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LEVEL 2 CERTIFICATE OF COMPETENCE IN LAND-BASED MACHINE MAINTENANCE

ASSESSMENT SCHEDULE

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NPTC LEVEL 2 CERTIFICATE OF COMPETENCE in LAND-BASED MACHINE MAINTENANCE
Candidate Information

Introduction

The scheme will be administered by the NPTC.

NPTC will:

- Publish
 - scheme regulations
 - assessment schedule
 - assessment material
- Approve centres to co-ordinate and administer the scheme
- Set standards for the training of Verifiers and Assessors
- Recruit, train and deploy Verifiers
- Manage verification
- Issue certificates to successful Candidates

The Certificate of Competence

Certificates of Competence will be awarded to Candidates who achieve the required level of competence in the Units to which their Certificate relates.

Instruction

Attendance at a course of instruction is not a pre-requisite for an application for an assessment but potential Candidates are strongly advised to ensure that they are up to the standards that will be expected of them when they are assessed.

NPTC does **not** hold a register of instructors; however instruction will normally be available from recognised training providers and/or centres of further or higher education active in the areas covered by this certificate. Further information on training may be obtained from the local Assessment Centre.

Access to Assessment

Assessment Centres will be responsible for arranging assessment on behalf of a Candidate. Assessment may only be carried out by an Assessor approved by NPTC for that scheme. Under no circumstances can either instructors involved in the preparation of candidates, or the candidates work place supervisors, or anyone else who might have a vested interest in the outcome, carry out the assessment.

The minimum age limit for Candidates taking certificates of competence is 16 years. There is no upper age limit.

Assessment

Assessment is a process by which it is confirmed that the Candidate is competent in the Units within the award to which the assessment relates. It is a process of collecting evidence about his/her capabilities and judging whether that evidence is sufficient to attribute competence.

The candidate must be registered through an NPTC approved Assessment Centre for this qualification prior to assessment.

The result of the assessment will be recorded on the assessment report form.

The schedule of assessment contains the criteria relating to:

- Observation of practical performance
- Assessment of knowledge and understanding

Performance Evaluation

The result of each assessment activity is evaluated against the following criteria:

- 4 = Meets or exceeds the assessment criteria by displaying a level of practical performance and/or underpinning knowledge, with no 'minor' or 'critical' faults. (Competent).
- 3 = Meets the requirements of the assessment criteria for both the practical performance and the underpinning knowledge, with some 'minor' faults but no 'critical' faults. (Competent).
- 2 = Does not fully satisfy the requirements of the assessment criteria, being unable to perform the practical task satisfactorily or being deficient in underpinning knowledge leading to the recording of minor faults. (Not yet competent).
- 1 = Does not satisfy the requirements of the assessment criteria, being unable to perform the practical task satisfactorily or safely or being deficient in underpinning knowledge leading to the recording of a critical fault. (Not yet competent).

A list of registered Assessment Centres is available from NPTC (www.nptc.org.uk)

Verification

Verification is a process of monitoring assessment; it is an essential check to confirm that the assessment procedures are being carried out in the way that NPTC has laid down. The overall aim of verification is to establish a system of quality assurance that is acceptable in terms of both credibility and cost effectiveness.

Approved Assessors will be subject to a visit by the Verifier at a time when assessments are being undertaken.

A selection of assessment reports completed by the assessor will be evaluated by an NPTC approved verifier.

Compliance with the verification requirements is a pre-requisite for Assessors remaining on NPTC's list of approved assessors.

Complaints and Appeals

NPTC and its Assessment Centres have a formal Complaints and Appeals procedure. In the event of any dissatisfaction with the arrangements and conditions of assessment, the candidate should first contact the Assessment Centre through whom the assessment was arranged and submit the complaint in writing.

For further information on NPTC's Equal Opportunities Policy and Complaints and Appeals Procedures, please refer to www.nptc.org.uk

Learning Outcomes

The candidate will be able to:

1. Apply **key** aspects of a Risk Assessment which apply to maintaining and running Agricultural and Horticultural machines
2. Carry out routine maintenance on an engine in accordance with the manufacturers instruction book
3. Apply appropriate key skills when making up an antifreeze solution
4. Carry out an oil change in accordance with manufactures instruction book
5. Inflate a tyre to a specified pressure in accordance with manufacturers instruction book
6. Carry out adjustments of belt/chain drives in accordance with manufacturers instructions
7. Clearly identify battery terminals for correct connections
8. Show an understanding of causes of batteries exploding
9. Dismantle and reset either a clutch, a breakaway device or shearbolt mechanism in accordance with manufactures instructions
10. Remove, sharpen and adjust a cutting system

Guidance Notes for Candidates and Assessors

The qualification is divided into six units:

Unit 1	Engine Maintenance for Land-based Machines	Unit 4	Battery Maintenance for Land-based Machines
Unit 2	Lubrication and Hydraulic Maintenance for Land-based Machines	Unit 5	Transmission, Belt and Chain Maintenance for Land-based Machines
Unit 3	Tyre Safety and Maintenance for Land-based Machines	Unit 6	Cutting Mechanism and Tine Maintenance for Land-based Machines

Qualification endorsement

The qualification may be endorsed either:

- **Agricultural Machinery**
- or
- **Horticultural Machinery**

According to the context in which the assessment was taken

Safe Practice:

Appropriate PPE must be worn at all times.

