



## **National Unit specification: general information**

**Unit title:** Land-based Engineering: An Introduction: Wheels and Tyres (SCQF level 4)

**Unit code:** H1MW 10

**Superclass:** SK

**Publication date:** August 2012

**Source:** Scottish Qualifications Authority

**Version:** 02

## **Summary**

The purpose of this Unit is to enable the candidate to develop a basic understanding of wheels, tyres and traction improvement systems used on land-based vehicles and equipment, and develop practical skills and safe working practices when removing, replacing and servicing wheels and tyres on land-based vehicles and equipment.

The Unit is suitable for candidates who wish to progress to apprentice training as engineering technicians working on land-based vehicles and equipment.

This is a mandatory Unit in the National Certificate in Land-based Engineering: An Introduction at SCQF level 4. It may also be taken as a freestanding Unit.

## **Outcomes**

- 1 Identify tyre types used in land-based operations.
- 2 Identify wheel types used in land-based operations.
- 3 Demonstrate the safe use of jacking equipment on land-based vehicles and equipment.
- 4 Remove, repair and refit wheels and tyres from land-based equipment.

## **Recommended entry**

Entry is at the discretion of the centre.

## General information (cont)

**Unit title:** Land-based Engineering: An Introduction: Wheels and Tyres (SCQF level 4)

### Credit points and level

0.5 credit at SCQF level 4 (3 SCQF credit points at SCQF level 4\*)

*\*SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

### Core Skills

Achievement of this Unit gives automatic certification of the following Core Skills component:

Complete Core Skill                      None

Core Skill component                      Critical Thinking at SCQF level 4

There are also opportunities to develop aspects of Core Skills which are highlighted in the Support Notes of this Unit specification.

## **National Unit specification: statement of standards**

**Unit title:** Land-based Engineering: An Introduction: Wheels and Tyres (SCQF level 4)

Acceptable performance in this Unit will be the satisfactory achievement of the standards set out in this part of the Unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

### **Outcome 1**

Identify tyre types, and their applications, used in land-based operations.

#### **Performance Criteria**

- (a) Identify land-based vehicle and equipment tyre markings and codes correctly.
- (b) Identify applications for tyres used on land-based vehicles.

### **Outcome 2**

Identify wheel types, and their applications, used in land-based operations.

#### **Performance Criteria**

- (a) Identify wheel types used on land-based vehicles correctly.
- (b) Identify applications for wheel types used on land-based vehicles.

### **Outcome 3**

Demonstrate the safe use of jacking equipment on land-based vehicles and equipment.

#### **Performance Criteria**

- (a) Select the correct lifting and support equipment for land-based vehicles.
- (b) Locate the jacking and support points for land-based vehicles.
- (c) Carry out safe jacking and support.

### **Outcome 4**

Remove, repair and refit a wheel and a tyre from land-based equipment.

#### **Performance Criteria**

- (a) Remove a driving wheel and tyre.
- (b) Repair tyre and tube.
- (c) Refit a tyre and wheel assembly.

## National Unit specification: statement of standards (cont)

**Unit title:** Land-based Engineering: An Introduction: Wheels and Tyres (SCQF level 4)

### Evidence Requirements for this Unit

All practical activities must be carried out under supervision and in accordance with current health and safety legislation and guidance, codes of practice and manufacturers' recommendations. Personal protective equipment (PPE) must be used wherever necessary.

A safety induction must be undertaken on workshop practices and the safe use of equipment.

Evidence is required to demonstrate that the candidates have achieved all of the Outcomes and Performance Criteria. Evidence can be produced holistically or Outcome by Outcome.

Written and/or oral and performance evidence must be produced in supervised conditions. All practical tasks must be carried out successfully on at least **one** occasion.

### Outcomes 1 and 2

Written and/or recorded oral evidence produced in closed-book conditions to demonstrate:

- ◆ Identification of markings and codes from six land-based vehicle tyres.
- ◆ Identification of the applications for six different land-based vehicle tyres.
- ◆ Identification of four land-based vehicle wheels.
- ◆ Identification of the applications for four different land-based vehicle wheels.

