, ix) extending arms loaders	
	2.4 Outline the implications of track widths, weight distribution and transfer, ballast and tractive aids on legislative and legal responsibilities	Covering: i) axle loadings ii) tyre loadings iii) gross weight iv) police notification v) escort vehicles vi) road and/or bridge restrictions vii) stability viii) traction Explain the relationships between driven axles and tractive power covering i) PTO driven axles ii) 4 WD inter axle ratios iii) correct tyre combinations iv) 4 wheel drive with equal and/or unequal size wheels	
3. Know how to carry out service and maintenance operations on tyres and tracks	3.1 Describe the methods of removing dismantling, repairing and reinstatement of tyres and wheel assemblies and tracks, their running gear and components		

Unit 213

	3.2 Describe how to carry out land-based equipment tests and checks	To confirm the following: i) inter axle mechanical ratios ii) suitability of tyre combinations iii) wheel rim conformity iv) tyre creep/slip v) wheel slip vi) wheel alignment vii) tyre conformity viii) alignment of tracks	
	3.3 Describe how to identify and rectify faults relating to tyres, wheel assemblies and tracks and their components	To include the following: i) torque wind up ii) tyre creep and/or slippage iii) vibration and bouncing iv) non conformity v) cracking/creaking vi) misalignment vii) uneven wear and/or rapid wear viii) deflation ix) de-lamination x) track jump off	

Unit 213

Learner's signature
I confirm that the evidence above is all my own work

…… Date ……

Assessor's name ……
I confirm that the evidence for this unit is complete and meets the requirements for validity, authenticity and sufficiency.

Signed……Date ……

Internal verifier's signature (if sampled)

……Date……

Unit 214

TITLE	Service and Repair Land-based Cutting and Mowing Equipment	Learner's name
LEVEL	2	
CREDIT LEVEL	5	
UAN	T/600/3409	
The aim of this unit is to provide the learner with the knowledge and skills required for servicing land based cutting and mowing equipment. Relationship to National Occupational Standards: This unit directly relates to 029NLEO17		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements (as appropriate to the qualification route taken)	For inserting direct evidence or referencing to where the evidence can be found
1. Be able to service cutting and mowing equipment	1.1 Identify cutting and mowing equipment used in the land-based sector		
	1.2 Dismantle, repair and reinstate cutting or mowing machinery and tools to manufacturers' specifications		
	1.3 Sharpen and adjust cutting mechanisms to conform with manufacturers' specification	Covering two of the following: i) saw blades and chains, ii) stationary and moving/rotating knives, iii) flails and hand tools	
	1.4 Identify faults affecting cutting performance and rectify to perform within the manufacturers' specification		

Unit 214

2. Know the construction, function and operation of cutting and mowing equipment	2.1 Describe the working principles of cutting and mowing equipment and their components	Covering: i) lawn and professional turf mowers ii) hedge trimmers iii) green crop mowers and toppers iv) harvester cutting mechanisms v) saws vi) chippers vii) hand tools	
	2.2 Describe how to dismantle, repair and reinstate cutting and mowing equipment	To the manufacturers' specification	
	2.3 Describe the methods of sharpening and setting cutting mechanisms and components	i) saw blades and chains ii) stationary and moving/rotating knives iii) flails and hand tools	
3. Know how the performance of cutting/mowing equipment is affecte by conditions	3.1 Describe the effect of crop/product type and conditions on the cutting and mowing process		
	3.2 State how adjustments and settings effect the performance of cutting and mowing equipment		

Unit 214

Learner's signature
I confirm that the evidence above is all my own work

…… Date ……

Assessor's name ……
I confirm that the evidence for this unit is complete and meets the requirements for validity, authenticity and sufficiency.

