City & Guilds Level 3 Diploma in Work-based Land-based Engineering Operations (0059)

www.cityandguilds.com

Qualification handbook and assessor guidance

501/0399/4

Version 1.4
July 2025

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About City & Guilds
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).

Publications
Every effort has been made to ensure that the information contained in this publication is true and correct at the time of going to press. However, City & Guilds' products and services are subject to continuous development and improvement and the right is reserved to change products and services from time to time. City & Guilds cannot accept liability for loss or damage arising from the use of information in this publication.
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Publications are available from **www.cityandguilds.com** under the 'Qualifications' tab and then click on 'Land-based industries'.

Contents

Version and date	Change detail	Section
V1.3 July 2021	Centre, assessor and Interval Verifier requirements updated	Assessment strategy
V1.4 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 15

City & Guilds Level 3 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 3 Diploma in Work-based Land-based Engineering Operations	0059-31, 32, 33, 34, 35	501/0399/4	360-480	750

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

0059-31 Level 3 Diploma in Work-based Land-based Engineering Operations (Agriculture)

0059-32 Level 3 Diploma in Work-based Land-based Engineering Operations (Arboriculture/forestry)

0059-33 Level 3 Diploma in Work-based Land-based Engineering Operations (Ground care)

0059-34 Level 3 Diploma in Work-based Land-based Engineering Operations (Fixed plant and storage)

0059-35 Level 3 Diploma in Work-based Land-based Engineering Operations (Construction Plant Maintenance)

Guided Learning Hours and Credit
Depending on the route chosen, the GLH and credit totals will vary. However, the overall GLH for this qualification is 488 and the credit value is 60, as listed on the Ofqual register

The Qualification

The City & Guilds Level 3 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 3 NVQ in Land-based Service Engineering (4025) which expired on 31 December 2010 (QAN 100/2466/9)

City & Guilds Level 3 Diploma in Work-based Land-based Engineering Operations (0059)

This qualification will form part of the Advanced 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 Plant 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 Level 2 Diploma in Work-based Land-based Engineering Operations.

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 3 Diploma in Work-based Land-based Engineering Operations 0059-31 to 35

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
L/601/5307	301	Recognise and Reduce Risks in the Land-based Engineering Work Area	3	5
F/600/3400	302	Understand and Follow Organisational Procedures within Land-based Engineering Establishments	2	5
Y/600/3435	303	Provide Customer Care within Land-based Engineering Operations	2	5
A/600/3430	304	Land-based Engineering Operations – Use Calculations	2	5
D/600/3436	305	Land-based Engineering Operations – Perform Thermal Joining Processes	3	10
H/600/3437	306	Land-based Engineering Operations – Service and Repair Engines and Components	3	10
K/600/3438	307	Service and Repair Suspension Systems on Land-based Equipment	3	5
M/600/3439	308	Maintain Electronic Control and Monitoring Systems on Land-based Equipment	3	10
H/600/3440	309	Service and Repair Hydraulic Systems and Components on Land-based Equipment	3	5
K/600/3441	310	Service and Repair Pneumatic Systems and Components for Land-based Equipment	3	5
M/600/3442	311	Service and Repair Powershift, Hydrostatic and CVT Transmissions on Land-based Equipment	3	10
L/601/5310	312	Refrigerant Handling	3	2
F/601/5305	313	Service and Repair of Land-based Air Conditioning, Climate Control and Refrigeration Plant and Equipment	3	3
T/600/3443	314	Monitor the Handover and Installation of Land-based Equipment	3	5
A/600/3444	315	Inspect and Test Land-based Machinery and Equipment	3	10

Rules of combination for the City & Guilds Level 3 Diploma in Work-based Land-based Engineering Operations (0059)

0059-31 City & Guilds Level 3 Diploma in Work-based Land-based Engineering Operations (Agriculture)	
Rules for achievement of qualification	All learners must complete all mandatory units (301-304, 306, 308, 309, 311 and 315), plus a minimum of 5 credits from (305, 307, 310, 312-314), for the pathway. A total of 70 credits are required. Learners completing the Advanced Apprenticeship should complete the following additional modules: 501, 502 and 600.

0059-32 City & Guilds Level 3 Diploma in Work-based Land-based Engineering Operations (Arboriculture/forestry)	
Rules for achievement of qualification	All learners must complete all mandatory units (301-304, 306, 308, 309 and 315), plus a minimum of 5 credits from (305, 307 and 310-314), for the pathway. A total of 60 credits are required. Learners completing the Advanced Apprenticeship should complete the following additional modules: 501, 502 and 600.