Ring spanners and sockets should be used wherever possible rather than open ended tools.

All equipment must be operated in such a way that the candidate, assessor and other persons or other equipment are not endangered.

When a machine is parked and left unattended, or in the case of a tractor a PTO shaft is being attached or detached the candidate must carry out the full safe stop procedure.

Manufacturer's instruction book must be available.

Candidate must not start an engine unless all guards are in place.

If these conditions are not observed this may result in the candidate not meeting the required standard.

Validation of Equipment:

Any land-based machine(s) complying with legal requirements is acceptable for the assessment, provided it is suitably equipped for **all** assessment criteria to be carried out.

Unit 1 – Engine Maintenance for Land-based Machines Candidates are required to carry out all activities.	
Assessment Activity	Assessment Criteria:
<p>1. Demonstrate knowledge of legal and safety requirements relating to machine maintenance and related operations in the context of:</p> <p>Statutory guarding requirements</p> <p>Safety clothing and protective equipment needed for use</p> <p>Lifting and handling tools/materials.</p> <p>Safe disposal of waste</p> <p>Safe stop techniques</p>	<ul style="list-style-type: none"> - All moving or hot parts must be guarded as defined in operator's manual/manufacturers handbook. - Machine may need to be fitted with ROPS and FOPS as defined in the Provision and Use of Work Equipment Regulations (PUWER) 1998 - Unless otherwise stated in manufacturers handbook, PPE should include: <ul style="list-style-type: none"> - safety boots - face/eye protection - suitable gloves for maintenance/barrier creams - other protection as highlighted by the COSHH/Risk Assessment For safe lifting and handling: <ul style="list-style-type: none"> - avoid manual handling where possible - use mechanical aids - use safe lifting techniques (bend knees and keep back straight) - waste oil and oily rags disposed of in line with local environmental legislation - spill oil prevented from entering water courses or sewers - bund for oil storage - ensure the machine is immobilised before working on it <ul style="list-style-type: none"> • chocking • safe stop • remove key
<p>2. Demonstrate knowledge of the dangers of bleeding or dismantling a fuel injection system</p>	<ul style="list-style-type: none"> - danger of pressurised fuel being injected through skin - contamination of eyes <p>Appropriate precautions when bleeding a fuel system</p> <ul style="list-style-type: none"> - wear PPE - ensure the system is de-pressurised
<p>3. Change fuel filters and bleed the fuel injection system on a diesel engine</p> <p>Start and run engine</p>	<ul style="list-style-type: none"> - cleaning prior to dismantling - avoidance of damage - dismantle sediment bowl/filter - assembly as appropriate, examine for sediment and clean - using instruction book, identify correct type of filter - re-assemble/re-fit bleed assembly and bleed whole system (if applicable) - examine for leaks - procedure to ensure cleanliness - correct and logical use of instruction book - use of seal(s) - systematic procedure - service intervals - clean afterwards - safe cold start procedure - smooth running

