



**NPTC**

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## **LEVEL 3 CERTIFICATE OF COMPETENCE IN UTILITY ARBORICULTURE**

### **Unit UA1 – BASIC ELECTRICAL KNOWLEDGE (Ground Worker)**

### **ASSESSMENT SCHEDULE**

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## NPTC Level 3 Certificate of Competence in Utility Arboriculture – Unit UA1 Basic Electrical Knowledge

### Candidate Information

This Unit covers the requirements for safe working nearing proximity to overhead conductors which may be live.

#### Introduction

The scheme will be administered by 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 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](http://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 regular 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](http://www.nptc.org.uk)

### Learning Outcomes

The candidate will be able to:

- Understand the basic principles of working safely in proximity to overhead and underground utility services
- Understand their responsibilities whilst on site
- Identify electrical equipment
- Electrically categorise trees
- Identify zones

### Guidance Notes for Candidates and Assessors

The assessment contains 2 compulsory parts:

- Part 1.1 Site Work Safety  
Part 1.2 System components, Tree Categories and Zones

**The following should be available:** A range of good quality photographs, or pictures of electrical plant and circuit components.

### Certificate endorsement:

A **Level 3 Certificate of Competence in Utility Arboriculture – Ground Worker** will be issued to candidates who successfully achieve Unit UA1 Basic Electrical Knowledge (Parts 1.1 - Site Work Safety and 1.2 - System components, Tree Categories and Zones).

### Safe Practice

Where assessment is conducted in a classroom:

1. Assessors must follow NPTC guidance issued to Assessment Centres relating to Child Protection in that particular environment.

Where assessments are conducted outside, in addition to the above:

2. Any overhead line(s) must be live or treated as live.
3. The Assessor must carry out an appropriate Risk Assessment for the site, document the findings and then apply the appropriate control measures before any assessments are started.
4. Emergency Procedures must be included as part of the RA. In particular, the location of the site, weather conditions, details of access, etc., which may be required by emergency services must be assessed and the nearest Accident and Emergency Hospital Unit identified. The means of contacting the emergency services must be established.
5. Any manual handling must be carried out so that it complies with current legislation.
6. Warning signs must be erected as appropriate to Risk Assessment.
7. Any necessary permissions must have been granted, and notifications made as appropriate: (e.g. Regional Electrical Companies/ Distribution Network Operators, Local Planning Authority, Forestry Authority, Forest Enterprise, Highways Authority, Private owners, Statutory undertakers, Police, etc.).
8. A current, recognised, 'Emergency First Aid' Training Certificate which includes treatment for shock is strongly recommended and may be a requirement of some Electricity Companies.
9. The assessments are carried out in accordance with safety guidelines in the Electricity Act 1989 (Schedule 4 Para. 9), Electricity at Work Regulations, HSE Guidance Notes GS6, HS (G) 47, HS (G) 85 Electricity at Work Safe Working Practices, Electricity Supply Industry (ESI) Model Distribution Safety Rules, EA Engineering recommendation G55/1, BS EN 50110-1, local Distribution Network Operators (DNO) Distribution Safety Rules and other relevant Safety Guides and current legislation, e.g. the Provision and Use of Work Equipment Regulations (PUWER) 1998.
10. It is the responsibility of the Assessment Centre, Assessor and Candidate to ensure that the additional requirements and provisions are met as relevant to the units
11. Additional information may be sought from the relevant operator manuals or any other safety publications.

