

Pearson Edexcel Level 3 Diploma in Work-based Land-based Engineering

Specification

Competence-based qualification

For first registration November 2011

Issue 2

Edexcel, BTEC and LCCI qualifications

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This specification is Issue 2. Key changes are listed in summary table on next page. We will inform centres of any changes to this issue. The latest issue can be found on the Pearson website: qualifications.pearson.com

This qualification was previously known as:

Pearson Edexcel Level 3 Diploma in Work-based Land-based Engineering (QCF)

The QNs remain the same.

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Summary of Pearson Edexcel Level 3 Diploma in Work-based Land-based Engineering Issue 2 changes

Summary of changes made between previous issue and this current issue	Page number
All references to QCF have been removed throughout the specification	
Definition of TQT added	1
Definition of sizes of qualifications aligned to TQT	2
TQT value added	6
Guided learning definition updated	16
QCF references removed from unit titles and unit levels in all units	19-73

Earlier issue(s) show(s) previous changes.

If you need further information on these changes or what they mean, contact us via our website at: qualifications.pearson.com/en/support/contact-us.html.

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Introducing Pearson Edexcel NVQ qualifications

What are NVQ qualifications?

National Vocational Qualifications (NVQs) are work-based qualifications that give learners the opportunity to develop and demonstrate their competence in the area of work or job role to which the qualification relates.

NVQs are based on the National Occupational Standards (NOS) for the appropriate sector. NOS define what employees, or potential employees, must be able to do and know, and how well they should undertake work tasks and work roles. At Level 2 and above, these qualifications are recognised as the competence component of Apprenticeship Frameworks. Qualifications at Level 1 can be used in Traineeships, which are stepping-stones to Apprenticeship qualifications. NVQs qualifications can also be delivered as stand-alone for those who wish to take a work-based qualification.

NVQs qualifications are outcomes-based with no fixed learning programme – allowing flexible delivery that meets the individual learner’s needs. They are suitable for those in employment or those who are studying at college and have a part-time job or access to a substantial work placement so that they are able to demonstrate the competencies that are required for work.

Most learners will work towards their qualification in the workplace or in settings that replicate the working environment as specified in the assessment requirements/strategy for the sector. Colleges, training centres and/or employers can offer these qualifications provided they have access to appropriate physical and human resources.

Sizes of NVQ/Competence-based qualifications

For all regulated qualifications, Pearson specify a total number of hours that is estimated learners will require to complete and show achievement for the qualification – this is the Total Qualification Time (TQT). The TQT value indicates the size of a qualification.

Within the TQT, Pearson identifies the number of Guided Learning Hours (GLH) that we estimate a centre delivering the qualification might provide. Guided learning means activities, such as lessons, tutorials, online instruction, supervised study and giving feedback on performance, that directly involve tutors and assessors in teaching, supervising and invigilating learners. Guided learning includes the time required for learners to complete external assessment under examination or supervised conditions.

In addition to guided learning, other required learning directed by tutors or assessors will include private study, preparation for assessment and undertaking assessment when not under supervision, such as preparatory reading, revision and independent research.

As well as TQT and GLH, qualifications can also have a credit value – equal to one tenth of TQT, rounded to the nearest whole number. TQT and credit values are assigned after consultation with users of the qualifications.

NVQ/Competence-based qualifications are available in the following sizes:

- Award – a qualification with a TQT value of 120 or less (equivalent to a range of 1–12 credits)
- Certificate – a qualification with a TQT value in the range of 121–369 (equivalent to a range of 13–36 credits)
- Diploma – a qualification with a TQT value of 370 or more (equivalent to 37 credits and above).

Qualification title covered by this specification

This specification gives you the information you need to offer the Pearson Edexcel Level 3 Diploma in Work-based Land-based Engineering:

Qualification title	Qualification Number (QN)	Accreditation start date
Pearson Edexcel Level 3 Diploma in Work-based Land-based Engineering	600/3550/X	01/11/11

You should use the Qualification Number (QN), when you wish to seek public funding for your learners. Each unit within a qualification will also have a unique reference number, which is listed in this specification.

The qualification title and unit reference numbers will appear on the learners' final certification document. Learners need to be made aware of this when they are recruited by the centre and registered with Pearson.

Key features of the Pearson Edexcel Level 3 Diploma in Work-based Land-based Engineering

This qualification:

- is nationally recognised
- is based on the Land-based Engineering Operations National Occupational Standards (NOS). The NOS and qualification structure(s) are owned by Lantra SSC.

The Pearson Edexcel Level 3 Diploma in Work-based Land-based Engineering Operations will be approved as a component for the Horticulture Apprenticeship framework.

What is the purpose of this qualification?

This qualification is appropriate for employees in the Land-based Engineering sector. It is designed to assess occupational competence in the workplace where learners are required to demonstrate skills and knowledge to a level required in land-based engineering industries.

Who is this qualification for?

This qualification is for all learners aged 16 and above who are capable of reaching the required standards.

Pearson's policy is that the qualification should:

- be free from any barriers that restrict access and progression
- ensure equality of opportunity for all wishing to access the qualification.

What are the benefits of this qualification to the learner and employer?