0059-33 City & Guilds Level 3 Diploma in Work-based Land-based Engineering Operations (Ground care)	
Rules for achievement of qualification	All learners must complete all mandatory units (301-304, 306, 308, 309, 311 and 315), plus a minimum of 5 credits from (305, 307, 310, 312-314), for the pathway. A total of 70 credits are required. Learners completing the Advanced Apprenticeship should complete the following additional modules: 501, 502 and 600.

0059-34 City & Guilds Level 3 Diploma in Work-based Land-based Engineering Operations (Fixed plant and storage)	
Rules for achievement of qualification	All learners must complete all mandatory units (301-304, 308-310 and 312-315), plus a minimum of 15 credits from (305-307 and 311), for the pathway. A total of 75 credits are required. Learners completing the Advanced Apprenticeship should complete the following

	additional modules: 501, 502 and 600.

0059-35 City & Guilds Level 3 Diploma in Work-based Land-based Engineering Operations (Construction Plant Maintenance)	
Rules for achievement of qualification	All learners must complete all mandatory units (301-304, 306, 308, 309, 314 and 315), plus a minimum of 10 credits from (305, 307, 310 - 313), for the pathway. A total of 70 credits are required.

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 3 Diploma in Work-based Land-based Engineering Operations as part of the Advanced Apprenticeship framework

Learners who are completing the Level 3 Diploma in Work-based Land-based Engineering Operations as part of the Advanced Apprenticeship framework are required to undertake an independent assessment in the form of two short answer written tests and an assignment. The tests may be taken three times a year. Exam dates are available on the Walled Garden. The tests cover the underpinning knowledge elements of the units included within the tests. Test specifications are on the following page.

The assignment and marking criteria can be found in the 0059 Level 3 Diploma in Work-based Land-based Engineering Operations assignment guide.

Centres will be required to provide Lantra SSC with evidence that the short answer written tests and assignment has been achieved before certification takes place.

Test Specifications

0059-501, 502 and 600

0059-501 Recognise and reduce risks in the land-based engineering work area

Duration: 50 minutes
Pass mark: 50%
Base mark: 32

Unit Number	Unit Title	No. of questions
301	Recognise and reduce risks in the land-based engineering work area.	**8**
	Total	**8**

0059-502 Maintain electronic control and monitoring systems on land-based equipment

Duration: 60 minutes
Pass mark: 50%
Base mark: 48

Unit Number	Unit Title	No. of questions
308	Maintain electronic control and monitoring systems on land-based equipment.	**12**
	Total	**12**

0059-600

This is an assignment based on the unit number 304, Land-based engineering operations – Use calculations (L2). This assignment and marking criteria can be found in the 0059 Level 3 Diploma in Work-based Land-based Engineering Operations assignment guide.

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 (0059-31 -35).

Full details on the procedures for these qualifications can 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.

Exemplar unit

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

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

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

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

Internal verifier's signature (if sampled)

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

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

Unit 301

TITLE	Recognise and Reduce Risks in the Land-based Engineering Work Area	Learner's name
LEVEL	3	
CREDIT LEVEL	5	
UAN	L/601/5307	
The aim and purpose of this unit is to provide the learner with the knowledge and skills and understanding to recognise and reduce risks within a land based engineering work environment. Relationship to National Occupational Standards: This unit directly relates to O29NLEO1		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements
1. Be able to recognise and reduce risks in the land-based engineering work area	1.1 Identify and evaluate health and safety and environmental hazards and their associated risks in the work area in line with best practice	Identify those who may be at an increased level of risk in the workplace Evaluate the effectiveness of the measures used to control risks
	1.2 Assess the effects of attitude, knowledge and experience upon perception of risk in the workplace	
	1.3 Define the term 'so far as is reasonably practicable'	
	1.4 Carry out risk assessment	A task specific and/or work area (health and safety and/or environmental) and report the significant findings as required by law clarifying levels of risk and recommended actions

Unit 301

2. Understand how to recognise and reduce risk within the land based engineering work area	2.1 Describe activities in the workplace that give rise to significant risks to health and safety and the environment	i) workplace environment ii) work practices Slip, trip and falls Falling objects Entrapment Asphyxiation/inhalation Noise levels Physical limitations Hazardous materials Fire and /or explosion Exposure times Ventilation and extraction PPE and its limitations Climatic conditions Lone working Stored energy i) atmospheric contamination ii) water course contamination iii) soil contamination iv) leakage and spillages v) storage and disposal of products and materials vi) mixing, dilution and / or neutralisation of chemicals vii) selection of environmentally friendly materials Working practices Give examples of changes in work practices and the environment that could increase risk
	2.2 Explain why certain individuals or groups maybe at an increased level of risk and how this can be addressed	Explain how attitude, knowledge and experience influence the perception of risk

Unit 301

	2.3	Explain the hierarchy of risk control measures	Explain the five steps to risk assessment as advocated by the HSE
	2.4	Summarise the legislative requirements regulating health and safety and environmental risk assessments	State who should be informed in relation to risk assessment findings Explain sources of information on health and safety and environmental legislation and implementing best practice

Unit 301

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

…….. Date ……..