**Part 1.1 Site work safety**

	<b>Assessment Activity</b>	<b>Assessment Criteria</b>	
1.	Demonstrate knowledge of what Risk Assessment documents should contain	<ul style="list-style-type: none"> <li>- Hazard identified : has the potential to cause harm (injury)</li> <li>- Risk evaluated: the likelihood of the injury occurring, to whom and its severity</li> <li>- Control Measures required: action to be taken to reduce (minimise) the risk of injury occurring</li> <li>- Risk assessment is properly documented (i.e you can understand it and it is relevant to the task and the site)</li> <li>- Monitoring: to ensure controls are still in place or that if further hazards arise controls are put in place to minimise risk</li> </ul>	E
2.	Demonstrate knowledge of the factors to consider when entering/exiting a site in a safe and controlled manner.	<ul style="list-style-type: none"> <li>- Work area limits defined and maintained</li> <li>- Identification of dangers inherent to site</li> <li>- Identification of environmental dangers on site</li> <li>- Work area is sufficient for safe working</li> <li>- Work equipment sited to prevent danger to overhead line and personnel</li> <li>- Location of work being carried out above ground</li> </ul>	E
3.	Demonstrate knowledge of the responsibility of the person in control of all of the tasks to be carried out adjacent to the over head line (OHL).	<p>Ensures:</p> <ul style="list-style-type: none"> <li>- No unauthorised access</li> <li>- Access and egress arrangements are clearly defined</li> <li>- Emergency meeting points are clearly identified</li> <li>- Method for communication amongst work party are clearly established</li> </ul>	E
4.	Demonstrate knowledge of personal protective equipment requirements whilst on the work site in order to comply with instructions and associated legislation.	<p>PPE is required where appropriate:</p> <ul style="list-style-type: none"> <li>- High visibility clothing</li> <li>- Head protection</li> <li>- Eye protection</li> <li>- Hand protection</li> <li>- Foot protection</li> <li>- Hearing protection</li> </ul>	E
5.	Demonstrate knowledge of how to prevent injury to self/others and damage to apparatus	<ul style="list-style-type: none"> <li>- Ensure the work is carried out as defined by the risk assessment/ method statement</li> <li>- Maintain safety distances</li> <li>- Locate underground cables and protect where necessary (steel plates, blocks of wood)</li> <li>- Locate other utilities (gas, plant water, sewer)</li> </ul>	E
6.	Demonstrate knowledge of the relevant safety rules, codes of practice and safety documents which underpin how tasks on site are undertaken safely	<p>Awareness of:</p> <ul style="list-style-type: none"> <li>- Electricity Company Safety Rules</li> <li>- Electricity Company codes of practice</li> </ul> <p>Safety documents issued:</p> <ul style="list-style-type: none"> <li>- Permit to Work/Permit for Work</li> <li>- Limitation of Access/Limited Work Certificate</li> </ul>	E
7.	Demonstrate knowledge of:  Permit to Work (PTW)/ Permit For Work (PFW)  Limitation of Access (LOA)/Limited Work Certificate (LWC)	<p><b>Permit to Work/Permit For Work:</b></p> <ul style="list-style-type: none"> <li>- Issued for work on dead HV equipment</li> </ul> <p><b>Limitation of Access/Limited Work Certificate:</b></p> <ul style="list-style-type: none"> <li>- Issued for work where verbal instructions are not sufficient</li> </ul>	E
8.	Demonstrate knowledge of the key aspects of a PTW/PFW and a LOA/LWC	<ul style="list-style-type: none"> <li>- Issued by a DNO appointed <u>person</u></li> <li>- received by a DNO appointed <u>person</u></li> <li>- Describes the work to be carried out</li> <li>- Describes the limit of the work and safety precautions to be applied, (where applicable)</li> <li>- It describes the equipment (spans etc.) which can be worked on safely</li> <li>- Identifies that the OHL is <u>Earthed</u></li> <li>- When all work is complete, document is cleared and staff informed</li> </ul> <ul style="list-style-type: none"> <li>- Issued by a DNO appointed <u>person</u></li> <li>- received by a DNO appointed <u>person</u></li> <li>- Identifies the location of the work</li> <li>- Describes the work to be carried out</li> <li>- Describes the limits of the work</li> <li>- Line is to be treated <u>as live (not earthed)</u></li> <li>- When all work is complete, document is cleared and staff informed</li> </ul>	E