This qualification allows learners to demonstrate competence against the NOS based on the needs of the land-based engineering sector as defined by Lantra SSC. The qualification contributes to the development of skilled labour in the sector.

What are the potential job roles for those working towards this qualification?

- Land-based vehicle maintenance supervisor
- Land-based vehicle diagnostic supervisor
- Land-based workshop supervisor
- Land-based mechanical supervisor

What progression opportunities are available to learners who achieve this qualification?

Learners can progress across the level and size of the land-based engineering competence and knowledge qualifications and into other occupational areas such as vehicle maintenance, equipment maintenance and land-based technology.

What is the qualification structure for the Pearson Edexcel Level 3 Diploma in Work-based Land-based Engineering?

Individual units can be found in the *Units* section.

The Total Qualification Time (TQT) for this qualification is 700.

The Guided Learning Hours for this qualification are 480.

For both the Agriculture and Groundcare pathways the learner must complete all mandatory units and a minimum of 5 credits from the optional units to give a minimum of 70 credits.

For the Arboriculture/Forestry pathway the learner must complete all mandatory units and a minimum of 5 credits from the optional units to give a minimum of 60 credits.

For the Fixed Plant and Storage pathway the learner must complete all mandatory units and a minimum of 15 credits from the optional units to give a minimum of 75 credits.

Agricultural pathway

Learners must complete all the mandatory units.

Unit Number	Reference Number	Unit title	Credit	Level
Mandatory units				
1	L/601/5307	Recognise and Reduce Risks in the Land-based Engineering Work Area	5	3
2	F/600/3400	Understand and Follow Organisational Procedures within Land-based Engineering Establishments	5	2
3	Y/600/3435	Provide Customer Care within Land-based Engineering Operations	5	2
4	A/600/3430	Land-based Engineering Operations – Use Calculations	5	2
5	H/600/3437	Land-based Engineering Operations – Service and Repair Engines and Components	10	3
6	M/600/3439	Maintain Electronic Control and Monitoring Systems on Land-based Equipment	10	3

Unit Number	Reference Number	Unit title	Credit	Level
7	H/600/3440	Service and Repair Hydraulic Systems and Components on Land-based Equipment	5	3
8	M/600/3442	Service and Repair Powershift, Hydrostatic and CVT Transmissions on Land-based Equipment	10	3
9	A/600/3444	Inspect and Test Land-based Machinery and Equipment	10	3

Learners must complete a minimum of 5 credits.

Optional units				
10	D/600/3436	Land-based Engineering Operations – Perform Thermal Joining Processes	10	3
11	K/600/3438	Service and Repair Suspension Systems on Land-based Equipment	5	3
12	K/600/3441	Service and Repair Pneumatic Systems and Components for Land-based Equipment	5	3
13	L/601/5310	Refrigerant Handling	2	3
14	F/601/5305	Service and Repair of Land-based Air Conditioning, Climate Control and Refrigeration Plant and Equipment	3	3
15	T/600/3443	Monitor the Handover and Installation of Land-based Equipment	5	3

Groundcare pathway

Learners must complete all the mandatory units.

Unit Number	Reference Number	Unit title	Credit	Level
Mandatory units				
1	L/601/5307	Recognise and Reduce Risks in the Land-based Engineering Work Area	5	3
2	F/600/3400	Understand and Follow Organisational Procedures within Land-based Engineering Establishments	5	2
3	Y/600/3435	Provide Customer Care within Land-based Engineering Operations	5	2
4	A/600/3430	Land-based Engineering Operations – Use Calculations	5	2
5	H/600/3437	Land-based Engineering Operations - Service and Repair Engines and Components	10	3
6	M/600/3439	Maintain Electronic Control and Monitoring Systems on Land-based Equipment	10	3
7	H/600/3440	Service and Repair Hydraulic Systems and Components on Land-based Equipment	5	3
8	M/600/3442	Service and Repair Powershift, Hydrostatic and CVT Transmissions on Land-based Equipment	10	3
9	A/600/3444	Inspect and Test Land-based Machinery and Equipment	10	3

Learner must complete a minimum of 5 credits.

Unit Number	Reference Number	Unit title	Credit	Level
Optional units				
10	D/600/3436	Land-based Engineering Operations - Perform Thermal Joining Processes	10	3
11	K/600/3438	Service and Repair Suspension Systems on Land-based Equipment	5	3
12	K/600/3441	Service and Repair Pneumatic Systems and Components for Land-based Equipment	5	3
13	L/601/5310	Refrigerant Handling	2	3
14	F/601/5305	Service and Repair of Land-based Air Conditioning, Climate Control and Refrigeration Plant and Equipment	3	3
15	T/600/3443	Monitor the Handover and Installation of Land-based Equipment	5	3

Arboriculture/forestry pathway

Learners must complete all the mandatory units.

