



**NPTC**

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**NPTC LEVEL 2 AWARD  
IN THE  
SAFE USE OF PESTICIDES (QCF)**

**MODULE PA2  
BOOM SPRAYER**

**ASSESSMENT SCHEDULE**

## Module PA 2 GROUND CROP SPRAYER Mounted or Trailed

either	A	Hydraulic nozzle type / Rotary atomiser type - boom (excluding pedestrian controlled machines)
or	C	Twin fluid nozzle type – boom (excluding pedestrian controlled machines)
or	D	Electro-statically charged type
or	E	Horizontal Boom Sprayers fitted with downward air assistance
or	F	Frame or Boom type Wick Applicators
or	AR	Vehicle Mounted Kerb Sprayers – hydraulic nozzle type/rotary atomiser type
or	ST	Spray Trains – hydraulic nozzle and rotary atomiser types

Candidates undertaking assessment on twin fluid nozzle type machines will also need to cover key points marked C.

Candidates who wish to undertake assessment on electrostatically charged nozzles must first have successfully completed the test items which relate to the type of equipment to which the charging unit is attached i.e. A, C and must then complete test items marked D.

If the assessment is conducted on a machine fitted with electro-static charging heads then test items marked D will be examined concurrently.

Candidates undertaking assessment using downward air assistance sprayers will also need to cover key points marked E, however, they will be qualified to operate equipment classified as falling under PA2A.

Candidates undertaking assessment on boom type wick applicators will also need to cover key points marked F.

Candidates undertaking assessment on hydraulic nozzle type/ rotary atomiser type vehicle mounted kerb sprayers (AR) are assessed in the context of PA2A.

Candidates undertaking assessment on hydraulic nozzle and/ rotary atomiser type sprayers fitted to vehicles running on permanent way (railway track) will be assessed in the context of PA2A.

Candidates already holding a certificate in one type of applicator wishing to supplement it with further types will need to complete relevant key points marked with the appropriate letter.

### Objective Candidates will be able to:-

1. Prepare the applicator for work, calibrate and operate it to ensure correct application rate without risk to themselves, other people and the environment.
2. Use the information detailed on product labels to determine the approved uses for the product and its potential hazards to human safety, non-target areas and the environment in general.
3. Carry out daily and routine maintenance on the applicator.
4. Carry out the correct procedure for cleaning personal protective equipment and application equipment which may have been contaminated with pesticide.

There are a number of methods of calibration which the candidates may use provided that it produces the correct end result.

### Qualification and Credit Framework (QCF) – credit value

PA2 has a credit value of 2 credits on the QCF

### Safe Practice:

Operating the prime mover and/or the equipment in such a way as to put the candidate, Assessor, or the environment at risk will cause the candidate to be declared not yet competent.

All equipment used must be of the standard required under current Health & Safety legislation.

Candidates must wear Personal Protective Equipment (PPE) appropriate to the risk whenever carrying out work on the applicator e.g. checking filters, replacing nozzles etc.

Contaminated PPE should never be taken into a tractor cab.

In addition before entering the cab, any PPE (other than coveralls and wellington boots) not required by legislation should be removed and placed in a suitable tractor locker or enclosed container outside the cab.

Candidates must be especially careful to avoid personal contamination when operating partially cabbled or uncabbled prime movers and be particularly aware of the effect that changing circumstances have on the stability of the equipment.

The assessment may be carried out using either pesticide or assimilated product.

### Pre-requisites

The foundation unit (PA1) is required by candidates before being assessed for this application unit.

**Validation of Equipment:**

Any type of Ground Crop Sprayer, mounted or trailed with or without Air Assistance, excluding pedestrian controlled machines and hand held equipment.

Operator's instruction book and calibration charts/calculators should be available for use by the candidate throughout the assessment. Any other relevant literature may also be used.

Candidates who undertake this assessment and are judged 'competent' are reminded of their legal obligation to receive/undertake appropriate additional training in the use of any equipment that differs from that used during the assessment, but which they are nevertheless qualified to use.

