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

www.cityandguilds.com

Qualification handbook and assessor guidance

501/0302/7

Version 4.2
July 2025

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As the UK's leading vocational education organisation, City & Guilds is leading the talent revolution by inspiring people to unlock their potential and develop their skills. We offer over 500 qualifications across 28 industries through 8500 centres worldwide and award around two million certificates every year. City & Guilds is recognised and respected by employers across the world as a sign of quality and exceptional training.

City & Guilds Group
The City & Guilds Group operates from three major hubs: London (servicing Europe, the Caribbean and Americas), Johannesburg (servicing Africa), and Singapore (servicing Asia, Australia and New Zealand). The Group also includes the Institute of Leadership & Management (management and leadership qualifications), City & Guilds Land Based Services (land-based qualifications), the Centre for Skills Development (CSD works to improve the policy and practice of vocational education and training worldwide) and Learning Assistant (an online e-portfolio).

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Contents

Version and date	Change detail	Section
V4.1 July 2021	Centre, assessor and Interval Verifier requirements updated	Assessment strategy
V4.2 July 2025	Added ‘City & Guilds’ to qualification title	Throughout
	QCA and NDAQ updated to Ofqual	
	Overall grading statement added	Page 13
	Access arrangements information added	Page 14

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

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

Qualification title and level	City & Guilds qualification number	Ofqual accreditation number	GLH	TQT
Level 2 Diploma in Work-based Land-based Engineering Operations	0059-21, 22, 23, 24, 25	501/0302/7	660-780	1090

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 (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 Register of Regulated Qualifications.

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 industries.

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 City & Guilds 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:
  Level 2 NVQ in Land-based Service Engineering (4025) which expires on 31 December 2010 (QAN 100/2465/7)

City & Guilds 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 Agriculture, Arboriculture/forestry, Ground care, Fixed plant and storage and Construction Pant Maintenance.

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 industries'. The documents can be found under 0059 City & Guilds 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 Land Based work-based qualification.	**www.cityandguilds.com**
Information guide for centres	**www.cityandguilds.com**
Product briefing sheet	**www.cityandguilds.com**

City & Guilds 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 Equipment	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 City & Guilds Level 2 Diploma in Work-based Land- based Engineering Operations (0059)

0059-21 City & Guilds Level 2 Diploma in Work-based Land-based Engineering Operations (Agriculture)	
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 City & Guilds 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, 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

0059-23 City & Guilds 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 City & Guilds Level 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 City & Guilds 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)

Assessment for the Diploma

The units will be assessed by the gathering of work-based evidence into a portfolio. The authenticity, sufficiency and validity of the evidence will be judged by the assessor.

The portfolio builder pack is available on **www.cityandguilds.com** (see page 7). It contains a series of pro-formae that may be helpful to learners/assessors in the compilation of portfolios.

Included in the pack are the following pro-formae:

- Centre contacts form
- Self assessment and personal action plan form
- Record of units achieved
- Witness status list
- Witness testimony form
- Assessment planning form
- Learner feedback sheet

Where witness testimony is used, the Witness Status List must be completed on one occasion by any witnesses used.

The record of units achieved must also be updated as the learner completes each unit.

The use of the other forms is optional.

Learners completing the City & Guilds Level 2 Diploma in Work-based Land-based Engineering Operations as part of the Apprenticeship framework

Learners who are completing the 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.

Test Specification

0059-500 City & Guilds Level 2 Diploma in Work-based Land-based Engineering Operations Independent Assessment

Duration: 50 minutes
Pass mark: 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**

Grading

This qualification is graded Pass / Fail only

Assessment strategy

Centre staffing

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

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

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

Assessors and internal verifiers

The centre must provide Assessor personnel who must be occupationally competent in the industry either qualified to at least level 2 and/or have current experience of working in the industry at this level. The centre must provide Internal Quality Assurance personnel who must be occupationally competent in the industry either qualified to at least level 2 and/or have current experience of working in the industry at this level. Assessors/Internal Quality Assurance personnel may hold relevant qualifications such as D32/33/34 or A1/V1 or TAQA however they are not a mandatory requirement for this qualification. They should have had formal training in assessment/IQA, which may be the qualifications above, or other training that allows the assessor to demonstrate competence in the practice of assessment/IQA. This training may be carried out in-house or with an external agency.

TAQA qualifications are considered very appropriate as Continuing Professional Development (CPD) or as best practice standards for new centre staff to work towards.

Assessor guidance

For the assessment of criteria within knowledge and understanding learning outcomes, it may be useful to use oral questions during direct observation and/or professional discussion.

For practical activities, witness testimony may be useful when direct observation does not cover all criteria. Product evidence may also be available.

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 their City & Guilds local office.

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. Ofqual 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 *Access to Assessment and Qualifications* which is available from **www.cityandguilds.com**

Access arrangements, reasonable adjustments and special consideration

City & Guilds has considered the design of this/these qualification(s) and its/their assessments in order to best support accessibility and inclusion for all learners. order to best support accessibility and inclusion for all learners. City & Guilds understands however that individuals have diverse learning needs and may require reasonable adjustments to fully participate. Reasonable adjustments, such as additional time or alternative formats, may be provided to accommodate learners with disabilities and support fair access to assessment.