Unit Number	Reference Number	Unit title	Credit	Level
Mandatory Units				
1	L/601/5307	Recognise and Reduce Risks in the Land-based Engineering Work Area	5	3
2	F/600/3400	Understand and Follow Organisational Procedures within Land-based Engineering Establishments	5	2
3	Y/600/3435	Provide Customer Care within Land-based Engineering Operations	5	2
4	A/600/3430	Land-based Engineering Operations – Use Calculations	5	2
5	H/600/3437	Land-based Engineering Operations – Service and Repair Engines and Components	10	3

Unit Number	Reference Number	Unit title	Credit	Level
Mandatory Units				
6	M/600/3439	Maintain Electronic Control and Monitoring Systems on Land-based Equipment	10	3
7	H/600/3440	Service and Repair Hydraulic Systems and Components on Land-based Equipment	5	3
9	A/600/3444	Inspect and Test Land-based Machinery and Equipment	10	3

Learners must complete a minimum of 5 credits.

Optional units				
8	M/600/3442	Service and Repair Powershift, Hydrostatic and CVT Transmissions on Land-based Equipment	10	3
10	D/600/3436	Land-based Engineering Operations – Perform Thermal Joining Processes	10	3
11	K/600/3438	Service and Repair Suspension Systems on Land-based Equipment	5	3
12	K/600/3441	Service and Repair Pneumatic Systems and Components for Land-based Equipment	5	3
13	L/601/5310	Refrigerant Handling	2	3
14	F/601/5305	Service and Repair of Land-based Air Conditioning, Climate Control and Refrigeration Plant and Equipment	3	3
15	T/600/3443	Monitor the Handover and Installation of Land-based Equipment	5	3

Fixed Plant and Storage pathway

Learners must complete all the mandatory units.

Unit Number	Reference Number	Unit title	Credit	Level
Mandatory units				
1	L/601/5307	Recognise and Reduce Risks in the Land-based Engineering Work Area	5	3
2	F/600/3400	Understand and Follow Organisational Procedures within Land-based Engineering Establishments	5	2
3	Y/600/3435	Provide Customer Care within Land-based Engineering Operations	5	2
4	A/600/3430	Land-based Engineering Operations – Use Calculations	5	2
6	M/600/3439	Maintain Electronic Control and Monitoring Systems on Land-based Equipment	10	3
7	H/600/3440	Service and Repair Hydraulic Systems and Components on Land-based Equipment	5	3
9	A/600/3444	Inspect and Test Land-based Machinery and Equipment	10	3
12	K/600/3441	Service and Repair Pneumatic Systems and Components for Land-based Equipment	5	3
13	L/601/5310	Refrigerant Handling	2	3
14	F/601/5305	Service and Repair of Land-based Air Conditioning, Climate Control and Refrigeration Plant and Equipment	3	3
15	T/600/3443	Monitor the Handover and Installation of Land-based Equipment	5	3

Learners must complete a minimum of 15 credits.

Unit Number	Reference Number	Unit title	Credit	Level
Optional units				
5	H/600/3437	Land-based Engineering Operations – Service and Repair Engines and Components	10	3
8	M/600/3442	Service and Repair Powershift, Hydrostatic and CVT Transmissions on Land-based Equipment	10	3
10	D/600/3436	Land-based Engineering Operations – Perform Thermal Joining Processes	10	3
11	K/600/3438	Service and Repair Suspension Systems on Land-based Equipment	5	3

How is the qualification graded and assessed?

The overall grade for the qualification is a 'pass'. The learner must achieve all the required units within the specified qualification structure.

To pass a unit the learner must:

- achieve **all** the specified learning outcomes
- satisfy **all** the assessment criteria by providing sufficient and valid evidence for each criterion
- show that the evidence is their own.

The qualification is designed to be assessed:

- in the workplace, or
- in conditions resembling the workplace, as specified in the assessment requirements/strategy for the sector, or
- as part of a training programme.

Assessment requirements/strategy

Any assessment strategy for units in this qualification is indicated within relevant units.

Evidence of competence may come from:

- **current practice** where evidence is generated from a current job role
- a **programme of development** where evidence comes from assessment opportunities built into a learning/training programme whether at or away from the workplace
- the **Recognition of Prior Learning (RPL)** where a learner can demonstrate that they can meet the assessment criteria within a unit through knowledge, understanding or skills they already possess without undertaking a course of learning. They must submit sufficient, reliable and valid evidence for internal and standards verification purposes. RPL is acceptable for accrediting a unit, several units or a whole qualification
- a **combination** of these.

It is important that the evidence is:

Valid	relevant to the standards for which competence is claimed
Authentic	produced by the learner
Current	sufficiently recent to create confidence that the same skill, understanding or knowledge persist at the time of the claim
Reliable	indicates that the learner can consistently perform at this level
Sufficient	fully meets the requirements of the standards.

Types of evidence

To successfully achieve a unit the learner must gather evidence which shows that they have met the required standard in the assessment criteria. Evidence can take a variety of different forms including the examples below. Centres should refer to the assessment strategy for information about which of the following are permissible:

- direct observation of the learner's performance by their assessor (O)
- outcomes from oral or written questioning (Q&A)
- products of the learner's work (P)
- personal statements and/or reflective accounts (RA)
- outcomes from simulation, where permitted by the assessment strategy (S)
- professional discussion (PD)
- assignment, project/case studies (A)
- authentic statements/witness testimony (WT)
- expert witness testimony (EPW)
- evidence of Recognition of Prior Learning (RPL).

The abbreviations may be used for cross-referencing purposes.