### Outcome 3

Written and/or recorded oral evidence and performance evidence to demonstrate the candidate's ability to lift and jack wheel assemblies found in tractor Units and land-based vehicles and equipment.

The evidence must demonstrate:

- ◆ Identification of appropriate jacking and support equipment which conform to safety conventions in their use.
- ◆ Location of jacking and support points to lift and support two land-based vehicles and one item of trailed equipment.
- ◆ Use of appropriate lifting and support equipment to lift and support two different types of land-based vehicles.

### Outcome 4

Performance evidence to demonstrate:

- ◆ Removal of one driving wheel and tyre assembly from a land-based vehicle and one wheel and tyre assembly from trailed equipment.
- ◆ Removal and repair of one tyre and tube assembly from a land-based vehicle.
- ◆ Refit of one wheel and tyre assembly from a land-based vehicle and one wheel and tyre assembly from trailed equipment.

## National Unit specification: support notes

**Unit title:** Land-based Engineering: An Introduction: Wheels and Tyres (SCQF level 4)

This part of the Unit specification is offered as guidance. The support notes are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 20 hours.

### Guidance on the content and context for this Unit

This is a mandatory Unit in the National Certificate in Land-based Engineering: An Introduction at SCQF level 4. It may also be offered as a freestanding Unit.

This Unit is aligned to the following Lantra Sector Skills Council's National Occupational Standards (NOS):

- ◆ Unit LEO 1 Recognise and reduce hazards in the land-based engineering work area.
- ◆ Unit LEO 16 Service and repair tyres and tracks on land-based equipment.
- ◆ Unit CU5A Establish and maintain working relationships with others.

All practical activities must be carried out according to current health and safety guidelines.

The Unit covers the practice required to maintain wheel and tyre assemblies in a safe serviceable condition where employed on wheeled land-based engineering vehicles and machinery. Safe working practices as laid down in the health and safety codes of practice, to include lifting and handling, must be followed. This Unit covers the understanding of the tyre types, construction, function and operation of land-based equipment employing tyres to transfer power to the ground or ground drive system. Tyre materials, construction and tread patterns, identification codes, radial and crossply design, tube and tubeless type fitments, load carrying capacities and speed symbols may be considered. Construction and use regulations relating to off road and agricultural vehicles, especially in relation to mixing tyres, acceptable tyre wear/damage and operating widths may be highlighted.

Traction and the transfer of tractive power to the ground through tyres and an introduction to traction aids, ballasting and weight transfer could be covered. Candidates can be given the opportunity to ballast a land-based vehicle rear tyre.

Identification of wheel types and applications, tyre materials, tyre construction (cross ply and radial) may be highlighted as well as types and uses of tread patterns for different applications, identification codes, tube and tubeless.

Fitments, load carrying capacity and speed symbols. Methods of increasing the tractive effort could include traction control, aids, weight distribution, tyre pressure and selection. The current legislation on construction and use relating to land-based vehicles and equipment travelling on public roads.

## **National Unit specification: support notes (cont)**

**Unit title:** Land-based Engineering: An Introduction: Wheels and Tyres (SCQF level 4)

Tyre damage/wear, mixing of crossply and radial tyres and vehicle/equipment width limitations. Wear patterns associated with incorrect tyre selection, incorrect use, tyre pressures, incorrect overloading and damage due to chemical contamination. Use of jacks and axle stands may be demonstrated, ensuring correct siting of the vehicle/equipment to carry out the work in safety.

### **Guidance on learning and teaching approaches for this Unit**

This Unit should be delivered by a combination of teaching and learning approaches which could include: tutor input, case studies, practical activities in groups, group discussions, tutorials, directed study, investigations using ICT, site visits, audio visual materials, guest speakers. Although candidates may work in groups they must be assessed individually. Candidates could be given constructive feedback to encourage the review and evaluation of their approaches to practical work including their contribution to team working.

All practical activities must be carried out according to current health and safety guidelines. As Outcomes 3 and 4 require candidates to practically jack, support, service and repair wheels and tyres in workshop situation, candidates must be introduced to current legislation, regulations and safe working procedures and practices before starting practical work.