**Site:**

Work site with suitable sprayer filling/washing facilities which comply with current environmental best practice and an area to be sprayed.

**Suggested facilities and equipment required to run the assessment:**

Applicator and additional equipment appropriate to the candidate.

First Aid kit which complies with the Health & Safety (First Aid) Regulations 1981.

Prime mover matched to the sprayer.

Instruction books for prime mover and sprayer.

Washing facilities.

Personal Protective Equipment to comply with pesticide label/COSHH risk assessment

Steel tape measure (2m)

Tape measure / Measuring wheel to measure 100m run

Suitable tools.

Air line, foot or bicycle pump.

Spare nozzle, filters etc.

**Clean** product labels or label duplicates appropriate to the candidate.

Clean water supply .

Accurate and suitable measuring jug

Measuring cylinder

Appropriate containers with simulated pesticide.

Nozzle testing equipment (optional).

Field markers.

Site for practical work.

Pocket calculator.

Wind speed gauge

Nozzle selection literature.

Tyre pressure gauge.

Suitable lubricants.

Appropriate Application Record Sheets

Assessment Activity	Assessment Criteria
<b>Preparation</b>	
<p>1. Identify applicator controls and components</p> <p>(C) Demonstrate knowledge of liquid flow, action of applicator in filling, application and circulation modes.</p> <p>(C) Remove, clean and replace a filter.</p> <p>(C) Demonstrate knowledge of nozzles</p> <p>(E)</p>	<ul style="list-style-type: none"> <li>- Pump</li> <li>- Pulsation damper</li> <li>- Filling control and devices</li> <li>- Agitation control</li> <li>- Pressure or volume regulator/pressure relief valve</li> <li>- On/off</li> <li>- Boom isolators</li> <li>- Tank wash system</li> <li>- Tank, filters, pump, pressure gauge, nozzles and other items specific to the applicator</li> <li>- Controls</li> <li>- Valve positions</li> <li>- Boom pressure compensation</li> <li>(C) - Liquid/air pressures through twin fluid nozzle</li> <li>(C) - Nozzle flow restrictor</li> <li>(C) - Spraylines and airlines</li> <li>(E) - Control of downward air speed and angle</li> <li>(E) - Control of nozzle angle</li> </ul> <p>- Candidate to explain liquid flow of the machine being used</p> <ul style="list-style-type: none"> <li>- Suitable procedure</li> <li>- Contain spillage</li> <li>- Check for defects</li> <li>-</li> <li>- Types of nozzle and their uses <ul style="list-style-type: none"> <li>● Flat fan. Standard boom nozzle</li> <li>● Air inclusion. Medium/coarse spray, low drift, LERAP 3 star</li> <li>● Cone. Good coverage for fungicides and insecticides</li> </ul> </li> </ul>
<p>2. Demonstrate knowledge of preparation of prime mover and equipment</p> <p>Demonstrate knowledge of legal requirements and safety regulations</p>	<ul style="list-style-type: none"> <li>- Fit carbon filter</li> <li>- Use in-cab controls</li> <li>- Ensure ventilation system is working correctly</li> <li>- Close all windows</li> <li>-</li> <li>- Compatibility of prime mover and applicator</li> <li>- Wheel track width</li> <li>- Front weights</li> <li>- Tyre pressures correct and tyres in good condition</li> <li>- Guards</li> <li>-</li> <li>- Be aware of any safety implications imposed by Risk Assessment on the machine and the operation and comply with their requirements</li> <li>- Ensure that all required guards are in place and in good condition</li> <li>- Comply with all relevant road traffic regulations when operating or transporting on the public highway</li> <li>- Comply with the Code of Practice</li> </ul>