Learners can use one piece of evidence to prove their knowledge, skills and understanding across different assessment criteria and/or across different units. It is, therefore, not necessary for learners to have each assessment criterion assessed separately. Learners should be encouraged to reference the assessment criteria to which the evidence relates.

Evidence must be made available to the assessor, internal verifier and Edexcel standards verifier. A range of recording documents is available on the Pearson website qualifications.pearson.com. Alternatively, centres may develop their own.

Centre recognition and approval

Centre recognition

Centres that have not previously offered Pearson qualifications need to apply for and be granted centre recognition as part of the process for approval to offer individual qualifications. New centres must complete both a centre recognition approval application and a qualification approval application.

Existing centres will be given 'automatic approval' for a new qualification if they are already approved for a qualification that is being replaced by the new qualification and the conditions for automatic approval are met. Centres already holding Pearson approval are able to gain qualification approval for a different level or different sector via Edexcel online.

Approvals agreement

All centres are required to enter into an approvals agreement which is a formal commitment by the head or principal of a centre to meet all the requirements of the specification and any linked codes or regulations. Pearson will act to protect the integrity of the awarding of qualifications, if centres do not comply with the agreement. This could result in the suspension of certification or withdrawal of approval.

Quality assurance

Detailed information on Pearson's quality assurance processes is given in *Annexe A*.

What resources are required?

Each qualification is designed to support learners working in the land-based engineering sector. Physical resources need to support the delivery of the qualifications and the assessment of the learning outcomes and must be of industry standard. Staff assessing the learner must meet the requirements within the overarching assessment strategy for the sector.

Unit format

Each unit in this specification contains the following sections.

Unit title:					This is the formal title of the unit that will appear on the learners certificate
Unit reference number:					This code is a unique reference number for the unit.
Level:					All units and qualifications have a level assigned to them. The level assigned is informed by the level descriptors by Ofqual, the qualifications regulator.
Credit value:					All units have a credit value. The minimum credit value is one, and credits can only be awarded in whole numbers. Learners will be awarded credits when they achieve the unit.
Guided learning hours:					Guided Learning Hours (GLH) is the number of hours that a centre delivering the qualification needs to provide. Guided learning means activities that directly or immediately involve tutors and assessors in teaching, supervising, and invigilating learners, for example lectures, tutorials, online instruction and supervised study.
Unit aim:					This provides a summary of the purpose of the unit.
Assessment requirements/evidence requirements:					The assessment/evidence requirements are determined by the SSC. Learners must provide evidence for each of the requirements stated in this section.
Assessment methodology:					This provides a summary of the assessment methodology to be used for the unit.
Learning outcomes:	Assessment criteria:	Evidence type:	Portfolio reference:	Date:	
			The learner should use this box to indicate where the evidence can be obtained eg portfolio page number.	The learner should give the date when the evidence has been provided.	
Learning outcomes state exactly what a learner should know, understand or be able to do as a result of completing a unit.		The assessment criteria of a unit specify the standard a learner is expected to meet to demonstrate that a learning outcome, or a set of learning outcomes, has been achieved.		Learners must reference the type of evidence they have and where it is available for quality assurance purposes. The learner can enter the relevant key and a reference. Alternatively, the learner and/or centre can devise their own referencing system.	

Units

Unit 1: **Recognise and Reduce Risks in the Land-based Engineering Work Area**

Unit reference number: L/601/5307

Level: 3

Credit value: 5

Guided learning hours: 30

Unit aim

The aim of this unit is to give the learner the knowledge and skills and understanding to recognise and reduce risks within a land-based engineering work environment.

Assessment methodology

This unit is assessed in the workplace or in conditions resembling the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
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			
		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 a risk assessment			
2	Understand how to recognise and reduce risks 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			
		2.2	Explain why certain individuals or groups may be at an increased level of risk and how this can be addressed			
		2.3	Explain the hierarchy of risk control measures			
		2.4	Summarise the legislative requirements regulating health and safety and environmental risk assessments			

Learner name: _____

Date: _____

Learner signature: _____

Date: _____

Assessor signature: _____

Date: _____

Internal verifier signature: _____

Date: _____

(if sampled)

Unit 2: **Understand and Follow Organisational Procedures within Land-based Engineering Establishments**

Unit reference number: F/600/3400

Level: 2

Credit value: 5

Guided learning hours: 30

Unit aim

The aim of this unit is to give the learner the knowledge, and skills required to understand and follow organisational procedures required by the job role.

Assessment methodology

This unit is assessed in the workplace or in conditions resembling the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to follow organisational procedures	1.1	Follow organisational, departmental and task procedures required of job role			
		1.2	Complete administrative tasks and record technical information			
		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			
2	Know the organisational procedures required by the job role	2.1	Describe the structure of a given land-based organisation covering: <ul style="list-style-type: none"> • levels of responsibility and authority • methods of communication • organisational procedures 			
		2.2	Describe the procurement, storage, retail and transport of parts			
		2.3	Describe how to complete and process internal and supplier documentation			

Learner name: _____

Date: _____

Learner signature: _____

Date: _____

Assessor signature: _____

Date: _____

Internal verifier signature: _____

Date: _____

(if sampled)

Unit 3: Provide Customer Care within Land-based Engineering Operations

Unit reference number:	Y/600/3435
Level:	2
Credit value:	5
Guided learning hours:	30

Unit aim

The aim of this unit is to give the learner the knowledge, understanding and skills required to provide customer care to customers using land-based engineering services.