Access arrangements are adjustments that allow candidates with disabilities, special educational needs, and temporary injuries to access the assessment and demonstrate their skills and knowledge without changing the demands of the assessment. These arrangements must be made before assessment takes place.

The Equality Act 2010 requires City & Guilds to make reasonable adjustments where a disabled person would be at a substantial disadvantage in undertaking an assessment.

It is the responsibility of the centre to ensure at the start of a programme of learning that candidates will be able to access the requirements of the qualification.

Special consideration is a post examination adjustment to a candidate's mark or grade to reflect temporary injury, illness or other indisposition at the time of the examination/assessment.

Please refer to the documents 'Joint Council for Qualifications (JCQ) Access Arrangements and Reasonable Adjustments', 'JCQ – A Guide to the special consideration process' and 'Access arrangements – When and how applications need to be made to City & Guilds' for more information. All of these are available on the City & Guilds website

Centre and qualification approval

New centres must apply for centre and qualification approval. Further information on this process is

available on the City & Guilds website.

Existing City & Guilds centres will need to get specific qualification approval to run this qualification. They should contact their City & Guilds Local Office.

Full details of the process for both centre and qualification approval are given in 'Providing City & Guilds qualifications – a guide to centre and qualification approval' which is available from **www.cityandguilds.com**

City & Guilds reserve the right to suspend an approved centre, or withdraw their approval from an approved centre to conduct a particular City & Guilds qualification, for reasons of debt, malpractice or for any reason that may be detrimental to the maintenance of authentic, reliable and valid qualifications or that may prejudice the name of City & Guilds.

Registration and certification

Learners must be registered at the beginning of their course. Centres should submit registrations using Walled Garden or Form S (Registration), under the appropriate qualification/complex (0059-21 -25).

Full details on the procedures for these qualifications will be found in the City & Guilds On-line Catalogue. This is accessed through the Walled Garden.

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.

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.

TITLE	Monitor and Maintain Health and Safety in a Land-based Engineering Work Area	Learner's name
UNIT NUMBER	201	
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
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	
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 and gases 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: I. shutdown of electricity II. The presence of gas cylinders and/ or equipment evacuation procedures III. the use of alarms the use of barriers IV. the use of warning signs V. 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 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
	2.3 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
	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 gases

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	Land-based Engineering Operations – Applying Mechanical Principles	Learner's name
UNIT NUMBER	202	
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
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	
	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 v) floating vi) self-aligning vii) sealed viii) self-lubricating ix) thrust and shell bearings x) plain bushes and washers
	2.2 Describe the use of specialist tools to install and maintain components	torque wrenches feeler gauges rolling resistance measurement lead wire engineer's blue
	2.3 Describe the construction, characteristics and fitting methods of seals	
	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

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	Land-based Engineering Operations – Understand how to Use, Service and Maintain, Tools and Equipment	Learner's name
UNIT NUMBER	203	
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
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 reamers iv) drill bits v) measuring and marking equipment specialist and test equipment vi) dismantling/reassembling vii) tools for fabrication viii) supporting ix) clamping x) compressing xi) extracting xii) lifting and slinging equipment

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	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 iv) equipment v) drill bits vi) chisel vii) reamers viii) measuring tools ix) engine testing x) fuel test equipment xi) hydraulic test equipment xii) electrical test equipment xiii) 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	i) State the relevant legislative requirements for workshop equipment ii) provision and use of work equipment iii) regulations electrical equipment iv) lifting equipment v) compressed air equipment vi) abrasive wheels

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TITLE	Land-based Engineering Operations - Material Preparation, Shaping and Assembling	Learner's name
UNIT NUMBER	204	
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
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

	1.4 Assemble and verify components and sub assemblies	To 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
	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

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TITLE	Land-based Engineering Operations – Carry Out Servicing and Maintenance on Land-based Equipment	Learner's name
UNIT NUMBER	205	
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
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

	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 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 v) 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

	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 iii) leakages loose and or missing fitments iv) rubbing and chafing v) wear vi) fire hazards vii) guarding viii) seizure ix) selecting, preparing and cleaning the work area x) carry out machine operational checks prior to commencing service operations xi) cleaning the machine prior to commencing work xii) protecting the machine against damage during service work xiii) make the machine safe prior to commencing work

	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 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.

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TITLE	Land-based Engineering Operations – Perform Thermal Joining and Cutting Processes	Learner's name
UNIT NUMBER	206	
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
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

	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

	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

	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

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TITLE	Land-based Engineering Operations – Service and Repair Cooling and Lubrication Systems	Learner's name
UNIT NUMBER	207	
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
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 their dilution rates ii) coolants
	1.3 Perform operations requiring the drainage and replacement of lubricants and coolants	i) taking samples ii) ensuring correct levels iii) flushing iv) materials to insulate hot and cold components v) dismantle, repair and reinstate cooling and lubrication systems and their components

	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 v) longevity vi) oil viscosity Methods i) liquid ii) forced air iii) convection/conduction iv) radiation v) heat sinks vi) 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

		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

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TITLE	Land-based Engineering Operations – Service and Repair Engines and Components	Learner's name
UNIT NUMBER	208	
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
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) super-chargers.