Assessment Activity	Assessment Criteria
3. Demonstrate knowledge of safe driving	<ul style="list-style-type: none"> <li>- Assess conditions</li> <li>- Desirability of 4-wheel drive</li> <li>- Appropriate speed</li> <li>- Correct gear selected</li> <li>- Applicator correctly attached</li> <li>- Effect of changing load on stability</li> <li>- Use of weights to stabilise prime mover</li> <li>- Check tyre pressures</li> <li>- Correct turning procedure</li> <li>- Keep centre of gravity as low as possible</li> <li>- Fingers and thumbs outside steering wheel</li>   <li>- Independent brakes coupled together when on a public highway</li> <li>- Travelling at high speed makes vehicle unstable</li> </ul>
4. Check for mechanical defects  (C) (C) (E) (F)  Check security of attachment of application mechanisms.   Demonstrate knowledge of lubrication of components (C)	<ul style="list-style-type: none"> <li>- Seized, worn or damaged components</li> <li>- Atomiser drives, electrical connections</li> <li>- Compressor</li> <li>- Pressure relief device functions correctly</li> <li>- Check air intakes and ducts for leaks and blockages</li> <li>- Wick, wick glands</li>   <li>- Bolts tight</li> <li>- Straps adjusted</li> <li>- All linkage secure</li> <li>- Side sway restricted</li>   <li>- Identify all lubrication points by using the instruction book</li> <li>- Identify the correct compressor lubricant.</li> </ul>
5. Demonstrate working knowledge of the functions of the control panel (IF APPLICABLE)   Demonstrate knowledge of action to be taken if system fails	<ul style="list-style-type: none"> <li>Answers in accordance with manufacturers instructions</li> <li>- Recognise malfunctions before and during operation</li> <li>- Check accuracy of calibration</li> <li>- Switch to test mode where applicable</li>   <li>- Stop pesticide application</li> <li>- Convert to manual if possible</li> <li>- Ensure:               <ul style="list-style-type: none"> <li>• Correct output</li> <li>• Correct forward speed</li> </ul> </li> </ul>
6. Read and interpret product label. ( as supplied or approved by the Assessor)          Select spray volume/ spray quality.	<ul style="list-style-type: none"> <li>- Field of use</li> <li>- PPE requirements</li> <li>- Product being used</li> <li>- Crop/target on which product may be used</li> <li>- Specific product precautions</li> <li>- Appropriate for type of applicator</li> <li>- Dose rate</li> <li>- Volume rate</li> <li>- Maximum number of treatments</li> <li>- Timing</li> <li>- Additional label information</li> <li>- Restrictions on use</li> <li>- Approved tank mixes (if applicable)</li> <li>- Use of adjuvants</li> <li>- Suitable for wick applicators</li> <li>- Dilution rate</li>   <li>- Recommended nozzles</li> <li>- Recommended spray quality</li> <li>- Risk of drift</li> <li>- Target</li> <li>- Crop canopy density</li> <li>- Reduced volume application</li> <li>- Correct liquid and air pressure selected</li> <li>- Appropriate liquid : air ratio</li> </ul>
7. Part fill applicator.	<ul style="list-style-type: none"> <li>- Suitable site selected</li> <li>- Fill by usual on site method following approved safe procedures.</li> <li>- Tank washer</li> <li>- Clean water supply</li> </ul>