Assessment methodology

This unit is assessed in the workplace or in conditions resembling the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
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			
		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			
		2.2	Describe how to communicate with the customer politely, respectfully and effectively			
		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 customers and corporate confidentiality must be respected			

Learner name: _____

Date: _____

Learner signature: _____

Date: _____

Assessor signature: _____

Date: _____

Internal verifier signature: _____

Date: _____

(if sampled)

Unit 4: Land-based Engineering Operations - Use Calculations

Unit reference number: A/600/3430

Level: 2

Credit value: 5

Guided learning hours: 30

Unit aim

The aim of this unit is to give the learner the knowledge and skills required to use calculations to support land-based engineering principles.

Assessment methodology

This unit is assessed in the workplace or in conditions resembling the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to use calculations to support engineering principles	1.1	Use ratios and units of measurement to express values			
		1.2	Use conversion factors to convert measurement values from one unit of measurement to another			
		1.3	Calculate/measure: <ul style="list-style-type: none"> • areas • weights • volumes • angles • flow rates and speeds • scaling 			
		1.4	Use physical and theoretical methods to establish measurements where relevant			
		1.5	Verify by calculation the calibration of machinery and equipment			
2	Know how to use calculations to support engineering principles	2.1	Identify the units of measurement used to express values			
		2.2	State how to use conversion tables			

Learning outcomes		Assessment criteria	Evidence type	Portfolio reference	Date
		2.3 Define the mathematical formulas for: <ul style="list-style-type: none"> • area • volume • circumference 			
		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			
		2.7 Describe how to measure: <ul style="list-style-type: none"> • speed • velocity • acceleration • deceleration • coefficient of friction 			

Learner name: _____

Date: _____

Learner signature: _____

Date: _____

Assessor signature: _____

Date: _____

Internal verifier signature: _____

Date: _____

(if sampled)

Unit 5: Land-based Engineering Operations - Service and Repair Engines and Components

Unit reference number: H/600/3437

Level: 3

Credit value: 10

Guided learning hours: 60

Unit aim

The aim of this unit is to give the learner the knowledge, understanding and skills required to perform service and repair procedures on engines within land-based engineering.

Assessment methodology

This unit is assessed in the workplace or in conditions resembling the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
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			
		1.3	Investigate failed or worn parts and record and report findings			
2	Be able to identify engine faults	2.1	Carry out tests to determine the cause of different engine problems			
		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			
		3.2	Explain the methods of sealing combustion chambers, fuel and ignition systems			
		3.3	Describe the effects of moisture and contaminants in fuel and ignition systems			
		3.4	Explain the procedure to verify correct engine timing covering both static and dynamic timing			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Understand how take engine measurements.	4.1	Describe the methods and techniques of taking engine specific measurements			

Learner name: _____

Date: _____

Learner signature: _____

Date: _____

Assessor signature: _____

Date: _____

Internal verifier signature: _____

Date: _____

(if sampled)

Unit 6: Maintain Electronic Control and Monitoring Systems on Land-based Equipment

Unit reference number: M/600/3439

Level: 3

Credit value: 10

Guided learning hours: 60

Unit aim

The aim of this unit is to give the learner the knowledge, understanding and skills required to maintain electronic control and monitoring systems on land-based equipment.

Assessment methodology

This unit is assessed in the workplace or in conditions resembling the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
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			
		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			
2	Understand how to maintain electronic control and monitoring systems	2.1	Summarise electronic control and monitoring systems and their application			
		2.2	Summarise how control and monitoring signals are generated and communicated and the causes and effects of interference			
		2.3	Summarise the function of electronic components			
		2.4	Describe the tools and equipment used to test, repair and reinstate electronic control and monitoring systems and their components			

Learning outcomes	Assessment criteria		Evidence type	Portfolio reference	Date
	2.5	Describe the methods used to check and maintain system integrity			
	2.6	Summarise how to retrieve, interpret, reinstate and verify information stored in electronic control units (ECU)			

Learner name: _____

Date: _____

Learner signature: _____

Date: _____

Assessor signature: _____

Date: _____

Internal verifier signature: _____

Date: _____

(if sampled)

Unit 7: Service and Repair Hydraulic Systems and Components on Land-based Equipment

Unit reference number:	H/600/3440
Level:	3
Credit value:	5
Guided learning hours:	30

Unit aim

The aim of this unit is to give the learner the knowledge, understanding and skills required to repair and service hydraulic systems in land-based equipment.

Assessment methodology

This unit is assessed in the workplace or in conditions resembling the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to perform service and maintenance operations on hydraulic systems and their components	1.1	Inspect performance of hydraulic systems and components			
		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 action			
		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			
		2.3	Explain the application of valves and the function of hydraulic systems and components			
		2.4	Identify diagnostic test/s that will evaluate hydraulic system performance			
		2.5	Interpret and compare test results			

Learner name: _____

Date: _____

Learner signature: _____

Date: _____

Assessor signature: _____

Date: _____

Internal verifier signature: _____

Date: _____

(if sampled)

Unit 8: **Service and Repair Powershift, Hydrostatic and CVT Transmissions on Land-based Equipment**

Unit reference number: M/600/3442

Level: 3

Credit value: 10

Guided learning hours: 60

Unit Aim

The aim of this unit is to give the learner the knowledge, understanding and skills required carry out service and repairs on powershift, hydrostatic and CVT transmissions on land-based equipment.