Signed……Date ……

Internal verifier's signature (if sampled)

……Date……

Unit 215

TITLE	Service and Repair Land-based Harvesting and Processing Equipment	Learner's name
LEVEL	2	
CREDIT LEVEL	10	
UAN	M/600/3408	
The aim of this unit is to provide the learner with the knowledge, understanding and skills required service and repair harvesting and processing equipment Relationship to National Occupational Standards: This unit directly relates to 029NLEO18		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements (as appropriate to the qualification route taken)	For inserting direct evidence or referencing to where the evidence can be found
1. Be able to perform service and repair operations on harvesting or processing equipment	1.1 Dismantle, repair and reinstate harvesting and/or processing equipment to the manufacturer's specifications and standards		
	1.2 Identify and rectify performance faults in equipment to achieve optimal performance		
	1.3 Identify and rectify faults in equipment which cause crop or product loss		
	1.4 Prepare equipment for periods of storage or lay up when not in use		

Unit 215

2. Know how to service and repair harvesting and processing equipment	2.1 Describe the construction, types and function of harvesting and processing equipment	i) green crop harvesters ii) combine harvesters iii) root crop harvesters iv) balers and presses v) grain driers vi) timber processors vii) wrappers viii) chippers and/or choppers ix) grinders x) mowers and or conditioners xi) pasturisation xii) grading equipment	
	2.2 Describe how to remove, dismantle, repair, reinstate and set up harvesting and processing equipment to manufacturer's specifications	To achieve optimal performance	
	2.3 Describe the processes used in harvesting and processing equipment	i) separation ii) drying iii) pasteurisation iv) compression v) tying vi) wrapping vii) grinding viii) chipping and chopping ix) cleaning x) grading xi) disposal and/or dispersal of waste products xii) threshing xiii) metering	

Unit 215

	2.4 Describe the methods of material handling within the harvesting process	i) elevating/lifting ii) lifting iii) conveying iv) transfer v) presentation and/or orientation vi) packing vii) Blowing viii) gathering	
	2.5 Describe the appropriate methods of clearing blockages from harvesting and processing equipment		
	2.6 Identify the causes of crop or product loss and poor sample quality contamination, damage, wastage and non compliance	With specifications to include the following: i) cleanliness ii) hygiene iii) bacterial count, iv) sizing v) bale and/or timber sizes vi) chop length vii) bruising viii) cracking ix) density x) leakage Explain how to prepare seasonal harvesting and processing equipment for periods of storage and lay up: i) bulk handling and storage facilities ii) crop driers iii) seasonal equipment iv) mowers/conditioners v) v)harvesters vi) balers vii) wrappers	

Unit 215

Learner's signature
I confirm that the evidence above is all my own work

…… Date ……

Assessor's name ……
I confirm that the evidence for this unit is complete and meets the requirements for validity, authenticity and sufficiency.

Signed……Date ……

Internal verifier's signature (if sampled)

……Date……

Unit 216

TITLE	Service and Repair Land-based Soil Preparation and Plant Establishment Equipment	Learner's name
LEVEL	2	
CREDIT LEVEL	10	
UAN	K/600/3407	
The aim of this unit is to provide the learner with the knowledge and skills required to service and repair soil preparation and plant establishment equipment Relationship to National Occupational Standards: This unit directly relates to 029NLEO19		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements (as appropriate to the qualification route taken)	For inserting direct evidence or referencing to where the evidence can be found
1. Be able to service and set-up soil preparation equipment	1.1 Remove, dismantle, repair and reinstate soil preparation and plant establishment machinery to manufacturers' specification		
	1.2 Set up trailed and mounted machines to work effectively with the prime mover		
2. Know the construction, function and operation of soil preparation, cultivation and plant establishment equipment	2.1 Describe the types, construction and function of soil engaging, preparation and cultivation machinery and plant establishment equipment	Soil engaging lift i) move ii) drain iii) invert iv) separate v) profile i) prepare land Plant establishment ii) plant iii) sow iv) irrigate v) fertilise vi) apply crop protection products vi) spread	

Unit 216

	2.2 Describe how to remove, dismantle, repair and reinstate soil preparation, cultivation and plant establishment machinery and equipment	To the manufacturers' specification Describe the causes of excessive wear to equipment and or components	
	2.3 Describe how to set up and verify the performance of soil preparation, cultivation and plant establishment equipment		
	2.4 Describe the methods and mechanisms used to meter and calibrate application rates	i) plants ii) crop protection products iii) seeds iv) liquids v) fertilizers including sprayers vi) seed drills vii) spreaders any other appropriate equipment.	
3. Know the factors which affect equipment and performance	3.1 Outline the impact of soil, seed, fertilizer types, crops, weather conditions on equipment performance settings		

Unit 216

Learner's signature
I confirm that the evidence above is all my own work

…… Date ……

Assessor's name ……
I confirm that the evidence for this unit is complete and meets the requirements for validity, authenticity and sufficiency.