Assessment Activity	Assessment Criteria
8. Check boom suspension and break-back devices.	<ul style="list-style-type: none"> <li>- Boom suspension</li> <li>- Height adjustment</li> <li>- Break-back efficiency</li> <li>- Boom folding</li> <li>- Avoiding contamination from booms</li> <li>- Proximity to overhead lines</li> </ul>
<b>CALIBRATE THE APPLICATOR</b>	
9. Select and calculate speed.  Calculate required output / volume rate  Select appropriate nozzle/atomiser and pressure/disc speed.	<ul style="list-style-type: none"> <li>- Forward speed suitable for crop/ground</li> <li>- Accurate measurement of 100m</li> <li>- Time in seconds to cover 100m using gear and r.p.m. established (if applicable)</li> <li>- Correct use of formula</li> <li>- Correct use of formula</li> <li>- Use of manufacturer's operators handbook</li> <li>- Nozzle/atomiser manufacturer's literature</li> </ul>
Candidates may have to have engine running and PTO in gear to carry out next operation. Ensure safe practices are followed on leaving the seat	
10. Check applicator for leaks and spray patterns  Check anti drip system.  Demonstrate procedure for replacing blocked nozzles/restrictor	<ul style="list-style-type: none"> <li>- Use higher than normal system pressure</li> <li>- Visual check of all nozzles/atomisers for even spray pattern with no blockages, streaking or pulsing and correct alignment.</li> <li>- Replace defective nozzles/atomisers</li> <li>- Lid and seals</li> <li>- Hoses and pipe work</li> <li>- Air leaks</li> <li>- Control valves</li> <li>- Pressure gauge</li> <li>- Check valves</li> <li>- Follow manufacturer's instructions for cleaning flow regulators</li> <li>- Care not to walk in contaminated crop</li> <li>- Replace nozzles according to manufacturer's instructions</li> <li>- Replacements from spare nozzles stored in a clean container</li> </ul>
11. Set operating pressure.  Check nozzle/atomiser outputs.  Demonstrate knowledge of calibration data to be recorded  (C) (C) (E) (E) (E)	<ul style="list-style-type: none"> <li>- As determined by nozzle chart</li> <li>- Pressurize, appropriate to the system</li> <li>- Using a measuring jug measure output from four nozzles/atomisers (at least one from each boom section) and compare with target output.</li> <li>- Vary pressure to make small adjustments only/change nozzles.</li> <li>- Or any other acceptable method.</li> <li>- Registration number of vehicle</li> <li>- Tyre size</li> <li>- Gear selected</li> <li>- Engine speed</li> <li>- Vehicle speed</li> <li>- Application volume</li> <li>- Nozzle/disc fitted</li> <li>- Pressure/disc speed</li> <li>- Flow rate</li> <li>- Additives used</li> <li>- Liquid pressure/air pressure</li> <li>- Nozzle restrictor fitted</li> <li>- Air outlet angle</li> <li>- Nozzle angle</li> <li>- Fan setting</li> </ul>

Assessment Activity	Assessment Criteria
<b>Site Work</b>	
<p>12. Calculate, measure and mix pesticide, part filling tank, adding pesticide to tank safely and fill tank to the required level.</p> <p>(F) (F)</p>	<ul style="list-style-type: none"> <li>- Suitable site</li> <li>- Determine the size of the area to be treated</li> <li>- Correct dose rate</li> <li>- Calculate appropriate quantities for full and part tank loads</li> <li>- Accurate measurement of pesticide.</li> <li>- Use of filling device where fitted.</li> <li>- Avoidance of spillage</li> <li>- Correct filling procedure</li> <li>- Observance of pesticide manufacturer's instructions for mixing, agitation, tank mixes.</li> <li>- Tank mixes</li> <li>- Availability and correct use of water supply.</li> <li>- Priming time for wicks.</li> <li>- Adjust flow rate to wick.</li> </ul>
<p>13. Demonstrate knowledge of the preparation of concentrated pesticides</p>	<p>Suspensions/Emulsions</p> <ul style="list-style-type: none"> <li>- Shake container thoroughly before use</li> <li>- Thorough agitation while mixing and during application</li> </ul> <p>Wettable powders</p> <ul style="list-style-type: none"> <li>- Premix the required amount of powder into a paste with a small amount of water.</li> <li>- Bulk up by mixing with more water</li> <li>- Add to the applicator</li> <li>- Wash out mixing container into applicator</li> <li>- Top up applicator to volume of water required</li> </ul> <p>Dispersible powders/granules</p> <ul style="list-style-type: none"> <li>- Mix required amount of granules with small amount of water</li> <li>- Ensure granules dissolved/dispersed</li> <li>- Add to half full applicator tank</li> <li>- Top up applicator to volume of water required.</li> </ul> <p>Soluble packages</p> <ul style="list-style-type: none"> <li>- Ensure dry storage</li> <li>- Handle with dry gloves</li> <li>- Put into applicator</li> <li>- Agitate</li> <li>- Top up to required volume of water</li> </ul>