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

Signed……..Date …….

Internal verifier's signature (if sampled)

……..Date……

Unit 302

TITLE	Understand and Follow Organisational Procedures within Land-based Engineering Establishments	Learner's name
LEVEL	2	
CREDIT LEVEL	5	
UAN	F/600/3400	
The aim of this unit is to provide the learner with the knowledge, and skills required to understand and follow organisational procedures required by the job role Pre-delivery is not exclusive to new equipment Relationship to National Occupational Standards: This unit directly relates to029NLEO2		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements
1. Be able to follow organisational procedures	1.1 Follow organisational, departmental and task procedures required of the job role	
	1.2 Complete administrative tasks and record technical information	In line with company and manufacturers and suppliers requirements i) job cards ii) parts requisitions iii) service records iv) warranty records
	1.3 Prepare and organise to carry out tasks required by the job role	
	1.4 Locate, access, download, file and store electronic software and copy technical documentation	i) service manuals ii) operators manuals iii) service information and history iv) diagnostic information

Unit 302

2. Know the organisational procedures required by the job role	2.1 Describe the structure of a given land-based organisation covering: i) levels of responsibility and authority ii) methods of communication iii) organisational procedures	Health and safety i) Environmental responsibilities ii) human resource procedures iii) internal and external communications iv) Quality standards v) Efficiency and effectiveness vi) Customer confidentiality
	2.2 Describe the procurement, storage, retail and transport of parts	i) ordering procedures ii) parts location and identification iii) Quality procedures
	2.3 Describe how to complete and process internal and supplier documentation	i) timesheets, ii) job cards, iii) parts requisitions, iv) unit records, e.g. engine hours, mileage, etc v) service records vi) Serial numbers vii) Warranty and quality control

Unit 302

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

…….. Date ……..

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

Signed……..Date …….

Internal verifier's signature (if sampled)

……..Date……

Unit 303

TITLE	Provide Customer Care within Land-based Engineering Operations	Learner's name
LEVEL	2	
CREDIT LEVEL	5	
UAN	Y/600/3435	
The aim of this unit is to provide the learner with the knowledge, understanding and skills required to provide customer care to customers using land based engineering services Relationship to National Occupational Standards: This unit directly relates to 029NLEO 3		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements
1. Be able to apply customer care principles	1.1 Project the appropriate level of professionalism, personal appearance conduct and behaviour	
	1.2 Communicate information to customers using appropriate methods	Accurately
	1.3 Describe the importance of meeting customers' expectations	
	1.4 Respect customer and corporate confidentiality	
2. Know how to apply customer care principles	2.1 Describe how to promote a positive image of yourself, colleagues, the organisation and it's products and services	State why customer care is important and the components that contribute to customer satisfaction and dissatisfaction
	2.2 Describe how to communicate with the customer politely, respectfully and effectively	Including written or verbal updating, taking and passing on messages, supplying information, confirmation of actions, being assertive or compliant

Unit 303

	2.3	Describe how to recognise different behaviours in customers	
	2.4	State the limits of your authority and responsibility when dealing with customers	
	2.5	State the reasons why customer and corporate confidentiality must be respected	

Unit 303

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

…….. Date ……..

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

Signed……..Date …….

Internal verifier's signature (if sampled)

……..Date……

Unit 304

TITLE	Land-based Engineering Operations – Use Calculations	Learner's name
LEVEL	2	
CREDIT LEVEL	5	
UAN	A/600/3430	
The aim of this unit is to provide the learner with the knowledge and skills required to use calculations to support land based engineering principles Relationship to National Occupational Standards: This unit directly relates to 029NLEO7		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements
1. Be able to use calculations to support engineering principles	1.1 Use ratios and units of measurement to express values	i) transmissions ii) engine iii) hydraulic iv) pneumatic v) electrical and machine performance including: • power • energy • torque • force • specific gravity • pressure • velocity • acceleration • deceleration • reduction ratios • friction

Unit 304

		• density • flow • resistance • load • current • noise
	1.2 Use conversion factors to convert measurement values from one unit of measurement to another	
	1.3 Calculate/measure: i) areas ii) weights iii) volumes iv) angles v) low rates and speeds vi) scaling	
	1.4 Use physical and theoretical methods to establish measurements where relevant	fuel consumption oil consumption torque reserve lifting force
	1.5 Verify by calculation the calibration of machinery and equipment	