Signed……Date ……

Internal verifier's signature (if sampled)

……Date……

Unit 217

TITLE	Service and Repair Land-based Transport, Handling and Storage Equipment	Learner's name
LEVEL	2	
CREDIT LEVEL	10	
UAN	H/600/3406	
The aim of this unit is to provide the learner with the knowledge and skills required when working with transport, handling and storage equipment within land based operations Relationship to National Occupational Standards: This unit directly relates to 029NLEO20		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements (as appropriate to the qualification route taken)	For inserting direct evidence or referencing to where the evidence can be found
1. Be able to service and repair transport, handling and storage equipment	1.1 Clean and prepare transport, handling and storage equipment for service and maintenance		
	1.2 Remove dismantle, repair and reinstate transport, handling and storage equipment to manufacturers specifications		
	1.3 Safely clear blockages from equipment		

Unit 217

2. Know the construction, function and operation of transport, handling and storage equipment	2.1 Identify transport, handling and storage equipment and their components	i) lifting equipment, cranes, forklifts, handlers, loaders and elevated platforms ii) winches, skylines and cable systems iii) latching and hitching systems iv) trailers, tankers, forage and feed wagons v) timber forwarders vi) conveyors vii) elevators viii) augers ix) suction blowers x) fixed and mobile tanks and or silos xi) slurry storage equipment xii) crop storage equipment xiii) temperature, humidity controlled storage equipment xiv) ingestors xv) bale collectors xvi) grass collection systems	
	2.2 Explain how to remove, dismantle, repair and reinstate transport, handling and storage equipment and their components	To manufacturers and or legislative requirements	
	2.3 Describe how to identify and isolate services from handling and storage equipment	i) oil ii) water iii) gas iv) electrical v) fuel	

Unit 217

	2.4 Describe the layout and characteristics of transport, handling and storage areas	i) lifting equipment, cranes, forklifts, handlers, loaders and elevated platforms ii) winches, skylines and cable systems iii) latching and latching systems iv) trailers, tankers, forage and feed wagons v) timber forwarders vi) conveyors vii) elevators viii) augers ix) suction blowers x) fixed and mobile tanks and or silos xi) slurry storage equipment xii) crop storage equipment xiii) temperature, humidity controlled storage equipment xiv) ingestors xv) bale collectors xvi) grass collection systems	
	2.5 Describe how to clean and prepare transport, handling and storage equipment for service and repair operations		
	2.6 Describe the methods of shortening, lengthening and joining belts, elevators and conveyors		
	2.7 Define the appropriate methods of clearing blockages from transport, handling and storage equipment	Describe how to install and commission new transport, handling and storage equipment	

Unit 217

Learner's signature
I confirm that the evidence above is all my own work

…… Date ……

Assessor's name ……
I confirm that the evidence for this unit is complete and meets the requirements for validity, authenticity and sufficiency.

Signed……Date ……

Internal verifier's signature (if sampled)

……Date……

Unit 218

TITLE	Service and Repair Pneumatic Systems and Components for Land-based Equipment	Learner's name
LEVEL	2	
CREDIT LEVEL	5	
UAN	J/600/3401	
The aim of this unit is to provide the learner with the knowledge, understanding and skills required repair and service pneumatic systems and components for land based equipment Relationship to National Occupational Standards: This unit directly relates to 029NLEO25		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements (as appropriate to the qualification route taken)	For inserting direct evidence or referencing to where the evidence can be found
1. Be able to perform service and repair operations on pneumatic systems and their components	1.1 Assemble or repair pipes and hoses used within pneumatic systems	Using recommended techniques and practices detect leaks and seal components in pneumatic systems.	
	1.2 Build and test a basic air pressure circuit (to include compressor, control valve, relief valve, pneumatic consumer)	To include compressor, control valve, relief valve, pneumatic consumer	
	1.3 Remove, dismantle, repair and reinstate pneumatic systems and components to manufacturers' specifications	and factory settings Safely release stored air pressure and condensation in systems and circuits.	