Unit 1 – Engine Maintenance for Land-based Machines (continued)	
Assessment Activity	Assessment Criteria:
<p>4. Inspect either a coil or a magneto ignition system</p> <p>Demonstrate method of inspecting spark</p> <p>Remove, clean, set and replace one spark plug</p>	<ul style="list-style-type: none"> - cracks and/or burning of insulating components - earth cut-out - at lead <u>NOT</u> on spark plug - dirt cleared away before removal - removal of all grit if abrasive cleaning used - only side electrode bent during setting - correct tightening procedure during-re-fitting
<p>5. Service ONE type of air cleaner</p>	<ul style="list-style-type: none"> - attention to pre-cleaner (if applicable) - inspection of whole cleaner assembly and connections - remove dirt before opening cleaner casing - check the condition of the unloader valve - correct cleaning procedure or replacement (if applicable) - use correct oil type (if applicable) - re-assembly - inspection - use of instruction book - inspect element and identify type - check function of air restriction warning device
<p>6. Cooling System</p> <p>a) Water Cooled Engines</p> <p>Report on condition of cooling system, make up anti-freeze mixture to provide a stated degree of frost protection</p> <p>Demonstrate knowledge of importance of correct coolant level</p> <p>Demonstrate knowledge of importance of correct anti-freeze mix/type</p> <p>Demonstrate knowledge of precautions to be taken when removing radiator cap from hot engine</p> <p>b) Air Cooled Engines</p> <p>Check condition of cooling system and ducting.</p>	<ul style="list-style-type: none"> - hoses examined for cracks and perishing - correct coolant or anti-freeze/water proportion - checks for leaks and rectify as necessary - examination of radiator core - expansion tank - use of compressed air for cleaning - air locks - Check the operation of the fan - sufficient coolant required to prevent engine overheating <p>Weak antifreeze/coolant can lead to:</p> <ul style="list-style-type: none"> - freezing - cracking and slush formation - engine overheating <p>Incorrect antifreeze/coolant type can lead to:</p> <ul style="list-style-type: none"> - corrosion - limited life <ul style="list-style-type: none"> - allow engine to cool to safe temperature - removal of radiator/pressure cap in two stages - use of rag to protect from steam <ul style="list-style-type: none"> - check for free air flow - clean cooling fins - use of compressed air for cleaning
<p>7. Demonstrate knowledge of reasons for over-heating</p>	<ul style="list-style-type: none"> - fan belt slack - radiator core blocked - radiator fins blocked - faulty thermostat - cylinder fins spaces blocked - low fluid levels - head gasket/porous liner failure - overloading machine - faulty radiator cap
<p>8. Comment on tightness of fan/generator belt drive</p>	<ul style="list-style-type: none"> - correct technique for measuring belt tension - inspection of pulleys for undue wear - check belt condition e.g. cracks, splits, perishing

Unit 2 - Lubrication and Hydraulic Maintenance of Land-based Machines	
Candidates are required to carry out items 1, 2 and one other item as selected by Assessor	
Assessment Activity	Assessment Criteria:
<p>1. Carry out an engine or gearbox oil change using correct lubricants</p> <p>Using the instruction book, identify the correct grade and volume of lubricants for the following:- Engine 'naturally aspirated' Engine 'turbo charger' Gearbox Final drive Power steering Hydraulics</p>	<ul style="list-style-type: none"> - machine on level ground - oil to be preferably warm before draining and allowed to drain for at least five minutes - area around drain plug, dip stick or level plug and filler to be cleaned before removing - filled to correct level using correct grade of oil and clean utensils - check for leaks and oil pressure, if applicable - entire operation carried out cleanly - Candidate to indicate frequency of oil change and type of lubricants required - comment on the condition of the old oil e.g. metal particles present - waste oil disposed of correctly (taking into account environmental and COSHH factors). - correct and logical use of instruction book
<p>2. Service oil filtration system</p> <p>Demonstrate knowledge of importance of correct filter</p>	<ul style="list-style-type: none"> - machine secured on level ground - filter bowl cleaned after old filter removed (if applicable) - fittings assembled correctly - new sealing ring normally used - oil on sealing face (cartridge type) - correct tightening - checking and topping up oil after running to allow for oil in filter body - correct sealing - special requirements of turbo charged engines (if applicable) - observe the condition of used oil - possibility of built-in pass valve - correct size and specification as per manufacturer's instruction book - should be appropriate to oil type, volume and filtration level
<p>Either</p> <p>3a. Lubricate a plain/taper bearing and a bearing assembly</p> <p>Demonstrate knowledge of dangers of over-greasing</p> <p>Or</p> <p>3b. Demonstrate knowledge of the dangers of high pressure oil leaks</p> <p>Top up an external hydraulic service system</p>	<ul style="list-style-type: none"> - reference to instruction book - nipple cleaned before greasing - greasing until clean grease exudes from end(s) of plain bearing - clean procedure throughout - correct attachment and removal of grease gun - dangers of excess grease, e.g. in brakes - bursting of oil seals - danger of pressurised oil being injected through skin - danger of scalding - manufacturers recommendation for 'checking method' - reference to instruction book - system de-pressurised - area round plugs and dipsticks cleaned before removal - any special procedures followed, e.g. steering rams/3-point linkage correctly positioned

Unit 3 – Tyre Safety and Maintenance of Land-based Machines

Candidates to complete all activities.

Assessment Activity	Assessment Criteria:
1. Fit a valve core and inspect for leakage	<ul style="list-style-type: none">- wheel raised and secured to avoid damage to tyre- correct technique for changing valve core- test for leakage prior to and after (any method acceptable, with due regard to personal hygiene)- valve cap replaced
2. Remove and replace a wheel	<ul style="list-style-type: none">- check for ballasting before removing wheel- wheel nuts slackened- wheel raised up to avoid damage- securely supported (axle stands)- wheel removed using appropriate mechanical aids where necessary- refit wheel or alternative wheel if appropriate- pre-tighten wheel nuts- lower machine- tighten wheel nuts as specified in the manufacturers handbook
2. Inspect tyre for damage	<ul style="list-style-type: none">- inspection of tyre<ul style="list-style-type: none">• walls• tread- comment on condition of tread wear and damage
3. Inflate a tyre to a stated pressure	<ul style="list-style-type: none">- selection of correct pressure gauge- use of safety cage if appropriate- tyre safely inflated to correct pressure