Unit 304

2. Know how to use calculations to support engineering principles	2.1 Identify units of measurement used to express values	vi) transmissions vii) engine viii) hydraulic ix) pneumatic x) electrical and machine performance including: • power • energy • torque • force • specific gravity • pressure • velocity • acceleration • deceleration • reduction ratios • friction • density • flow • resistance • load • current noise
	2.2 State how to use conversion tables	and the conversion factors for calculations
	2.3 Define the mathematical formulas for: i) area ii) volume iii) circumference	Outline the principles of: • Ohms Law • Newton's Law of Motion • Boyle's Law • Pascal's Law

Unit 304

	2.4 State the relationship between speed and torque	
	2.5 Describe how to calculate power, torque, force, consumption and application rates	
	2.6 Describe the methods and equipment required to carry out a measuring task and the factors that can distort measurements	Describe the methods used to check calibration / application rates Describe the power ratings (BHP or KW) and what they represent including ECE, DIN, SAE
	2.7 Describe how to measure: i) speed ii) velocity iii) acceleration iv) deceleration v) coefficient of friction	Describe how to calculate speed from ratios and input or output speed

Unit 304

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.

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Unit 305

TITLE	Land-based Engineering Operations – Perform Thermal Joining Processes	Learner's name
LEVEL	3	
CREDIT LEVEL	10	
UAN	D/600/3436	
The aim of this unit is to provide the learner with the knowledge, understanding and skills required to safely carry out thermal joining processes 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	1.1 Prepare the workplace and equipment to carry out a thermal joining process	To include safe shut down of equipment
	1.2 Set up equipment and carry out preparation of material for positional welding techniques	i) MIG/MAG ii) TIG iii) MMA Use: Clamping Tacking Bevelling Positioning
	1.3 Join or repair a range of materials producing joints	Of the required quality and dimensions
	1.4 Identify faults using appropriate inspection techniques	

Unit 305

2.	Understand high temperature thermal joining techniques	2.1 Explain the different techniques used to carry out positional thermal joining procedures	i) visual inspection, ii) non destructive and destructive procedures covering iii) undercutting, iv) slag traps, v) penetration, vi) cracking leak testing
		2.2 Explain how to prepare and set up MIG/MAG, TIG, MMA welding equipment for positional welding tasks	
		2.3 Explain how to use thermal joining techniques to join and repair	i) Cast iron ii) Alloys iii) Dissimilar metals
		2.4 Explain the safety preparations and precautions required to minimise risk prior to and during thermal joining and repair processes	Taking into account 4 of each of the following: i) Seals ii) Filters iii) Contamination iv) Distortion v) Stress relief vi) Fire and fume hazards vii) Electrical/electronic components and/or systems viii) Ancillary equipment Precautions i) fumes, ii) explosions, iii) heat/fire, iv) sharp edges, v) airborne debris vi) personal injury

Unit 305

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Unit 306

TITLE	Land-based Engineering Operations – Service and Repair Engines and Components	Learner's name
LEVEL	3	
CREDIT LEVEL	10	
UAN	H/600/3437	
The aim of this unit is to provide the learner with the knowledge, understanding and skills required to perform service and repair procedures on engines within land based engineering. 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 service and repair procedures on engines and their components	1.1 Prepare, inspect and record the condition of engines and their components	
	1.2 Use correct measuring equipment to verify compliance of engine components	Covering six of the following: i) Piston and connecting rod ii) Piston ring gapping iii) Cylinder/liner taper, ovality and protrusion iv) Crankshaft journal ovality and end float v) Piston / head clearances vi) Valve, guide, seat, train, operating system vii) Cylinder head / block distortion viii) Engine oil pump Record results and compare with specifications and make recommendations
	1.3 Investigate failed or worn parts and record and report findings	

Unit 306

2. Be able to identify engine faults	2.1 Carry out tests to determine the cause of different engine problems	Two of the following: i) Compression ii) Engine power iii) Fuel consumption iv) Fuel pressure
	2.2 Set and adjust engine performance within specified limits.	
	2.3 Identify and rectify engine system faults	
3. Understand how to analyse and interpret findings from engine inspections and rectify	3.1 Describe how to identify and rectify the cause of engine problems	i) engine performance ii) misfire iii) backfire iv) engine oil pressure v) overheating vi) seizure vii) abnormal noise viii) non starting ix) excessive crank case breathing x) oil consumption fuel delivery and system pressures xi) air intake charge pressures xii) abnormal fuel usage injection, cam shaft and ignition timing xiii) emissions including blue, white or black smoke engine performance not in accordance with manufacturers' specification xiv) weak and rich fuel mixtures xv) restricted intake and exhaust air flow xvi) verifying governor operation xvii) operation of cold starts