		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

	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	

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TITLE	Service and Repair of Clutches, Fluid Flywheels and Torque Convertors on Land-based Equipment	Learner's name
UNIT NUMBER	209	
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
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	

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

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TITLE	Service and Repair Mechanical Transmissions on Land-based Equipment	Learner's name
UNIT NUMBER	210	
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
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	

2. Know the type and characteristics of transmission and gearboxes	2.1	Describe the types, construction, characteristics and operating principles of transmissions and gearboxes	Components to cover 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	
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

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TITLE	Service and Repair Braking Systems on Land-based Equipment	Learner's name
UNIT NUMBER	211	
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
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

	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

	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

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TITLE	Service and Repair Wheeled and Tracked Steering Systems on Land-based Equipment	Learner's name
UNIT NUMBER	212	
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
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

	2.2 Describe the types, construction and function of steering system components	Including: i) steering boxes ii) rack and pinion iii) steering inkages 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 steering 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) iv) heavy steering v) steering wheel free play vi) incorrect tyre pressure and sizes

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TITLE	Service and Repair Tyres and Tracks on Land-based Equipment	Learner's name
UNIT NUMBER	213	
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
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	

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 vii) pressure/tension/weight viii) ballasting

	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 ix) decreasing and variable loads x) 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	
		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

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TITLE	Service and Repair Land-based Cutting and Mowing Equipment	Learner's name
UNIT NUMBER	214	
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
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	

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 affected 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	

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TITLE	Service and Repair Land-based Harvesting and Processing Equipment	Learner's name
UNIT NUMBER	215	
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
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	

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

	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) harvesters vi) balers vii) wrappers

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TITLE	Service and Repair Land-based Soil Preparation and Plant Establishment Equipment	Learner's name
UNIT NUMBER	216	
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
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' specifications	
	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 i) lift ii) move iii) drain iv) invert v) separate vi) profile vii) prepare land Plant i) establishment ii) plant iii) sow iv) irrigate v) fertilise vi) apply crop protection products
		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 prayers vi) seed drills vii) spreaders viii) 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	

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TITLE	Service and Repair Land-based Transport, Handling and Storage Equipment	Learner's name
UNIT NUMBER	217	
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
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	

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
	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

	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

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TITLE	Service and Repair Pneumatic Systems and Components for Land-based Equipment	Learner's name
UNIT NUMBER	218	
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
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
	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

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TITLE	Service and Repair Electrical systems on Land-based Equipment	Learner's name
UNIT NUMBER	219	
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
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

	1.2 Perform tests using equipment and practices to measure and verify the 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	
	2.3 Compare the specification, safe maintenance and charging of different types of battery	a. lead acid b. gel c. maintenance free d. 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 • Charging circuits alternators rectifiers • Lighting circuits indicators brake lights side, head and marker lights work lights iii) Instrumentation fuel temperature tachometer hour meter v) Spark ignition • Spark generation vii) Ancillary circuits • wiper motors, stop circuits, ventilation, horn switches, actuators viii) Safety and circuit protection • Battery isolation safety isolation • fuses and fuseable links thermal switches • over – under voltage switching relays • RCCD, earth bonding ix) Double insulation

		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

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TITLE	Service and Repair Hydraulic Systems and Components on Land-based Equipment	Learner's name
UNIT NUMBER	220	
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
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 iii) 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
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 i) High/low pressure circuits ii) Fixed and variable displacement circuits iii) Open and closed centre circuits iv) Load sensed circuits v) Auxiliary systems vii) Hydraulic system components viii) Hydraulic pumps and motors fixed and variable ix) displacement x) Hydraulic pressure maintaining valves, relief valves, shock valves xi) Hydraulic control valves distributors, solenoid valves, proportional valves, pressure differential valves, pilot operated valves xii) Hydraulic rams, single, acting, double acting and cushioned xiii) Hydraulic direction flow valves, flow dividers, orbital valves, priority valves, restrictors xiv) Reservoirs xv) 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

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TITLE	Maintain and develop personal performance	Learner's name
UNIT NUMBER	221	
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
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	

	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	

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TITLE	Establish and maintain effective working relationships with others	Learner's name
UNIT NUMBER	222	
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
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	

	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	

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

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements
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 safe operation of plant or machinery for non-operational activities	3.1 Prepare plant or machinery for non-operational activities including inspection, repair, maintenance, configuration, testing or travel.	minimum of two of the following: • 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	

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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
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 • Steering and braking systems • Monitoring 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	

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TITLE	Service and repair earthmoving equipment and material handling equipment	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
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	

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