2. Know the construction, function and operation of pneumatic systems and components used in land-based engineering	2.1 Identify pneumatic systems and components	i) air compressors ii) air pressure regulating valves iii) relief and dump valves iv) air pressure control valves v) hand brake and foot brake valves vi) diaphragm operated valves vii) air activated cylinders viii) air cushions ix) fail-safe emergency system components air receivers and dryers	
	2.2 Describe the different types of pneumatic circuit including single line and twin line	Identify the symbols used in pneumatic circuit diagrams	
	2.3 Describe how to remove, dismantle, repair and reinstate pneumatic components and systems	To manufacturer's specifications Describe how to assemble and repair and manufacture pneumatic pipes Describe how to identify pneumatic pipe types and their appropriate fittings	
	2.4 Describe the construction, types and function of pneumatic system components	Including: i) Air compressors ii) Air pressure regulating valves, relief valves, dump valves iii) Air pressure control valves, handbrake valve, footbrake valves, diaphragm operated valves, iv) Air activated cylinders, air cushions, failsafe/emergency system components v) Air receivers and driers	
	2.5 Describe the primary causes of pneumatic failures and their symptoms	(including water, fatigue, contamination, leaks)Describe the methods of leak detection in air systems Explain how to carry out leak tests in a pneumatic system	

Unit 218

Learner's signature
I confirm that the evidence above is all my own work

…… Date ……

Assessor's name ……
I confirm that the evidence for this unit is complete and meets the requirements for validity, authenticity and sufficiency.

Signed……Date ……

Internal verifier's signature (if sampled)

……Date……

Unit 219

TITLE	Service and Repair Electrical systems on Land-based Equipment	Learner's name
LEVEL	2	
CREDIT LEVEL	10	
WBA REFERENCE	Y/600/3404	
The aim of this unit is to provide the learner with the knowledge, understanding and skills required to carry out service and repair on electrical systems within land-based equipment The learner will need to ensure they comply with current legislation and guidelines to complete this unit. * Primary AC systems and components limited to the identification and verification of the type of power supply, the risks and hazards involved and the isolation of the electrical source. How to carry out fundamental operations/repairs e.g. check if circuit is live and has integrity, and check overload protection. (i) single (ii) 3 phase voltage and colour coding – 415, 240, 110 Relationship to National Occupational Standards: This unit directly relates to 029NLEO22		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements (as appropriate to the qualification route taken)	For inserting direct evidence or referencing to where the evidence can be found
1. Be able to perform service and repair operations on electrical systems and their components used in land-based equipment	1.1 Identify electrical circuits and components and their functions from wiring diagrams and visual recognition	To include the following: i) series and parallel connections ii) power supply and battery types iii) circuit protect devices iv) fixed and/or variable resistors v) diodes vi) relays vii) switches viii) wire types and sizes ix) electrical consumers	

Unit 219

	1.2 and the Perform tests using equipment practices to measure and verify correct operation of electrical systems and their components	Appropriate equipment and practices i) voltage ii) current iii) continuity, iv) resistance v) battery vi) condition	
	1.3 Identify and rectify faults in electrical systems and components		
	1.4 Maintain the integrity of electrical systems	To include all the following: i) wiring harnesses ii) connectors and connections iii) earthing iv) power supplies and / or batteries	
	1.5 Remove dismantle, rectify faults, repair and reinstate electrical components and circuits to manufacturer's specifications and standards	Faults i) short circuit ii) open circuit high resistance	
2. Know the construction, function and operation of electrical systems and circuits and their components	2.1 Identify and interpret electrical circuit diagrams	To include the following: i) electrical component symbols ii) colour coding, iii) wire identification and sizing iv) series and parallel connections State how to identify alternating and direct current and the common voltages in use	
	2.2 Summarise Ohm's law' its application and principles		