Assessment Activity	Assessment Criteria
<p>14. Carry out an environmental risk assessment of the application site</p> <p>(E)</p>	<p>May include:</p> <ul style="list-style-type: none"> <li>- Ground conditions</li> <li>- Water courses</li> <li>- LERAPS/Buffer zones</li> <li>- Drains</li> <li>- Wildlife</li> <li>- Flowering plants</li> <li>- Public access</li> <li>- Sensitive crops/areas</li> <li>- Hedgerows</li> <li>- Housing</li> <li>- Factors particular to the site</li> </ul> <ul style="list-style-type: none"> <li>- Visible signs or wind speed gauge at suitable height</li> <li>- Wind direction</li> </ul> <ul style="list-style-type: none"> <li>- Check and maintain application rate</li> <li>- Observe buffer zones (LERAPS)</li> <li>- Other environmental margins</li> <li>- Warn neighbours</li> <li>- Use an appropriate pesticide</li> <li>- Incorporate pesticide if required</li> <li>- Careful timing of application</li> <li>- Comply with environmental assessment</li> <li>- Avoid spray drift</li> <li>- Warning signs</li> </ul> <ul style="list-style-type: none"> <li>- Awareness of likely effects of drift to crops, people, wildlife and environment</li> </ul> <ul style="list-style-type: none"> <li>- Weather conditions</li> <li>- Direction of spraying</li> <li>- Nozzle size and type</li> <li>- Nozzle pressure/disc speed</li> <li>- Balancing flow rate and atomiser speed</li> <li>- Vehicle speed</li> <li>- Boom height</li> <li>- Downward air assistance</li> </ul>
<p>15. Demonstrate knowledge of safe and accurate spraying procedures on site</p> <p>(E) Demonstrate knowledge of the importance of the air assistance speed and direction (E only)</p>	<p>Methods of marking may include:</p> <ul style="list-style-type: none"> <li>- Tramlines</li> <li>- Row crops.</li> <li>- Blob markers</li> <li>- Marker poles</li> <li>- Marker dyes</li> <li>- GPS</li> </ul> <ul style="list-style-type: none"> <li>- Carefully avoid contact with the contaminated area,</li> <li>- Mark the spot at which the tank emptied, either by a marker in a row or tramline or by turning 90 degrees in a grass field as long as the wheelings are clearly visible.</li> <li>- Continue spraying by accurately matching at the appropriate point</li> </ul> <ul style="list-style-type: none"> <li>(E) - Keeps the air bag inflated over its entire length</li> <li>(E) - A larger air volume is produced which in a dense crop, by opening the crop canopy, improves the penetration of the spray into the crop</li> <li>(E) - In some instances it may allow a lower boom height to be used</li> <li>(E) - In a short crop or on arable ground with no crop cover it could lead to excessive drift</li> </ul> <ul style="list-style-type: none"> <li>(E) - Inclining the nozzle forward will open the crop canopy and counteract the effect on the spray created by: <ul style="list-style-type: none"> <li>• The forward speed of the sprayer</li> <li>• A head wind</li> </ul> </li> <li>(E) - Inclining the nozzle rearward will open the crop canopy and counteract the effect on the spray created by a tail wind.</li> </ul>