Assessment methodology

This unit is assessed in the workplace or in conditions resembling the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to perform service and repair operations on powershift, hydrostatic and CVT transmissions and their components	1.1	Identify transmissions and their components			
		1.2	Remove, dismantle, repair and reinstate transmission to manufacturer's specification and standards			
		1.3	Perform operational and diagnostic tests identifying and categorising faults in transmission			
2	Understand the construction function and operation of powershift, hydrostatic, CVT transmissions and their components	2.1	Interpret technical documentation relating to transmissions to perform diagnostic tests			
		2.2	Explain the different types of transmissions including layout, construction, operating principles and function			
		2.3	Describe how to remove, dismantle, repair and reinstate powershift, hydrostatic, CVT transmissions and their components			
		2.4	Evaluate faults in powershift, hydrostatic and CVT transmissions using operational and diagnostic test data			

Learner name: _____

Date: _____

Learner signature: _____

Date: _____

Assessor signature: _____

Date: _____

Internal verifier signature: _____

Date: _____

(if sampled)

Unit 9: Inspect and Test Land-based Machinery and Equipment

Unit reference number:	A/600/3444
Level:	3
Credit value:	10
Guided learning hours:	60

Unit aim

The aim of this unit is to give the learner the knowledge, understanding and skills required to inspect and test land-based machinery and equipment.

Assessment methodology

This unit is assessed in the workplace or in conditions resembling the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to inspect and test land-based machinery and equipment	1.1	Establish the objectives of the inspection or test			
		1.2	Observe and record information to evaluate the condition, application and performance of equipment			
		1.3	Prepare and carry out test/s			
2	Be able to analyse and interpret findings	2.1	Check the data gathered is accurate and takes account of test conditions			
		2.2	Recognise the cause and effect of failure/s			
		2.3	Analyse the data using approved methods and procedures			
		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			
		3.4	Describe the difference between a characteristic and a malfunction			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Understand how to formulate and recommend actions	4.1	Describe the actions that could be considered following inspection and testing and their implications			
		4.2	Explain how to recognise the need for operator training requirements to avoid reoccurrence of failures			

Learner name: _____

Date: _____

Learner signature: _____

Date: _____

Assessor signature: _____

Date: _____

Internal verifier signature: _____

Date: _____

(if sampled)

Unit 10: **Land-based Engineering
Operations - Perform Thermal
Joining Processes**

Unit reference number: D/600/3436

Level: 3

Credit value: 10

Guided learning hours: 60

Unit aim

The aim of this unit is to give the learner the knowledge, understanding and skills required to safely carry out thermal joining processes.

Assessment methodology

This unit is assessed in the workplace or in conditions resembling the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to perform thermal joining	1.1	Prepare the workplace and equipment to carry out a thermal joining process			
		1.2	Set up equipment and carry out preparation of material for positional welding techniques			
		1.3	Join or repair a range of materials producing joints			
		1.4	Identify faults using appropriate inspection techniques			
2	Understand high temperature thermal joining techniques	2.1	Explain the different techniques used to carry out positional thermal joining procedures			
		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			
		2.4	Explain the safety preparations and precautions required to minimise risk prior to and during thermal joining and repair processes			

Learner name: _____

Date: _____

Learner signature: _____

Date: _____

Assessor signature: _____

Date: _____

Internal verifier signature: _____

Date: _____

(if sampled)

Unit 11: Service and Repair Suspension Systems on Land-based Equipment

Unit reference number: K/600/3438

Level: 3

Credit value: 5

Guided learning hours: 30

Unit aim

The aim of this unit is to give the learner the knowledge, understanding and skills required to service and repair suspension systems and components on land-based equipment.

Assessment methodology

This unit is assessed in the workplace or in conditions resembling the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
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			
		1.2	Diagnose faults in suspension assemblies and their components and recommend action			
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			
		2.2	Describe how to remove, dismantle, repair and reinstate suspension assemblies and components			
		2.3	Describe how to diagnose faults in suspension assemblies and components and recommend actions			

Learner name: _____

Date: _____

Learner signature: _____

Date: _____

Assessor signature: _____

Date: _____

Internal verifier signature: _____

Date: _____

(if sampled)

Unit 12: Service and Repair Pneumatic Systems and Components for Land-based Equipment

Unit reference number: K/600/3441

Level: 3

Credit value: 5

Guided learning hours: 30

Unit aim

The aim of this unit is to give the learner the knowledge, understanding and skills required to carry out service and repairs on pneumatic systems and components for land-based equipment.