Unit 219

	2.3 Compare the specification, safe maintenance and charging of different types of battery	i) lead acid ii) gel iii) maintenance free iv) dry cell	
	2.4 Describe the principles, construction and function of electrical circuits and their components	i) Starter circuits Inertia, pre-engaged, heat start, safety start, switching ii) Ignition circuits iii) Charging circuits alternators rectifiers iv) Lighting circuits indicators brake lights side, head and marker lights work lights v) Instrumentation fuel temperature tachometer hour meter vi) Spark ignition Spark generation vii) Ancillary circuits wiper motors stop circuits ventilation horn switches actuators viii) Safety and circuit protection	

Unit 219

		Battery isolation safety isolation fuses and fuseable links thermal switches over – under voltage switching relays RCCD, earth bonding Double insulation	
	2.5 Describe how to remove dismantle, test, verify, repair and reinstate electrical circuits and their components	To manufacturer's specifications to include the following: i) starting systems ii) charging systems iii) safety and / or circuit protection systems iv) ignition systems v) spark ignition systems vi) lighting systems vii) instrumentation systems viii) ancillary systems	
	2.6 Outline the risks posed to electrical systems and components by other activities or incidents	i) welding ii) short circuit iii) battery open circuit iv) overcharging v) reverse polarity	

Unit 219

Learner's signature
I confirm that the evidence above is all my own work

…… Date ……

Assessor's name ……
I confirm that the evidence for this unit is complete and meets the requirements for validity, authenticity and sufficiency.

Signed……Date ……

Internal verifier's signature (if sampled)

……Date……

Unit 220

TITLE	Service and Repair Hydraulic Systems and Components on Land-based Equipment	Learner's name
LEVEL	2	
CREDIT LEVEL	10	
UAN	L/600/3402	
The aim of this unit is to provide the learner with the knowledge, understanding and skills required to service and repair hydraulic systems and components in land based equipment Relationship to National Occupational Standards: This unit directly relates to 029NLEO24		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements (as appropriate to the qualification route taken)	For inserting direct evidence or referencing to where the evidence can be found
1. Be able to perform service and maintenance operations on hydraulic systems and their components	1.1 Identify and locate, hydraulic systems and their components		
	1.2 Build and test a basic hydraulic circuit		
	1.3 Prepare the hydraulic system to be tested and carry out tests using system diagnostic tools	i) pressure ii) flow temperature	
	1.4 Remove dismantle, repair and reinstate hydraulic systems and components to manufacturer's specifications and factory settings	Safely release stored energy in hydraulic systems and circuits including pipes and hoses and component parts	

Unit 220

2. Know the construction, function and operation of hydraulic circuit systems and their components used in land based engineering applications	2.1 Describe how to read and interpret hydraulic circuit diagrams and symbols	Identify the common symbols used in hydraulic circuit diagrams	
	2.2 Describe how to remove dismantle, repair and reinstate hydraulic components and systems	To manufacturer's specifications	
	2.3 Describe different types of hydraulic circuits and the construction and function of hydraulic system components	Types High and low pressure hydraulic circuits including combined high/low pressure circuits i) Fixed and variable displacement circuits ii) Open and closed centre circuits iii) Load sensed circuits iv) Auxiliary systems Hydraulic system components i) Hydraulic pumps and motors fixed and variable displacement ii) Hydraulic pressure maintaining valves, relief valves, shock valves iii) Hydraulic control valves distributors, solenoid valves, proportional valves, pressure differential valves, pilot operated valves	

Unit 220

		iv) Hydraulic rams, single, acting, double acting and cushioned v) Hydraulic direction flow valves, flow dividers, orbital valves, priority valves, restrictors vi) Reservoirs vii) Accumulators Describe types of hydraulic pipe and hose and fittings and their applications. State how to assemble and repair hydraulic hoses and pipes in accordance with engineering principles and protocol	
	2.4 Describe primary causes of hydraulic failure and systems	How to carry out diagnostic tests and adjust hydraulic components and systems to manufacturers specifications: Diagnostic tests Correct operating temperature, i) System/line pressure ii) flow tests, iii) adjust pressure limiting valve iv) adjust relief valves v) pressure differential gauges vi) position, draft and response controls Failures and symptoms i) low oil level ii) inappropriate oil iii) contamination iv) cavitation v) overload	

Unit 220

Learner's signature
I confirm that the evidence above is all my own work

…… Date ……

Assessor's name ……
I confirm that the evidence for this unit is complete and meets the requirements for validity, authenticity and sufficiency.