Assessment Activity	Assessment Criteria
<p>16. Apply to a given area in a safe and appropriate manner.</p> <p>(E only) Demonstrate knowledge of action to take in the event of the failure of the air assistance system (E)</p>	<ul style="list-style-type: none"> <li>- Ensure boom is level or aligned to target.</li> <li>- Boom height according to target and type of nozzle/nozzle angle.</li> <li>- Operate controls to start and finish applying accurately at beginning and end of each bout.</li> <li>- Correct forward speed and pressure for site conditions.</li> <li>- Accurate matching of bouts / use of driving aids</li> <li>- Coping with obstacles e.g. electricity poles.</li> <li>- All area treated/minimising overlaps and misses.</li> <li>- Awareness of changes in wind speed and direction.</li> </ul> <ul style="list-style-type: none"> <li>- Stop, or continue to spray in a mode suitable to weather conditions</li> </ul>
<b>Post Operation</b>	
<p>17. Demonstrate knowledge of:</p> <p>a) cleaning and decontamination of the applicator</p> <p>(F)</p> <p>b) procedures to protect the environment and the operator before undertaking repairs or replacement of parts</p> <p>(F)</p> <p>c) preparation of applicator for storage</p>	<ul style="list-style-type: none"> <li>- Appropriate site.</li> <li>- Thorough washing with water and suitable additive if recommended.</li> <li>- Internal and external surfaces.</li> <li>- Use of in-built systems when provided.</li> <li>- Safe disposal of tank washings by approved methods.</li> <li>- Thorough flushing of systems.</li> <li>- When cleaning should take place.</li> <li>- Safe procedures followed.</li> <li>- Safe disposal of surplus dilute pesticide</li> <li>- Cleaning of the wick</li> </ul> <ul style="list-style-type: none"> <li>- Select an appropriate containment site and possible containers for contaminated material.</li> <li>- Ensure that the applicator is made safe (engine stopped, supports if appropriate).</li> <li>- Safely isolate,</li> <li>- Drain and thoroughly decontaminate area or part to be replaced or repaired</li> <li>- Move away from wash site before repairs undertaken</li> <li>- Danger of operator contamination from exposed wick</li> </ul> <ul style="list-style-type: none"> <li>- Ensure the applicator is clean and dry.</li> <li>- Inspect for wear and/or damage,</li> <li>- Replace any worn or damaged parts.</li> <li>- Ensure system is drained and all valves left in appropriate positions</li> <li>- If appropriate, draw antifreeze through system, particularly the pump.</li> <li>- Remove filters and nozzles and store appropriately.</li> <li>- Lubricate as required</li> <li>- Store undercover and out of direct sunlight</li> <li>- Store in a secure area</li> </ul>
<p>18. Complete an application record.</p>	<ul style="list-style-type: none"> <li>- Records completed.</li> <li>- Accurate recording.</li> </ul>

<b>SPRAYERS FITTED WITH ELECTRO-STATIC CHARGING HEADS CHECKING THE FUNCTION OF THE UNIT (2D)</b>	
<b>Assessment Activity</b>	<b>Assessment Criteria</b>
19. Check fitting of control box.  Check wiring on sprayer  Check nozzle-charging heads.  Check earthing	<ul style="list-style-type: none"> <li>- Viewable/controllable from driving position.</li> <li>- Presents no hazard to driver.</li> <li>- Correctly wired to tractor electrical system.</li> <li>- Away from vibration.</li> <li>- Cables routed safely</li> <li>- No pinch/stretch/damage points.</li> <li>- Dry.</li> <li>- All connections tight and making good waterproof seal.</li> <li>- Condition of electric connections.</li> <li>- No damage to charging heads.</li> <li>- None mis-shaped</li> <li>- All earth wires are making a good connection with tractor/sprayer metal parts.</li> <li>- Earth strap from tractor/sprayer to the ground of sufficient length.</li> </ul>
20. Check function of charging heads.	<ul style="list-style-type: none"> <li>- Sprayer partially filled with water.</li> <li>- Suitable type and amount of water added to tank and agitated thoroughly.</li> <li>- Appropriate pressure set.</li> <li>- System switched on.</li> <li>- Persons and animals kept clear of charging heads.</li> <li>- Good ligament formation or use of proprietary voltage meter and probe.</li> <li>- No physical contact with high voltage.</li> </ul>
21. Demonstrate knowledge of cleaning procedures for electro-static charging heads	<ul style="list-style-type: none"> <li>- Use a damp cloth and dispose of safely</li> <li>- Do not use a pressure washer</li> </ul>