Assessment methodology

This unit is assessed in the workplace or in conditions resembling the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to perform service and repair operations on pneumatic systems and components	1.1	Inspect performance of pneumatic systems and components			
		1.2	Prepare system to be tested and carry out tests using diagnostic tools			
		1.3	Interpret and record the test results and recommend action			
		1.4	Remove, dismantle, repair and reinstate system and components to manufacturer's 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			
		2.2	Explain the application and function of pneumatic systems and components			
		2.3	Explain diagnostic tests and how to interpret the results			
		2.4	Describe how to dismantle, repair and reinstate pneumatic systems and components			

Learner name: _____

Date: _____

Learner signature: _____

Date: _____

Assessor signature: _____

Date: _____

Internal verifier signature: _____

Date: _____

(if sampled)

Unit 13: Refrigerant Handling

Unit reference number: L/601/5310

Level: 3

Credit value: 2

Guided learning hours: 10

Unit aim

The aim of this unit is to give the learner the knowledge, understanding and skills required to handle refrigerants.

Assessment methodology

This unit is assessed in the workplace or in conditions resembling the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
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			
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			

Learner name: _____

Date: _____

Learner signature: _____

Date: _____

Assessor signature: _____

Date: _____

Internal verifier signature: _____
(if sampled)

Date: _____

Unit 14: **Service and Repair of Land-based Air Conditioning, Climate Control and Refrigeration Plant and Equipment**

Unit reference number: F/601/5305

Level: 3

Credit value: 3

Guided learning hours: 20

Unit aim

The aim of this unit is to give the learner the knowledge, understanding and skills required to service and repair land-based air conditioning, climate control and refrigeration plant and equipment.

Assessment methodology

This unit is assessed in the workplace or in conditions resembling the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to perform air conditioning, climate control and refrigeration service and maintenance operations	1.1	Remove, dismantle, inspect, repair and reinstate systems and/or components			
		1.2	Select and use the appropriate tools and equipment to carry out testing and maintenance activities			
		1.3	Diagnose and rectify different faults			
		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			
		2.2	Explain how to carry out operational checks and diagnostic tests to establish system functionality			
		2.3	Describe how to recognise and rectify faults			
		2.4	Describe how to collect, transfer and dispose of any waste material following current legal and environmental requirements			

Learning outcomes	Assessment criteria		Evidence type	Portfolio reference	Date
	2.5	Summarise the procedures, tools and equipment to remove dismantle, inspect and reinstate air conditioning and refrigeration components			
	2.6	Explain what relevant documentation should be used when handling refrigerants			

Learner name: _____

Date: _____

Learner signature: _____

Date: _____

Assessor signature: _____

Date: _____

Internal verifier signature: _____

Date: _____

(if sampled)

Unit 15: Monitor the Handover and Installation of Land-based Equipment

Unit reference number: T/600/3443

Level: 3

Credit value: 5

Guided learning hours: 30

Unit aim

The aim of this unit is to give the learner the knowledge, understanding and skills required to prepare for and hand over the installation of land-based equipment.

Assessment methodology

This unit is assessed in the workplace or in conditions resembling the workplace. Learners can enter the types of evidence they are presenting for assessment and the submission date against each assessment criterion. Alternatively, centre documentation should be used to record this information.

Learning outcomes and assessment criteria

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Be able to perform the handover and installation of land-based equipment	1.1	Identify a suitable location, agree and prepare for handover and installation with customer			
		1.2	Use the correct procedure to handover and install the equipment as specified			
		1.3	Use an appropriate format to record the results of the installation			
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			
		2.2	Describe how to carry out an installation using a systematic process and the relevant quality control systems including special machine characteristics			
		2.3	Describe technical advice and assistance within limits of own authority and how to deal with queries and problems			

Learner name: _____

Date: _____

Learner signature: _____

Date: _____

Assessor signature: _____

Date: _____

Internal verifier signature: _____

Date: _____

(if sampled)

Further information

To get in touch with us visit our 'Contact us' pages:

- Edexcel, BTEC and Pearson Work Based Learning contact details: qualifications.pearson.com/en/support/contact-us.html
- books, software and online resources for UK schools and colleges: www.pearsonschoolsandfecolleges.co.uk

Key publications

- *Adjustments for candidates with disabilities and learning difficulties, Access and Arrangements and Reasonable Adjustments, General and Vocational qualifications* (Joint Council for Qualifications (JCQ))
- *Supplementary guidance for reasonable adjustments and special consideration in vocational internally assessed units* (Pearson)
- *General and Vocational qualifications, Suspected Malpractice in Examination and Assessments: Policies and Procedures* (JCQ)
- *Equality Policy* (Pearson)
- *Recognition of Prior Learning Policy and Process* (Pearson)
- *UK Information Manual* (Pearson)
- *Pearson Edexcel NVQs, SVQs and competence-based qualifications – Delivery Requirements and Quality Assurance Guidance* (Pearson)

All of these publications are available on our website: qualifications.pearson.com

Further information and publications on the delivery and quality assurance of NVQ/Competence-based qualifications are available at our website on the Delivering BTEC pages. Our publications catalogue lists all the material available to support our qualifications. To access the catalogue and order publications, please go to the resources page of our website.

Useful publications

Related information and publications include:

- *Centre Handbook for Pearson NVQs and Competence-based Qualifications* published annually
- Functional Skills publications – specifications, tutor support materials and question papers
- the current Pearson publications catalogue and update catalogue.