Signed……Date ……

Internal verifier's signature (if sampled)

……Date……

Unit 221

TITLE	Maintain and develop personal performance	Learner's name
LEVEL	2	
CREDIT LEVEL	2	
UAN	F/502/1689	
The aim of this unit is to provide the learner with the knowledge and skills to be able to agree and develop their own personal performance with an appropriate person. The learner will maintain and develop personal performance with regard to: i. working to targets and completing specific tasks ii. quality of work Relationship to National Occupational Standards: This unit directly relates to O29NCU5.1		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements (as appropriate to the qualification route taken)	For inserting direct evidence or referencing to where the evidence can be found
1. Maintain personal performance	1.1 Identify current competence and areas for development using relevant techniques and processes		
	1.2 Carry out work in accordance with responsibilities and organisational requirements		
2. Develop personal performance	2.1 Agree personal performance and targets with an appropriate person		
	2.2 Review performance and progress regularly and use the outcome to plan future development activities		
	2.3 Seek advice from an appropriate person if clarification is required concerning specific tasks		

Unit 221

	2.4	Seek constructive feedback and advice from others and use it to help maintain and improve performance		
3. Know how to develop personal performance	3.1	State own limits of responsibility in relation to specific tasks and activities		
	3.2	State who to obtain advice from in relation to specific tasks and activities		
	3.3	List the correct procedures for obtaining advice		
	3.4	State the risks involved in not obtaining advice where specific tasks and activities are unclear		
	3.5	Describe how to determine and agree development needs and personal targets		
	3.6	State why personal performance should be reviewed		

Unit 221

Learner's signature
I confirm that the evidence above is all my own work

…… Date ……

Assessor's name ……
I confirm that the evidence for this unit is complete and meets the requirements for validity, authenticity and sufficiency.

Signed……Date ……

Internal verifier's signature (if sampled)

……Date……

Unit 222

TITLE	Establish and maintain effective working relationships with others	Learner's name
LEVEL	2	
CREDIT LEVEL	2	
UAN	T/502/1690	
The aim of this unit is to provide the learner with the knowledge and skills required to work effectively with others under minimal direction through clear communication and co-operation. The learner will establish and maintain effective working relationships with the colleagues, supervisors and managers, persons external to the team, department or organisation. Relationship to National Occupational Standards: This unit directly relates to O239NCU 5.2		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements (as appropriate to the qualification route taken)	For inserting direct evidence or referencing to where the evidence can be found
1. Maintain working relationships with others	1.1 Identify opportunities to improve working practices with the appropriate person		
	1.2. Carry out activities requiring co-operation with others in accordance with required procedures		
	1.3 Communicate with others in a way which promotes effective working relationships		
	1.4 Keep others informed about work plans or activities which affect them		
	1.5 Seek assistance from others without causing undue disruption to normal work activities		

Unit 222

	1.6 Respond in a timely and positive way when others ask for help or information		
2. Understand why good working practices are important	2.1 State why good working relationships are important		
	2.2 Suggest ways in which good working relationships can be maintained		
	2.3 State the methods of dealing with disagreements within the workplace		
	2.4 Describe own level of responsibility in relation to dealing with disagreements		
	2.5 State why effective communication is important		

Unit 222

Learner's signature
I confirm that the evidence above is all my own work

…… Date ……

Assessor's name ……
I confirm that the evidence for this unit is complete and meets the requirements for validity, authenticity and sufficiency.

