

LANTRA

Raising skills, backing business

Assessment Guidance for
Land-based Engineering Operations
Level 2 and 3 SVQs

October 2014

Qualification structure for SVQ level 2 in Land-based Engineering at SCQF level 5

There are three routes within the SVQ 2 in Land-based Engineering at SCQF level 5 as follows:

Agriculture
Arboriculture/Forestry
Ground Care

For all routes each candidate is required to achieve the nine Core Mandatory units, plus four units from Section One.

In addition each candidate on the Agriculture or Arboriculture/Forestry route must achieve three units from Section Two and each candidate on the Ground Care route must achieve two units from Section two.

Note – the candidate can take one unit from Section One as part of the selection for Section Two if not already undertaken in Section One.

There is also one additional unit available for all routes which can be undertaken if required but is not compulsory.

Core Mandatory units (For all routes complete all)

Unit LANLEO4	Core land-based engineering principles – Mechanical principles
Unit LANLEO5	Core land-based engineering principles – Tools and equipment
Unit LANLEO6	Core land-based engineering principles – Material preparation, shaping and assembling
Unit LANLEO8	Core land-based engineering principles – Servicing and maintenance
Unit LANLEO9	Core land-based engineering principles – Thermal joining processes
Unit LANLEO10	Core land-based engineering principles – Cooling and lubrication
Unit LANLEO22	Service and repair electrical systems on land-based equipment
Unit LANCS4	Establish and maintain working relationships with others
Unit LANCS2	Monitor and maintain health, safety and security

Section One (For all routes complete 4)

Unit LANLEO12	Service and repair clutches, fluid flywheels and torque convertors on land-based equipment
Unit LANLEO13	Service and repair mechanical transmission on land-based equipment
Unit LANLEO14	Service and repair braking systems on land-based equipment
Unit LANLEO15	Service and repair wheeled and tracked steering systems on land-based equipment
Unit LANLEO16	Service and repair tyres and tracks on land-based equipment

Section Two (For Agriculture or Arboriculture/Forestry route complete 3. For Ground Care route complete 2. Note – for all routes one unit can be from Section One if not already undertaken)

Unit LANLEO17	Service and repair land-based cutting and mowing equipment
Unit LANLEO18	Service and repair land-based harvesting and processing equipment
Unit LANLEO19	Service and repair land-based soil preparation, cultivation and plant establishment equipment
Unit LANLEO20	Service and repair land-based transport, handling and storage equipment

Additional Unit (This unit is not compulsory but can be undertaken if required)

Unit LANLEO2	Organisational procedures in land-based engineering
--------------	---

Qualification structure for SVQ level 3 in Land-based Engineering at SCQF level 6

There are three routes within the SVQ 3 in Land-based Engineering at SCQF level 6 as follows:

Agriculture
Arboriculture/Forestry
Ground Care

For all routes each candidate is required to achieve the eight Core Mandatory units, plus two units from Section One and three units from Section Two.

Note – the candidate can take one unit from Section One as part of the selection for Section Two if not already undertaken in Section One.

Core Mandatory units (For all routes complete all)

Unit LANLEO1	Recognise and reduce hazards in the land-based engineering work area
Unit LANLEO2	Organisational procedures in land-based engineering
Unit CFA BAA625	Agree how to manage and improve own performance in a business environment
Unit LANLEO3	Customer care in land-based engineering
Unit LANLEO7	Core land-based engineering principles – Calculations
Unit LANLEO11	Service and repair engines on land-based equipment
Unit LANLEO24	Service and repair hydraulic systems and components on land-based equipment
Unit LANLEO30	Inspect and test land-based equipment

Section One (For all routes complete 2)

Unit LANLEO23	Service and repair electronic control and monitoring systems on land-based equipment
Unit LANLEO26	Service and repair powershift, hydrostatic, CVT transmissions on land-based equipment
Unit LANLEO29	Monitor the handover and installation of land-based equipment

Section Two (For all routes complete 3, one of which can be from Section One if not already undertaken)

Unit LANLEO21	Service and repair suspension systems on land-based equipment
Unit LANLEO25	Service and repair pneumatic systems and components on land-based equipment
Unit LANLEO27	Refrigerant handling
Unit LANLEO28	Service and repair land-based air-conditioning/refrigeration equipment

External Quality Control

Lantra is looking for strong and robust external quality control. The information below identifies the Land-based Engineering Operations industry's preference for specific forms of external quality control of SVQs.