Unit 306

	3.2 Explain the methods of sealing combustion chambers, fuel and ignition systems.	
	3.3 Describe the effects of moisture and contaminates in fuel and ignition systems	
	3.4 Explain the procedure to verify correct engine timing covering both static and dynamic timing	Explain how to carry out the following tests to determine the cause of different engine problems i) Compression ii) Engine power iii) Fuel consumption iv) Fuel pressure
4. Understand how take engine measurements	4.1 Describe the methods and techniques of taking engine specific measurements	i) piston ring gapping ii) cylinder, liner, taper, ovality and protrusion iii) crank shaft journal ovality and end float iv) piston/head clearance v) valve, guide, seat, train, operating system vi) cylinder head and ancillary components

Unit 306

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Unit 307

TITLE	Service and Repair Suspension Systems on Land-based Equipment	Learner's name
LEVEL	3	
CREDIT LEVEL	5	
UAN	K/600/3438	
The aim of this unit is to provide the learner with the knowledge, understanding and skills required service and repair suspension systems and components on land based equipment Relationship to National Occupational Standards: This unit directly relates to 029NLEO21		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements
1. Be able to perform service and repair operations on suspension systems and their components	1.1 Remove, dismantle repair and reinstate suspension systems and components to manufacturer's specifications	i) Cab suspension ii) Seat suspension iii) Axle suspension
	1.2 Diagnose faults in suspension assemblies and their components and recommend actions	Appropriate
2. Understand the construction, function and operation of suspension systems	2.1 Describe the types, construction and operating principles of suspension assemblies and their components	i) cab mounts ii) dampers iii) springs iv) accumulators v) levelling devices vi) cab and seat
	2.2 Describe how to remove, dismantle, repair and reinstate suspension assemblies and components	To operator's/manufacturers' specifications i) cab suspension ii) seat suspension iii) axle suspension

	2.3 Describe how to diagnose faults in suspension assemblies and components and recommend actions	

Unit 307

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Unit 308

TITLE	Maintain Electronic Control and Monitoring Systems on Land-based Equipment	Learner's name
LEVEL	3	
CREDIT LEVEL	10	
UAN	M/600/3439	
The aim of this unit is to provide the learner with the knowledge, understanding and skills required to maintain electronic control and monitoring systems on land based equipment Relationship to National Occupational Standards: This unit directly relates to 029NLEO23		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements
1. Be able to maintain electronic control and monitoring systems	1.1 Identify and locate, electronic control and monitoring systems and their components to retrieve and interpret stored information	To meet manufacturer's specifications
	1.2 Establish parameters, calibrate and verify performance of the electronic control and monitoring systems	
	1.3 Maintain electronic control and monitoring systems and their components to confirm integrity	
	1.4 Prepare the system to be tested and carry out a diagnostic test using diagnostic tools and equipment to evaluate or rectify system performance	

Unit 308

2. Understand how to maintain electronic control and monitoring systems	2.1 Summarise electronic control and monitoring systems and their application	i) engine management ii) transmission management iii) headland management iv) performance monitoring v) closed circuit television monitoring vi) equipment instrumentation vii) driver information viii) suspension control ix) hydraulic control x) pilot steering xi) global positioning service xii) multiplexing xiii) telemetry xiv) automatic guidance systems
	2.2 Summarise how control and monitoring signals are generated and communicated and the causes and effects of interference	i) CAN bus ii) ISO bus iii) GPS/satellite State the causes and effects of interference and summarise the methods of inhibiting external influences iv) wireless v) Pulse Width vi) Modulation PWM

Unit 308

	2.3 Summarise the function of electronic components	The following components: i) transistors ii) capacitors iii) regulators iv) resistors v) transformers vi) thermisters vii) transducers viii) transmitters ix) actuators x) electronic control units (ECU) Summarise the types and methods of inhibiting external electronic influences i) screening ii) twisted pairs iii) grounding/earthing
	2.4 Describe the tools and equipment used to test, repair and reinstate electronic control and monitoring systems and their components	
	2.5 Describe the methods used to check and maintain system integrity	i) connections ii) wiring routes/fixings iii) grounding/earthing
	2.6 Summarise how to retrieve, interpret, reinstate and verify information stored in electronic control units (ECU)	Summarise how to calibrate and verify the correct operation of electronic control and monitoring equipment