Signed……Date ……

Internal verifier's signature (if sampled)

……Date……

TITLE	Operating plant or machinery for non-operational activities in the work place	Learner's name
UNIT NUMBER	223	
LEVEL	2	
CREDIT LEVEL	10	
UAN	D/616/2005	
AIM: N/A		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements	For inserting direct evidence or referencing to where the evidence can be found
1. Interpret the given information relating to the work and resources when operating plant or machinery for non-operational activities	1.1 Extract relevant information for the safe operation of machine or equipment		
	1.2 Comply with safe systems of work procedures and organizational procedures		
	1.3 Describe different types of information resources used for the safe operation of plant and machine		
2. be able to minimise the risk of damage to the surrounding area or equipment when operating plant for non-operational activities	2.1 Identify potential hazards when operating plant or machinery for non-operational activities		
	2.2 Carry out a risk assessment for operating plant for non-operational activities		
	2.3 Protect the work area and those within from damage or injury in accordance with safe working practices and organisational procedures		
3. be able to demonstrate the	3.1 Prepare plant or machinery for non-	minimum of two of the following:	

safe operation of plant or machinery for non-operational activities	operational activities including inspection, repair, maintenance, configuration, testing or travel.	• hand operated power tools • static plant or machinery • pedestrian controlled equipment • tracked plant • wheeled plant • rollers • powered access equipment • trailed items of plant.	
	3.2 Configure plant or machinery for non-operational activities including inspection, repair, maintenance, configuration, testing or travel.		
	3.3 Operate plant or machinery for non-operational activities including inspection, repair, maintenance, configuration, testing or travel.		
	3.4 Demonstrate consideration of environment, location and weather conditions		
	3.5 Demonstrate compliance with industry standard signals and instruction whilst maneuvering or operating plant and equipment for the non-operational activities		

Learner's signature
I confirm that the evidence above is all my own work

…… Date ……

Assessor's name ……
I confirm that the evidence for this unit is complete and meets the requirements for validity, authenticity and sufficiency.

Signed……Date ……

Internal verifier's signature (if sampled)

……Date……

TITLE	Service and repair construction plant equipment	Learner's name
UNIT NUMBER	224	
LEVEL	2	
CREDIT LEVEL	10	
UAN	H/616/2006	
The aim of this unit is to provide the learner with the knowledge and skills to service and repair construction plant equipment.		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements	For inserting direct evidence or referencing to where the evidence can be found

1. be able to perform service and repair operation on construction plant equipment	1.1 Confirm the service and repair requirements for specific construction plant equipment	Construction Plant equipment including: • Heavy earthmoving plant and equipment • Cranes and lifting equipment • Building and associated plant • Civil engineering plant • Road building plant • Small plant and tools • Powered access equipment (electric) • Powered access equipment (diesel) • Powered access equipment (bi-energy) • Piling equipment • Tunnelling equipment • Lift trucks (electric) • Lift trucks (diesel) • Lift trucks (gas) • Plant electrics (DC auto) • Plant electrics (AC) • Engine and transmission reconditioning • Road/rail plant • Hydraulic attachments Machine systems used in Construction Plant equipment including: • Diesel Engines • Fuel Injection Systems • Electrical/Electronic Systems • Hydraulic Systems • HVAC systems • Powertrain Systems • Track laying Systems	

	1.2 Dismantle construction plant to manufacturer's specification and standards	Remove, dismantle, repair, reinstate, setup and inspect construction plant equipment to manufacturer's specifications: • the preparation, testing and use of tools and equipment used for dismantling removing and replacing components appropriate safety precautions • the importance of logical and systematic processes • the inspection and testing of systems and components • the preparation of replacement units for re-fitting or replacement • the reasons why replacement components and units must meet the original specifications (OES)	
	1.3 Repair construction plant to manufacturer's specification and standards		
	1.4 Reinstate construction plant to manufacturer's specification and standards		
	1.5 Setup construction plant to manufacturer's specification and standards		
	1.6 Rectify performance faults in equipment to achieve optimal performance		
	1.7 Carry out inspections on construction plant		
2. Know how to service and repair construction plant equipment	2.1 Describe the construction, types and function of construction plant equipment		
	2.2 Describe how to remove, dismantle, repair, reinstate and maintain construction plant equipment to manufacturer's specifications		