Set banks of questions

This method involves the use of banks of questions. Lantra will require awarding bodies to introduce an enhancement of assessment practices through the use of banks of questions. These banks of questions will assess candidates' knowledge and understanding of specific units. They will be either locally devised and assessed, and moderated by the external verifier, or, centrally devised, locally assessed, and moderated by the external verifier.

A bank of questions should be prepared for each unit specified, together with the anticipated key points of knowledge or understanding required in response. Candidates' responses can be oral or written. Types of questioning could include:

- Open written response assessment
- Oral questioning
- Multiple choice tests

These question banks will be moderated by the external verifier to ensure the validity and reliability of the questions and answers, and to ensure consistency and standardisation between centres.

The questions and anticipated key points of knowledge and understanding required in response must be developed to take into account the variety of contexts within the industry.

Use of simulation

Simulations may be used to generate evidence where naturally occurring evidence is not available. Where simulations are used to generate performance evidence, these must properly reflect the requirements of the real work environment and should be agreed with the External Verifier to ensure that they are suitable and relevant for the proposed assessment.

Evidence requirements

Unit	LANLE01	Recognise and reduce hazards in the land-based engineering work area	
Level	6	Credit	6
Notes:			
<p>Where examples are provided the learner should be required to provide sufficient breadth of evidence relevant to the route being undertaken, using the examples as a guide.</p> <p>See guidance on Page 4 regarding use of simulation.</p>			

Unit	LANLE02	Organisational procedures in land-based engineering	
Level	5	Credit	7
Notes:			
<p>Where examples are provided the learner should be required to provide sufficient breadth of evidence relevant to the route being undertaken, using the examples as a guide.</p> <p>For Performance Criteria 7 the term 'flash files' can include any kind of software updates.</p> <p>See guidance on Page 4 regarding use of simulation.</p>			

Unit	LANLE03	Customer care in land-based engineering	
Level	5	Credit	4
Notes:			
<p>Where examples are provided the learner should be required to provide sufficient breadth of evidence relevant to the route being undertaken, using the examples as a guide.</p> <p>See guidance on Page 4 regarding use of simulation.</p>			

Unit	LANLE04	Core land-based engineering principles – Mechanical principles	
Level	5	Credit	7
Notes:			
<p>Where examples are provided the learner should be required to provide sufficient breadth of evidence relevant to the route being undertaken, using the examples as a guide.</p> <p>See guidance on Page 4 regarding use of simulation.</p>			

Unit	LANLE05	Core land-based engineering principles – Tools and equipment	
Level	5	Credit	7
Notes:			
<p>Where examples are provided the learner should be required to provide sufficient breadth of evidence relevant to the route being undertaken, using the examples as a guide.</p> <p>For Knowledge and Understanding requirement (h) the candidate should know and understand how to identify three different electrical power supply requirements for power tools.</p> <p>See guidance on Page 4 regarding use of simulation.</p>			

Unit	LANLE06	Core land-based engineering principles – Material preparation, shaping and assembling	
Level	5	Credit	13
Notes:			
<p>Where examples are provided the learner should be required to provide sufficient breadth of evidence relevant to the route being undertaken, using the examples as a guide.</p> <p>The candidate is not required to cover timing of components unless it is part of their normal job.</p> <p>The candidate is not required to cover routing of components unless it is part of their normal job.</p> <p>See guidance on Page 4 regarding use of simulation.</p>			

Unit	LANLE07	Core land-based engineering principles - Calculations	
Level	6	Credit	13
Notes:			
<p>Where examples are provided the learner should be required to provide sufficient breadth of evidence relevant to the route being undertaken, using the examples as a guide.</p> <p>Anyone undertaking mains electrical work must comply with current regulations.</p> <p>See guidance on Page 4 regarding use of simulation.</p>			

Unit	LANLE08	Core land-based engineering principles – Servicing and maintenance	
Level	5	Credit	13
Notes:			
<p>Where examples are provided the learner should be required to provide sufficient breadth of evidence relevant to the route being undertaken, using the examples as a guide.</p> <p>Anyone undertaking mains electrical work must comply with current regulations.</p> <p>For Performance Criteria 5 add 'incorrect operation' to the list of examples.</p> <p>For Performance Criteria 6 add 'and it is fit for purpose' at the end.</p> <p>For Knowledge and Understanding (j) remove 'or a crop' from the list of examples, this is covered in LANLEO18.</p> <p>See guidance on Page 4 regarding use of simulation.</p>			

Unit	LANLE09	Core land-based engineering principles – Thermal joining processes	
Level	5	Credit	14
Notes:			
<p>Where examples are provided the learner should be required to provide sufficient breadth of evidence relevant to the route being undertaken, using the examples as a guide.</p> <p>Joints should be formed using materials from 0.8 to 10mm in thickness and should be a minimum of 100mm in length. Joints can be formed on the bench or in position on machines or</p>			

fixed equipment.