A safe system of work will be established in line with Health and Safety guidelines while taking cognisance of candidate's previous experience and abilities prior to the commencement of practical activities. The storage and handling of materials and methods for disposal of waste materials produced during the servicing of land-based equipment must comply with current legislation and good practice.

### **Guidance on approaches to assessment for this Unit**

#### **Outcomes 1 and 2**

Assessment must be conducted under supervised, closed-book conditions. The assessment should holistically cover the commonly available wheels and tyres found on land-based vehicles and equipment

#### **Outcome 3**

Evidence will be generated by a series of assessments designed to test candidates' abilities to lift and support tractor Units and land-based equipment. Candidates could undertake assessments in small groups (2/3 persons) but each should be assessed individually. An observation checklist could be used to record the evidence of candidates having satisfied all the Performance Criteria.

## National Unit specification: support notes (cont)

**Unit title:** Land-based Engineering: An Introduction: Wheels and Tyres (SCQF level 4)

### Outcome 4

Evidence will be generated by a series of assessments designed to test candidates' abilities, in accordance with the manufacturer's recommendations to, maintain, remove, repair and refit and wheel and tyre assembly systems found in land-based vehicles and equipment. Candidates must be assessed individually. An observation checklist could be used to record the evidence of candidates having satisfied all the Performance Criteria in the Outcome. Observation checklist should be used to provide evidence of the candidate's ability to complete the given tasks safely and correctly and carry out maintenance and test procedures correctly and within realistic time scales.

### Opportunities for the use of e-assessment

E-assessment may be appropriate for some assessments in this Unit. By e-assessment we mean assessment which is supported by Information and Communication Technology (ICT), such as e-testing or the use of e-portfolios or social software. Centres which wish to use e-assessment must ensure that the national standard is applied to all candidate evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. Further advice is available in *SQA Guidelines on Online Assessment for Further Education (AA1641, March 2003)*, *SQA Guidelines on e-assessment for Schools (BD2625, June 2005)*.

### Opportunities for developing Core Skills

In this Unit candidates will develop practical skills and safe working practices whilst removing, replacing and servicing wheels and tyres. They will develop skills in jacking vehicles and equipment.

Candidates will:

- ◆ work toward the relevant industrial standards
- ◆ develop safe working practices
- ◆ Identify tyre types markings and codes used in land-based operations

This means that as candidates are doing this Unit they will be developing aspects of the Core Skills of *Problem Solving*, *Working with Others* and *Numeracy*.

Whilst completing this Unit, candidates may develop aspects of the following Core Skills where specific learning and teaching approaches are adopted:

*Communication* may be developed where report/job card writing is possible. This may further be developed when they identify types and construction, communicating basic written conclusions regarding land-based vehicle wheels and tyres. As candidates are not required to produce and respond to detailed and complex written instructions but to gather and communicate basic detail regarding wheel and tyres.

## **National Unit specification: support notes (cont)**

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*Numeracy* may be developed where various aspects of wheel and tyres system are determined during the practical aspects of the Unit.

*Problem Solving* may be developed as candidates undertake practical workshop activities with group practical tasks.

*Working with Others* may be developed in team working during practical situations sharing engineering workshop areas, tools and equipment. This could be discussed in terms of the nature and scope of team goals, roles and responsibilities. Candidates engaged in practical work have to interact with their tutors, support staff and other candidates.

This Unit has the Critical Thinking component of Problem Solving embedded in it. This means that when candidates achieve the Unit, their Core Skills profile will also be updated to show they have achieved Critical Thinking at SCQF level 4.

### **Disabled candidates and/or those with additional support needs**

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering whether any reasonable adjustments may be required. Further advice can be found on our website [www.sqa.org.uk/assessmentarrangements](http://www.sqa.org.uk/assessmentarrangements)



## History of changes to Unit

Version	Description of change	Date
02	Core Skills Component Critical Thinking at SCQF level 4 embedded.	06/08/2012

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