Pearson publications concerning the Quality Assurance System and the internal and standards verification of vocationally related programmes can be found on the Pearson website.

NB: Some of our publications are priced. There is also a charge for postage and packing. Please check the cost when you order.

How to obtain National Occupational Standards

To obtain the National Occupational Standards please go to www.ukstandards.org.uk.

Professional development and training

Pearson supports UK and international customers with training related to NVQ and BTEC qualifications. This support is available through a choice of training options offered in our published training directory or through customised training at your centre.

The support we offer focuses on a range of issues including:

- planning for the delivery of a new programme
- planning for assessment and grading
- developing effective assignments
- building your team and teamwork skills
- developing student-centred learning and teaching approaches
- building Functional Skills into your programme
- building effective and efficient quality assurance systems.

The national programme of training we offer can be viewed on our website (qualifications.pearson.com). You can request customised training through the website or by contacting one of our advisers in the Training from the Pearson team via Customer Services to discuss your training needs.

The training we provide:

- is active
- is designed to be supportive and thought-provoking
- builds on best practice
- may be suitable for those seeking evidence for their continuing professional development.

Annexe A: Quality assurance

Key principles of quality assurance

- A centre delivering Pearson qualifications must be an Pearson recognised centre and must have approval for qualifications that it is offering.
- The centre agrees, as part of gaining recognition, to abide by specific terms and conditions relating to the effective delivery and quality assurance of assessment. The centre must abide by these conditions throughout the period of delivery.
- Pearson makes available to approved centres a range of materials and opportunities to exemplify the processes required for effective assessment and provide examples of effective standards. Approved centres must use the guidance on assessment to ensure that staff who are delivering Pearson qualifications are applying consistent standards.
- An approved centre must follow agreed protocols for: standardisation of assessors; planning, monitoring and recording of assessment processes; internal verification and recording of internal verification processes and dealing with special circumstances, appeals and malpractice.

Quality assurance processes

The approach to quality assured assessment is made through a partnership between a recognised centre and Pearson. Pearson is committed to ensuring that it follows best practice and employs appropriate technology to support quality assurance processes where practicable. The specific arrangements for working with centres will vary. Pearson seeks to ensure that the quality assurance processes it uses do not inflict undue bureaucratic processes on centres, and works to support them in providing robust quality assurance processes.

The learning outcomes and assessment criteria in each unit within this specification set out the standard to be achieved by each learner in order to gain each qualification. Pearson operates a quality assurance process, designed to ensure that these standards are maintained by all assessors and verifiers.

For the purposes of quality assurance, all individual qualifications and units are considered as a whole. Centres offering these qualifications must be committed to ensuring the quality of the units and qualifications they offer, through effective standardisation of assessors and internal verification of assessor decisions. Centre quality assurance and assessment processes are monitored by Pearson.

The Pearson quality assurance processes will involve:

- gaining centre recognition and qualification approval if a centre is not currently approved to offer Pearson qualifications
- annual visits to centres by Pearson for quality review and development of overarching processes and quality standards. Quality review and development visits will be conducted by an Pearson quality development reviewer
- annual visits by occupationally competent and qualified Pearson Standards Verifiers for sampling of internal verification and assessor decisions for the occupational sector
- the provision of support, advice and guidance towards the achievement of National Occupational Standards.

Centres are required to declare their commitment to ensuring quality and appropriate opportunities for learners that lead to valid and accurate assessment outcomes. In addition, centres will commit to undertaking defined training and online standardisation activities.

Annexe B: Centre certification and registration

Pearson Standards Verifiers will provide support, advice and guidance to centres to achieve Direct Claims Status (DCS). Pearson will maintain the integrity of Pearson NVQs through ensuring that the awarding of these qualifications is secure. Where there are quality issues identified in the delivery of programmes, Pearson will exercise the right to:

- direct centres to take action
- limit or suspend certification
- suspend registration.

The approach of Pearson in such circumstances is to work with the centre to overcome the problems identified. If additional training is required, Pearson will aim to secure the appropriate expertise to provide this.

What are the access arrangements and special considerations for the qualifications in this specification?

Centres are required to recruit learners to Pearson qualifications with integrity.

Appropriate steps should be taken to assess each applicant's potential and a professional judgement should be made about their ability to successfully complete the programme of study and achieve the qualification. This assessment will need to take account of the support available to the learner within the centre during their programme of study and any specific support that might be necessary to allow the learner to access the assessment for the qualification. Centres should consult Pearson's policy on learners with particular requirements.

Pearson's policy on access arrangements and special considerations for Pearson qualifications aims to enhance access to the qualifications for learners with disabilities and other difficulties (as defined by the Equality Act) without compromising the assessment of skills, knowledge, understanding or competence. Please refer to *Access Arrangements and Special Considerations for BTEC and Pearson NVQ Qualifications* for further details (qualifications.pearson.com).

Annexe C: Additional requirement for qualifications that use the term 'NVQ' in a qualification title

For information please go to www.ofqual.gov.uk to access the document *Operating rules for using the term 'NVQ' in a qualification title*.

October 2017

For information about Edexcel, BTEC or LCCI qualifications visit qualifications.pearson.com

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