This unit does not cover the repair of safety critical components.

Knowledge and Understanding (i) the word 'inadequate' should be inserted before 'penetration'.

Electric equipment includes manual metal arc, metal inert gas and soldering equipment.

Gas equipment includes ox y-acetylene.

Thermal joining includes welding and non-fusion joining, e.g. soldering and brazing.

See guidance on Page 4 regarding use of simulation.

Unit	LAMLEO10	Core land-based engineering principles – Cooling and lubrication	
Level	5	Credit	7
Notes:			
Where examples are provided the learner should be required to provide sufficient breadth of evidence relevant to the route being undertaken, using the examples as a guide.			
For Performance Criteria 2 the candidate is not required to carry out sensory tests and interpret laboratory results but should have an understanding of the sensory tests process.			
For Performance Criteria 4 the candidate is not required to apply insulation to heating or cooling elements but should have an understanding of the purpose for this.			
See guidance on Page 4 regarding use of simulation.			

Unit	LANLEO11	Engine fundamentals	
Level	6	Credit	16
Notes:			
This unit is appropriate for persons working under the supervision of a more competent person.			
Where examples are provided the learner should be required to provide sufficient breadth of evidence relevant to the route being undertaken, using the examples as a guide.			
See guidance on Page 4 regarding use of simulation.			

Unit	LANLEO12	Service and repair clutches, fluid flywheels and torque converters on land-based equipment	
Level	6	Credit	13

Notes:

This unit is appropriate for persons working under the supervision of a more competent person.

Refer to LANLEO4 Core land-based engineering principles – Mechanical principles for setting bearings and the relationship of gears and pinions to one another and method of lubrication.

Where examples are provided the learner should be required to provide sufficient breadth of evidence relevant to the route being undertaken, using the examples as a guide.

For Performance Criteria 1 the candidate should be required to:

Access, remove and replace two of the following devices used to engage and disengage drive:

- Overrun clutches
- Torque limiting and slip clutches
- Dry single and dual clutches
- Wet plate clutches single and multi disc
- Fluid flywheels and mechanical centrifugal clutches
- Cone type clutches
- Electro magnetic clutches
- Torque convertors with and without lock out
- Damper plates and vibration limiting components
- Dog clutches

For Performance Criteria 2 the candidate should:

Dismantle, repair and reinstate clutches, torque converters, fluid flywheel assemblies to manufacturers' specifications and standards *where applicable*

For Performance Criteria 3 the candidate should:

Carry out three of the following:

- stall tests
- slipping point of torque limiting clutches tests
- pressure tests
- measurement of components

For Knowledge and Understanding (c) the candidate need only demonstrate the appropriate knowledge to support the tasks being carried out.

See guidance on Page 4 regarding use of simulation.

Unit	LANLEO13	Service and repair mechanical transmission on land-based equipment	
Level	5	Credit	9
Notes:			
<p>This unit is appropriate for persons working under the supervision of a more competent person.</p> <p>Refer to unit LANLEO4 Core land-based engineering principles – Mechanical principles for setting bearings and the relationship of gears and pinions to one another and method of lubrication.</p> <p>Where examples are provided the learner should be required to provide sufficient breadth of evidence relevant to the route being undertaken, using the examples as a guide.</p> <p>For each of the Performance Criteria should be demonstrated on a minimum of three separate transmission assemblies, one of which must be a mechanical gearbox.</p> <p>For Knowledge and Understanding (e) add 'universal joints' to the list of examples.</p> <p>See guidance on Page 4 regarding use of simulation.</p>			

Unit	LANLEO14	Service and repair braking systems on land-based equipment	
Level	5	Credit	5
The learner must demonstrate that they know and understand:			
Notes:			
<p>This unit is appropriate for persons working under the supervision of a more competent person.</p> <p>Where examples are provided the learner should be required to provide sufficient breadth of evidence relevant to the route being undertaken, using the examples as a guide.</p> <p>See guidance on Page 4 regarding use of simulation.</p>			