	2.3 Describe the specific systems used in construction plant equipment		
	2.4 Describe the safe working methods conducting service and repair of construction plant equipment	Safe Working methods for conducting service and repair of construction plant equipment including: • Identify service and repair requirements from drawings, specifications, and manufactures information. • Method Statements/safe working procedure • Correct selection and use of special service tools • Moving standard loads • Risk Assessments and Pre-task assessments • Contamination Control • Documentation/Record completion following task	
	2.5 Identify information resources required to carry out service and repair of construction plant		

Learner's signature

I confirm that the evidence above is all my own work

…….. Date ……..

Assessor's name ……

I confirm that the evidence for this unit is complete and meets the requirements for validity, authenticity and sufficiency.

Signed……..Date …….

Internal verifier's signature (if sampled)

……..Date……

TITLE	Service and repair earthmoving equipment and material handling	Learner's name
UNIT NUMBER	225	
LEVEL	2	
CREDIT LEVEL	10	
UAN	K/616/2007	
The aim of this unit is to provide the learner with the knowledge and skills required to service and repair earthmoving equipment or material handling equipment.		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements	For inserting direct evidence or referencing to where the evidence can be found

1. be able to perform service and repair operations on earth moving equipment or material handling equipment	1.1 Confirm the service and repair requirements for specific earthmoving plant or material handling equipment	Construction, types and function of earthmoving equipment or material handling including: • Track type Tractors • Track Type Loaders • Tracked Hydraulic Excavators • Wheeled Hydraulic Excavators • Off highway dump trucks • Articulated dump trucks • Back Hoe Loaders • Telehandlers • Skid Steer Loaders • Compactors • Wheel Loaders • Wheel Tractor Scrapers • Generating sets • Industrial Power Packs • Motor Graders Machine systems used in earthmoving equipment or material handling including equipment including: • Diesel Engines • Fuel Injection Systems • Electrical/Electronic Systems • Hydraulic Systems • HVAC systems • Powertrain Systems • Track laying Systems • Steering and braking systems • Monitoring Systems	

	1.2 Dismantle earthmoving equipment to manufacturer's specification and standards	Remove, dismantle, repair, reinstate, setup and inspect earthmoving equipment or material handling including equipment to manufacturer's specifications: • the preparation, testing and use of tools and equipment used for dismantling removing and replacing components • appropriate safety precautions • the importance of logical and systematic processes • the inspection and testing of systems and components • the preparation of replacement units for re-fitting or replacement • the reasons why replacement components and units must meet the original specifications (OES)	
	1.3 Repair earthmoving equipment to manufacturer's specification and standards		
	1.4 Reinstate earthmoving equipment to manufacturer's specification and standards		
	1.5 Setup earthmoving equipment to manufacturer's specification and standards		
	1.6 Rectify performance faults in equipment to achieve optimal performance		
	1.7 Carry out inspections on earthmoving equipment or material handling equipment		

2. Know how to service and repair earthmoving equipment or material handling equipment	2.1 Describe the construction, types and function of earthmoving equipment or material handling		
	2.2 Describe how to remove, dismantle, repair, reinstate and maintain earthmoving equipment or material handling equipment to manufacturer's specifications		
	2.3 Describe the specific systems used in earth moving equipment or material handling equipment		

	2.4 Describe the safe working methods conduction service and repair of earthmoving equipment or material handling equipment	Safe Working methods for conducting service and repair of earthmoving equipment or material handling including: • Identify service and repair requirements from drawings, specifications, and manufactures information. • Method Statements/safe working procedure • Correct selection and use of special service tools • Moving standard loads • Risk Assessments and Pre-task assessments • Contamination Control • Documentation/Record completion following task	
	2.5 Identify information resources required to carry out service and repair of earthmoving equipment or material handling equipment		

Learner's signature
I confirm that the evidence above is all my own work

…….. Date ……..……..

Assessor's name ……
I confirm that the evidence for this unit is complete and meets the requirements for validity, authenticity and sufficiency.

Signed……..Date ……

Internal verifier's signature (if sampled)

……..Date……