Unit 308

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Unit 309

TITLE	Service and Repair Hydraulic Systems and Components on Land-based Equipment	Learner's name
LEVEL	3	
CREDIT LEVEL	5	
UAN	H/600/3440	
The aim of this unit is to provide the learner with the knowledge, understanding and skills required to repair and service hydraulic systems 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 Inspect performance of hydraulic systems and components	and evaluate
	1.2 Prepare the system to be tested and carry out tests using diagnostic tools to assess system performance	
	1.3 Interpret diagnostic results and recommend actions	Appropriate
	1.4 Remove, dismantle, repair and reinstate system and components to manufacturer's specifications	
2. Understand the construction, function and operation of hydraulic circuit systems and their components used in land based engineering applications	2.1 Interpret circuit diagrams and symbols and their functions within the system	
	2.2 Explain how to dismantle, repair and reinstate hydraulic components and systems	To manufacturer's specifications

Unit 309

	2.3 Explain the application of valves and the function of hydraulic systems and components	Valves i) orbitrol valves ii) Proportional valves iii) load sensed circuits iv) hydrostatic circuits v) trailer brake valves
		Hydraulic systems and components i) Hydraulic pumps and motors fixed and variable displacement ii) Hydraulic pressure maintaining valves, relief valves, shock valves iii) Hydraulic control valves, distributors, solenoid valves, proportional valves, pressure differential valves, pilot operated valves, trailer brake valve iv) Hydraulic rams, single, acting, double acting and cushioned v) Hydraulic direction flow valves, flow dividers, orbital valves, priority valves, restrictors vi) Reservoirs vii) Accumulators
	2.4 Identify diagnostic test/s that will evaluate hydraulic system performance	and justify
	2.5 Interpret and compare test results	To manufacturers specifications and summarise options and recommendations

Unit 309

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Unit 310

TITLE	Service and Repair Pneumatic Systems and Components for Land-based Equipment	Learner's name
LEVEL	3	
CREDIT LEVEL	5	
UAN	K/600/3441	
The aim of this unit is to provide the learner with the knowledge, understanding and skills required to carry out service and repair on 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 components	1.1 Inspect performance of pneumatic systems and components	and evaluate
	1.2 Prepare system to be tested and carry out tests using diagnostic tools	
	1.3 Interpret and record the results and recommend action	Appropriate
	1.4 Remove, dismantle, repair and reinstate system and components to manufacturers' specification	
2. Understand the construction, function and operation of pneumatic systems and components used in land-based engineering	2.1 Interpret circuit diagrams and symbols and their functions within a pneumatic system	

Unit 310

	2.2 Explain the application and function of pneumatic systems and components	i) air compressors, air pressure regulating valves ii) relief valves iii) dump valves iv) air pressure control valves v) hand brake valves vi) foot brake valves vii) diaphragm operated valves viii) air activated cylinders, ix) air cushions x) fail-safe/ emergency system components, xi) air receivers and dryers
	2.3 Explain diagnostic tests and how to interpret the results	Summarise the options and recommendations that are formulated from the test results
	2.4 Describe how to dismantle, repair and reinstate pneumatic systems and components	

Unit 310

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Unit 311

TITLE	Service and Repair Power shift, Hydrostatic and CVT Transmissions on Land-based Equipment	Learner's name
LEVEL	3	
CREDIT LEVEL	10	
UAN	M/600/3442	
The aim of this unit is to provide the learner with the knowledge, understanding and skills required carry out service and repair on powershift, hydrostatic, CVT transmission on land based equipment Relationship to National Occupational Standards: This unit directly relates to 029NLEO27		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements
1. Be able to perform service and repair operations on power shift, hydrostatic and CVT transmissions and their components	1.1 Identify transmissions and their components	i) powershift, ii) hydrostatic and iii) CVT transmissions
	1.2 Remove, dismantle, repair and reinstate transmission to manufacturer's specification and standards	Prepare transmission to be tested
	1.3 Perform operational and diagnostic tests identifying and categorising faults in transmission	i) Mechanical ii) Hydraulic iii) Electrical / electronic iv) Operator use Record faults and recommend appropriate action

Unit 311

2. Understand the construction function and operation of power shift, hydrostatic, CVT transmissions and their components		
	2.1 Interpret technical documentation relating to transmissions to perform diagnostic tests	i) drive paths ii) shift and engagement patterns iii) stationary and rotating components iv) fault codes i) monitoring intermittent faults ii) simulation iii) substitution iv) operational tests
	2.2 Explain the different types of transmissions including layout, construction, operating principles and function	i) speed sequencing and / or matching components ii) directional change and / or shuttle components iii) range change and variable speed components iv) speed monitoring devices v) transmission clutching and braking components vi) single and multiple epicyclic units vii) variable displacement pumps viii) hydrostatic motors ix) safety and protection devices x) operational limitations (stationary work) (towing) (bump starting) (engine braking) Explain why it is necessary to time certain transmission components