Unit	LANLEO15	Service and repair wheeled and tracked steering systems on land-based equipment	
Level	5	Credit	4
Notes:			
<p>This unit is appropriate for persons working under the supervision of a more competent person.</p> <p>Where examples are provided the learner should be required to provide sufficient breadth of evidence relevant to the route being undertaken, using the examples as a guide.</p> <p>For Performance Criteria 5 the candidate is required to 'check' steering geometry but only to 'set' or adjust where required. The term 'steering lock' refers to 'toe out on turns'.</p> <p>See guidance on Page 4 regarding use of simulation.</p>			

Unit	LANLEO16	Service and repair tyres and tracks on land-based equipment	
Level	5	Credit	11
Notes:			
<p>This unit is appropriate for persons working under the supervision of a more competent person.</p> <p>Where examples are provided the learner should be required to provide sufficient breadth of evidence relevant to the route being undertaken, using the examples as a guide.</p> <p>Learners should be made aware of the risks of working with wheels and tyres.</p> <p>For Performance Criteria 4 add 'punctures' to the list of examples.</p> <p>For Knowledge and Understanding (c) add 'use of inner tubes' to the list of examples.</p> <p>See guidance on Page 4 regarding use of simulation.</p>			

Unit	LANLEO17	Service and repair land-based cutting and mowing equipment	
Level	5	Credit	7
Notes:			
<p>Where examples are provided the learner should be required to provide sufficient breadth of evidence relevant to the route being undertaken, using the examples as a guide.</p> <p>For Performance Criteria 3 add cylinders/reels to the list of examples.</p> <p>See guidance on Page 4 regarding use of simulation.</p>			

Unit	LANLEO18	Service and repair land-based harvesting and processing equipment	
Level	5	Credit	11
Notes:			
<p>Where examples are provided the learner should be required to provide sufficient breadth of evidence relevant to the route being undertaken, using the examples as a guide.</p> <p>See guidance on Page 4 regarding use of simulation.</p>			

Unit	LANLEO19	Service and repair land-based soil preparation, cultivation and plant establishment equipment	
Level	5	Credit	5
Notes:			
<p>Where examples are provided the learner should be required to provide sufficient breadth of evidence relevant to the route being undertaken, using the examples as a guide.</p> <p>In the Overview the reference to drainage and pipe laying equipment should be included in the previous list rather than the list of implements driven by PTOs.</p> <p>See guidance on Page 4 regarding use of simulation.</p>			

Unit	LANLEO20	Service and repair land-based transport, handling and storage equipment	
Level	5	Credit	8
Notes:			
<p>Where examples are provided the learner should be required to provide sufficient breadth of evidence relevant to the route being undertaken, using the examples as a guide.</p> <p>Learners should be made aware of the risks of working with storage tanks, silos and slurry stores.</p> <p>See guidance on Page 4 regarding use of simulation.</p>			

Unit	LANLE021	Service and repair suspension systems on land-based equipment	
Level	5	Credit	5
Notes:			
<p>Where examples are provided the learner should be required to provide sufficient breadth of evidence relevant to the route being undertaken, using the examples as a guide.</p> <p>To achieve this unit the learner should cover each of the following suspension systems:</p> <ul style="list-style-type: none"> i. cab suspension ii. seat suspension iii. axle suspension <p>See guidance on Page 4 regarding use of simulation.</p>			

Unit	LANLE022	Service and repair electrical systems on land-based equipment	
Level	6	Credit	14
Notes:			
<p>This unit is for those who work under the supervision of a more competent member of staff.</p> <p>Where examples are provided the learner should be required to provide sufficient breadth of evidence relevant to the route being undertaken, using the examples as a guide.</p> <p>System requirements indicates satisfactory serviceable condition.</p> <p>For Knowledge and Understanding (c) learners should know and understand the application of Ohm's law.</p> <p>See guidance on Page 4 regarding use of simulation.</p>			

Unit	LANLE023	Service and repair electronic control and monitoring systems on land-based equipment	
Level	7	Credit	18
Notes:			
<p>Where examples are provided the learner should be required to provide sufficient breadth of evidence relevant to the route being undertaken, using the examples as a guide.</p> <p>Any testing equipment used should be calibrated appropriately.</p> <p>For Knowledge and Understanding (b) the learner should know and understand the function and operation of electronic control and monitoring systems e.g. engine management systems etc. Detailed knowledge and understanding of the function and operation of the list of components is helpful but not essential at this level.</p> <p>See guidance on Page 4 regarding use of simulation.</p>			