	<b>Assessment Activity</b>	<b>Assessment Criteria</b>	
9.	Demonstrate knowledge of Earths	<ul style="list-style-type: none"> <li>- Demonstrates that the OHL is dead and safe for work</li> <li>- Must be applied before work starts</li> <li>- Must be seen from the point of work.</li> <li>- Any equipment without an Earth must be treated as live</li> </ul>	E
10.	Demonstrate knowledge of safety points to consider when working under the control of a Safety Document	<ul style="list-style-type: none"> <li>- Know the limits of the work area identified</li> <li>- Cease work immediately following instruction from the Safety Document holder</li> <li>- Leave site only after agreement with the holder of the Safety Document</li> <li>- Report back to Safety Document holder on returning to the site (The work arrangements may have changed or the line may have been re-energised)</li> <li>- Everyone on the site working under the Safety Document needs to understand its contents.</li> </ul>	E
11.	Demonstrate knowledge of the factors to consider when working in the designated area and when leaving the site safe for others (e.g. public)	<ul style="list-style-type: none"> <li>- Ensure work does not interfere with other parties</li> <li>- Maintaining the general safe condition of the site at all times during and after work</li> <li>- Ensure Logs/brush/chippings stacked clear of the line</li> </ul> <p>Ensure equipment/machinery does not impede:</p> <ul style="list-style-type: none"> <li>- Work</li> <li>- Access points/Egress points</li> </ul> <ul style="list-style-type: none"> <li>- Remove site 'spoil' where appropriate</li> <li>- Fences, ditches, paths, young trees, badger setts etc. left undamaged</li> <li>- Tools and equipment all removed from site</li> </ul>	E
12.	<p>Demonstrate knowledge of:</p> <p>The minimum ground clearances (over normal ground) for the following type of lines:</p> <p>a) LV b) 11kV c) 33kV d) Roads e) Jumpers, (droppers to transformers, airbreaks etc)</p> <p>The link between increasing line voltage and change in ground clearance</p>	<ul style="list-style-type: none"> <li>- LV = 5.2M</li> <li>- 11kV = 5.2M</li> <li>- 33kV = 5.2M</li> <li>- Roads = 5.8M</li> <li>- Jumpers = 4.3M</li> </ul> <p>- The higher the line voltage the greater the ground clearance</p>	E
13.	<p>Demonstrate knowledge of:</p> <p>Ways in which fires can increase the danger from overhead lines</p> <p>And</p> <p>How to reduce the electrical danger from fires adjacent to a line</p>	<ul style="list-style-type: none"> <li>- Increase the likelihood of a flash over – carbon particles</li> <li>- Heat can cause conductors to sag – reduces ground clearance and brings OHL (vicinity zone) closer to operator</li> <li>- Poles could catch fire</li> <li>- Conductors could melt and break</li> </ul> <ul style="list-style-type: none"> <li>- Chip arisings away from line</li> <li>- Stack arisings away from line</li> <li>- Cart arisings away</li> <li>- Avoid fires adjacent to lines if possible</li> <li>- Build fires away from line</li> <li>- Ensure smoke blows away from line</li> </ul>	E