Unit 4 – Battery Maintenance of Land-based Machines	
Candidates to complete all activities. A spare battery may be used.	
Candidates must be aware of (and use) additional appropriate PPE specifically required for working with batteries (i.e. face shield/goggles, apron, acid proof gloves)	
Assessment Activity	Assessment Criteria:
1. Demonstrate knowledge of cleaning battery terminals	- use of soda and hot water
2. Top up electrolyte	- level checked - topped up as required - distilled water used
3. Put on charge and remove from charge Demonstrate knowledge of causes of battery exploding	- battery kept level at all times and not knocked - charger switched off before connecting - correct connection - cell cover removed if necessary - suitable rate of charge selected - danger of excessive charge rate - charger switched off before disconnection - connection or disconnection while on charge - arcing with tools - sparks near gas outlet - correct order of removal/replacement of leads
4. Check that battery is properly secured and battery leads connected	- leads connected and checked for damage - terminals cleaned satisfactorily - correct anti-corrosion grease put on leads and terminals when reconnecting - bolts are tight but not over-tightened - correct polarity
5. Connect two batteries with jump leads	- safe order of connecting/ disconnecting - correct polarity - positive to positive, negative to metal part on chassis away from the battery
6. Check the function of lights	- identify fuse - replace with correct type - replace light bulb

Unit 5 – Transmission, Belt and Chain Maintenance of Land-based Machines Candidates are required to carry out two items from 1 to 3 as selected by the Assessor. Guards may be removed prior to the test providing that the machine will not be run in that condition.	
Assessment Activity	Assessment Criteria:
1. Fit, tension and check alignment of a belt drive on a machine such as Mower/ Fertiliser distributor/ Turf Maintenance equipment/ Pedestrian controlled machine/ Mini digger/excavator Demonstrate knowledge of use of 'matched' belt sets	<ul style="list-style-type: none"> - belt fitted and aligned in accordance with manufacturer's instruction book - belt tensioned in accordance with manufacturer's instruction book - Candidate to indicate relevant inspection of belt wear and condition of belt and pulley - belt slackened - power transmission - longevity
2. Chain drives; check the tension of a chain and adjust if required Demonstrate knowledge of replacement of a chain	<ul style="list-style-type: none"> - Check tension according to manufacturer' instructions - Set tension according to manufacturer's instructions - Check chain lubrication - Check for wear/damage - Select correct chain - Set tension according to manufacturer's instructions
3. Demonstrate knowledge of the reasons for correctly setting up the overload protection device Dismantle, clean, re-assemble, re-set ONE of the following overload protection devices. Either Friction clutch OR Audible Slip Clutch OR Breakaway device OR Shear bolt mechanism Demonstrate knowledge of danger of using incorrect shear bolts	<ul style="list-style-type: none"> - Avoid damage to the machine - Remove clutch components and ensure correct sequence - examination of plain and friction plates for wear and oil/grease - correct cleaning method - check spring length (if applicable) - correct method of setting slipping load - examination of serrated plates for rust and wear, correct cleaning method - lubrication of spigot - if appropriate - correct method of setting slipping load - examination of working surfaces for rust and damage - correct cleaning method - check spring length - lubrication - if appropriate - correct method of setting breakaway load - examination of shear bolt bushes, bush edges, and fit of bush in housing - failure of bolt to shear due to excess strength or bending and jamming instead of shearing - Ensure all guarding is fitted after re-set - Ensure all mechanisms work correctly after re-set

Unit 6 - Cutting Mechanism and Tine Maintenance of Land-based Machines**Candidate to complete all activities**

Assessment Activity	Assessment Criteria:
1. Demonstrate knowledge of the run down time of the cutting mechanism before removal of any guards	<ul style="list-style-type: none">- Sufficient time to elapse allowing moving parts to come to rest- Avoids damage to power unit
2. Remove, sharpen and adjust a cutting system (e.g. flail, cylinder, rotary)	<ul style="list-style-type: none">- Safe practice- Correct angle for filing- Reference to manufacturers manual- Inspect and report on cutting mechanism- Test cutting mechanism- Balancing of cutting mechanism- Adjust or replace if required- inspect drive mechanism (e.g. bearings)- Correct clearance - test run the machine
3. Inspect the tines on a machine	<ul style="list-style-type: none">- Safe practice followed- Excess damage or wear identified- Missing tines identified
4. Replace worn or damaged tines on a machine	<ul style="list-style-type: none">- Safe practice followed- Tine fitted according to manufacturer's instructions- Correct torque setting- correct alignment of new tines- importance of positioning of new components for balance