Unit 311

	2.3	Describe how to remove, dismantle, repair and reinstate powershift, hydrostatic, CVT transmissions and their components	to manufacturer's specification and standards
	2.4	Evaluate faults in powershift, hydrostatic and CVT transmissions using operational and diagnostic test data	i) (Mechanical ii) Hydraulic iii) Electric / electronic iv) Operator use

Unit 311

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Unit 312

TITLE	Refrigerant Handling	Learner's name
LEVEL	3	
CREDIT LEVEL	2	
UAN	L/601/5310	
The aim of this unit is to provide the learner with the knowledge, understanding and skills required to handle refrigerants Relationship to National Occupational Standards: This unit directly relates to 029nLEO28		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements
1. Be able to handle refrigerants in accordance with legislation	1.1 Identify and locate air conditioning systems and their components	
	1.2 Identify the correct refrigerant types and system capacities according to application	
	1.3 Use the appropriate tools and equipment to carry out refrigerant handling activities recovery	
	1.4 Follow safety procedures to collect and transfer any waste material in accordance with relevant legislation and policies	
	1.5 Maintain and process appropriate records	

Unit 312

2. Know how to handle refrigerants in accordance with legislation	2.1	Describe the operating principles and function of Mobile Air Conditioning (MAC) and fixed plant refrigeration systems and components	
	2.2	Describe types of refrigerants and their properties, characteristics and environmental impact	
	2.3	Describe how to handle refrigerants including recovery, testing (pressure or vacuum), flushing and recharging in Mobile Air Conditioning and fixed plant refrigeration systems	
	2.4	Describe how to work in a way which minimises the risk of any refrigerant emissions	

Unit 312

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Unit 313

TITLE	Service and Repair of Land-based Air Conditioning, Climate Control and Refrigeration Plant and Equipment	Learner's name
LEVEL	3	
CREDIT LEVEL	3	
UAN	F/601/5305	
The aim of this unit is to provide the learner with the knowledge, understanding and skills required service and repair land based air conditioning, climate control and refrigeration plant and equipment Relationship to National Occupational Standards: This unit directly relates to 029NLEO28		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements
1. Be able to perform air conditioning, climate control and refrigeration service and maintenance operations	1.2 Remove, dismantle, inspect, repair and reinstate systems and/or components	To legislative and manufacturer's specifications and standards Identify and locate system types and their components as appropriate
	1.2 Select and use the appropriate tools and equipment to carry out testing and maintenance activities	To manufacturer's specifications and standards i) leak testing ii) pressure testing iii) vacuum testing iv) gas recovery v) system flushing vi) recharging vii) performance testing viii) Maintenance Carry out operational checks and/or tests to establish system functionality

Unit 313

	1.3	Diagnose and rectify different faults	Five faults i) compressor and / or drive failure ii) refrigerant loss iii) restricted refrigerant flow iv) restricted air flow v) faulty switch and / or sensors vi) faulty temperature controls vii) under / over charge of refrigerant or lubricant viii) system contamination and / or corrosion
	1.4	Collect, transfer and dispose of any waste material following current legal and environmental requirements	
	1.5	Maintain appropriate records	
2. Understand the construction function and operation of air conditioning, climate control and refrigeration systems and their components	2.1	Describe the types, construction, function and operating principles of air conditioning, climate control and refrigeration systems and their components	i) compressors and their drives, ii) couplings, iii) pipes and hoses iv) condenser v) evaporator vi) receiver drier vii) thermostats viii) control and thermal expansion valves (TXV), fixed orifice tube (FOT)

Unit 313

	2.2	Explain how to carry out operational checks and diagnostic tests to establish system functionality	i) compressor drive ii) switches and controls iii) cooling rate/effectiveness iv) condensation and or icing v) insulation, air flow vi) filter inspection Explain how to evaluate tests results Justify appropriate diagnostic conclusion/s based on test results
	2.3	Describe how to recognise and rectify faults	i) compressor and or/drive failure, refrigerant loss ii) restricted refrigerant/air flow, iii) faulty switch and/or sensors iv) temperature controls v) under/over charge of refrigerant or lubricant vi) system contamination and/or corrosion
	2.4	Describe how to collect, transfer, dispose of any waste material following current legal and environmental requirements	