Unit	LANLE024	Service and repair hydraulic systems and components on land-based equipment	
Level	5	Credit	12
Notes:			
<p>This unit is for those who work under the supervision of a more competent member of staff.</p> <p>Where examples are provided the learner should be required to provide sufficient breadth of evidence relevant to the route being undertaken, using the examples as a guide.</p> <p>Basic testing and diagnostics is covered in LANLE030 Inspect and test land-based equipment.</p> <p>See guidance on Page 4 regarding use of simulation.</p>			

Unit	LANLE025	Service and repair pneumatic systems and components on land-based equipment	
Level	6	Credit	7
Notes:			
<p>This unit is for those who work under the supervision of a more competent member of staff.</p> <p>Where examples are provided the learner should be required to provide sufficient breadth of evidence relevant to the route being undertaken, using the examples as a guide.</p> <p>Basic testing and diagnostics is covered in LANLE030 Inspect and test land-based equipment.</p> <p>See guidance on Page 4 regarding use of simulation.</p>			

Unit	LANLE026	Service and repair powershift, hydrostatic, CVT transmissions on land-based equipment	
Level	6	Credit	12
Notes:			
<p>This unit is for those who work under the supervision of a more competent member of staff.</p> <p>Where examples are provided the learner should be required to provide sufficient breadth of evidence relevant to the route being undertaken, using the examples as a guide.</p> <p>To achieve this unit the learner should cover two of the following systems:</p> <ul style="list-style-type: none"> i. powershift ii. hydrostatic iii. CVT <p>For Performance Criteria 4 the learner should identify and categorise faults in two of the following three areas:</p> <ul style="list-style-type: none"> i. mechanical ii. hydraulic iii. electrical/electronic 			

Refer to unit LANLE04 Core land-based engineering principles – Mechanical principles for setting bearings and the relationship of gears and pinions to one another and method of lubrication.

See guidance on Page 4 regarding use of simulation.

Unit	LANLE027	Refrigerant handling		
Level	5	Credit	5	
Notes:				
<p>Where examples are provided the learner should be required to provide sufficient breadth of evidence relevant to the route being undertaken, using the examples as a guide.</p> <p>Particular attention should be given to health and safety and legislation.</p> <p>See guidance on Page 4 regarding use of simulation.</p>				

Unit	LANLE028	Service and repair land-based air-conditioning/refrigeration equipment		
Level	7	Credit	7	
Notes:				
<p>Where examples are provided the learner should be required to provide sufficient breadth of evidence relevant to the route being undertaken, using the examples as a guide.</p> <p>Particular attention should be given to health and safety and legislation.</p> <p>See guidance on Page 4 regarding use of simulation.</p>				

Unit	LANLE029	Monitor the handover and installation of land-based equipment		
Level	7	Credit	3	
Notes:				
<p>Where examples are provided the learner should be required to provide sufficient breadth of evidence relevant to the route being undertaken, using the examples as a guide.</p> <p>The term installation is used in this context to mean any aspect of the initial use of a product or service.</p> <p>This unit requires adherence to all relevant legislation and regulations.</p> <p>See guidance on Page 4 regarding use of simulation.</p>				

Unit	LANLE030	Inspect and test land-based equipment	
Level	7	Credit	12
Notes:			
<p>Where examples are provided the learner should be required to provide sufficient breadth of evidence relevant to the route being undertaken, using the examples as a guide.</p> <p>See guidance on Page 4 regarding use of simulation.</p>			

Unit	LANCS2	Monitor and maintain health, safety and security	
Level	5	Credit	10
Evidence requirements			
<p>A. provide performance evidence for evaluating risks resulting from a minimum of two of the following:</p> <ul style="list-style-type: none"> i. the use and maintenance of machinery or equipment ii. the use of materials or substances iii. working practices which do not conform to laid down procedures iv. unsafe behaviour v. accidental breakages and spillages vi. environmental factors vii. reporting accidents to self or other in accordance with work place practice <p>B. provide performance evidence for following a minimum of four types of workplace policies which cover:</p> <ul style="list-style-type: none"> i. the use of safe working methods and equipment ii. the safe use of hazardous substances iii. smoking, eating, drinking and drugs iv. what to do in the event of an emergency v. personal presentation 			
Notes:			
<p>Evidence from performance is required and should be the primary source of evidence. However this will often be supported by questioning or other assessment methods in order to gather evidence of the learner's ability to perform competently.</p>			

Unit	LANCS4	Establish and maintain working relationships with others	
Level	5	Credit	4
Evidence requirements			
A. establish and maintain good working relationships with: (i) colleagues (ii) supervisors and managers (iii) persons external to the team, department or organisation			
Notes:			
Evidence from simulations is not acceptable for this unit.			