Unit 313

	2.5	Summarise the procedures, tools and equipment to remove dismantle, inspect and reinstate air conditioning and refrigeration components	To legislative and manufacturer's specifications and standards Explain how to select and use the appropriate tools and equipment to include all of the following i) maintenance ii) leak testing iii) recovery iv) flushing v) recharging vi) performance testing vii) pressure testing viii) vacuum testing
	2.6	Explain what relevant documentation should be used when handling refrigerants	and how to maintain the appropriate records

Unit 313

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Unit 314

TITLE	Monitor the Handover and Installation of Land-based Equipment	Learner's name
LEVEL	3	
CREDIT LEVEL	5	
UAN	T/600/3443	
The aim of this unit is to provide the learner with the knowledge, understanding and skills required to prepare for and handover the installation of land-based equipment Relationship to National Occupational Standards: This unit directly relates to 029NLEO29		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements
1. Be able to perform the handover and installation of land-based equipment	1.1 Identify a suitable location, agree and prepare for hand over and installation with customer	
	1.2 Use the correct procedure to handover and install the equipment as specified	i) legal ii) machine economic iii) performance iv) efficiency v) professionalism i) handbooks ii) stop procedures iii) safety issues iv) control and operation techniques v) maintenance vi) service schedules vii) warranty and terms and conditions

Unit 314

	1.3	Use an appropriate format to record the results of the installation	Recipient to sign
2. Understand how to perform the handover and installation of land-based equipment	2.1	Identify the reasons and benefits of handover and installation of products	i) legal ii) machine economic iii) performance iv) efficiency v) professionalism
	2.2	Describe how to carry out an installation using a systematic process and the relevant quality control systems including special machine characteristics	i) handbooks ii) stop procedures iii) safety issues iv) control and operation techniques v) maintenance vi) service schedules vii) warranty and terms and conditions Recipient to sign
	2.3	Describe technical advice and assistance within limits of own authority and how to deal with queries and problems	

Unit 314

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Unit 315

TITLE	Inspect and Test Land-based Machinery and Equipment	Learner's name
LEVEL	3	
CREDIT LEVEL	10	
UAN	A/600/3444	
The aim of this unit is to provide the learner with the knowledge, understanding and skills required to inspect and test land-based machinery and equipment Relationship to National Occupational Standards: This unit directly relates to 029NLEO30		

Learner Outcomes The learner will:	Assessment Criteria The learner can:	Assessment Requirements
1. Be able to inspect and test land-based machinery and equipment	1.1 Establish the objectives of the inspection or test	Covering three activities i) compliance (manufacturer's/ technical/ legislation) ii) verification of repair iii) accident or incident occurrence iv) diagnosis
	1.2 Observe and record information to evaluate the condition, application and performance of equipment	Relevant service history Technical reference date Investigate failed and/or worn parts and record the findings
	1.3 Prepare and carry out test(s)	Within agreed timescales Equipment must be Serviceable Calibrated Certification in date
2. Be able to analyse and interpret findings	2.1 Check the data gathered is accurate and takes account of test conditions	Eliminate any influence of external factors affecting the performance
	2.2 Recognise the cause and effect of failure(s)	

Unit 315

	2.3 Analyse the data using approved methods and procedures	e.g. dynamometer tests, oil sampling Compare the analysis against the product specification and identify any deviations Determine the implications of the findings
	2.4 Present findings and recommendations	
3. Understand how to Inspect and test land-based machinery and equipment	3.1 Describe methods used to investigate intermittent faults	
	3.2 Describe the causes and symptoms of malfunction	
	3.3 Describe the methods, diagnostic and specialist equipment used to establish conformity with manufacturer's, technical and legislation requirements	Appropriate Methods i) logical elimination ii) simulation iii) comparison iv) isolation of components v) comparing results against vi) Manufacturers specification
	3.4 Describe the difference between a characteristic and a malfunction	Explain how to analyse, interpret and present findings

Unit 315

4	Understand how to formulate and recommend actions	4.1	Describe actions that could be considered following inspection and testing and their implications	The range of Action i) replace ii) repair iii) modify iv) update v) substitution vi) impound vii) beyond economic repair viii) service ix) pass/fail x) unsafe Implications i) warranty ii) cost effectiveness iii) integrity of repair iv) insurance considerations v) timescale vi) health and safety vii) impact on dealership operations viii) impact on the customers' operations
		4.2	Explain how to recognise the need for operator training requirements to avoid reoccurrence of failures	Explain how to classify a repair i) warranty ii) insurance claim iii) forced breakage iv) lack of maintenance v) unauthorised intervention vi) sabotage/ vandalism vii) overload viii) operator abuse ix) inappropriate usage

Unit 315

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