**Part 1.2 System components, Tree Categories and Zones**

	<b>Assessment Activity</b>	<b>Assessment Criteria</b>	
1.	Identify a range of High Voltage (HV)/Low Voltage (LV) overhead line components and explain the risks when working adjacent to each:		E
a.	Wood pole Overhead Lines HV to cover  Voltages 11 kV 33kV	- HV Overhead Line identified Associated risks: - High voltage conductors between pole's - Supporting steelwork at the pole top - Stay wires above the 'in-stay' insulator	E
b.	Overhead Lines LV	- LV Overhead Line identified Associated risk - Low voltage conductors between pole's - Supporting steelwork at the pole top - Stay wires above the 'in-stay' insulator - Street lighting	E
c.	Transformers (associated with 11kV and 33kV OHL's)	- Transformer identified Associated risks: - High voltage bushings on the transformer - Low voltage bushings on the transformer - Connecting jumpers from the high-voltage lines - Connecting jumpers are lower than the minimum OHL ground clearance - Vicinity zone close to ground	E
d.	Cable Terminal Pole HV and LV	- Cable Terminal Pole HV and LV identified Associated risks: - High-voltage bushings on the pole box or cable termination - Jumpers connecting the cable to the overhead line - Supporting steelwork at the pole top - Damage to the cable at ground level	E
e.	Jumpers HV and LV	- HV and LV Jumpers identified Associated risks: - Any jumpers that come down the pole and connect to other equipment. - All jumpers that connect one line to another	E
f.	Air Break Switch (Pole top mounted and under slung)	- Air Break Switch (Pole top mounted and under slung) identified Associated risks: - Jumpers that connect the overhead line to the airbreak switch. - Supporting steelwork at the pole top - Operating handle that comes down the pole to ground level - Open/closed	E
g.	Earths: HV Earths LV Bonds	- HV Earths and LV Bonds identified Associated risks – HV Earths: - Disconnection of the earth at ground level before removal from the OHL. - Disconnection of the earth at the ground level during the period of the work Associated Risks – LV Bonds - Connection to phase conductors before connection to neutral/earth conductor - Disconnection of phase conductors before disconnection of neutral/earth conductor	E
h.	Aerial Bundled Conductor	- Aerial Bundled Conductor identified Associated risks: - Damaged to the conductor insulation - Conductor terminations may be exposed - Must be treated as live at all times	E
i.	Fuses HV and LV	- HV and LV Fuses identified Associated risks: - Fuse unit - Live equipment above <u>or</u> inside the fuse unit even when fuse removed	E

	Assessment Activity	Assessment Criteria	
	1 continued...		
j.	Auto reclosers/ Pole Mounted Circuit Breaker	<ul style="list-style-type: none"> <li>- Auto reclosers/ Pole Mounted Circuit Breaker identified</li> </ul> Associated risks: <ul style="list-style-type: none"> <li>- High-voltage bushings</li> <li>- Jumpers connecting the Auto recloser / Pole Mounted Circuit Breaker to the overhead line</li> </ul>	E
k.	Transmission Tower Lines	<ul style="list-style-type: none"> <li>- Transmission Tower Lines identified</li> </ul> Associated risks: <ul style="list-style-type: none"> <li>- High-voltage conductors between towers</li> <li>- Suspension insulators at each tower</li> <li>- Jumpers connecting one part of the line to another</li> </ul>	E
l.	Grid and Primary Substations	<ul style="list-style-type: none"> <li>- Primary and Grid substation identified</li> </ul> Associated risks: <ul style="list-style-type: none"> <li>- Damage to 'un-climbable' fence</li> <li>- Unauthorised access</li> <li>- Live equipment at low level</li> </ul>	E
m.	Secondary Distribution Substation	<ul style="list-style-type: none"> <li>- Ground Mounted Secondary Distribution Substation (Transformer) identified</li> </ul> Associated risks: <ul style="list-style-type: none"> <li>- Damage to any cable connected to the substation HV/LV</li> <li>- Damage to sub station plant and equipment</li> </ul>	E
n.	Underground Cables	<ul style="list-style-type: none"> <li>- Underground Cables identified</li> </ul> Associated risks: <ul style="list-style-type: none"> <li>- Shallow cable depth</li> <li>- Any cable damage caused by digging, ground anchors, fencing etc</li> <li>- Cable damage if suitable methods of locating not used (DNO plans, cable locator e.g. CAT/JENNY)</li> </ul>	E
2.	Demonstrate knowledge of how trees are electrically categorised when located in proximity to an overhead line	Category 1: <ul style="list-style-type: none"> <li>- Tree already within live zone or if felled, sectioned or pruned would breach the live zone</li> </ul> Category 2: <ul style="list-style-type: none"> <li>- Trees in the vicinity zone or if felled, sectioned or pruned have the potential to breach the vicinity zone</li> </ul> Category 3: <ul style="list-style-type: none"> <li>- Trees that can be felled sectioned or pruned with no risk of breaching the vicinity zone</li> </ul>	E
3.	Demonstrate knowledge of safe working practices for trees in Categories 1 and 2	<ul style="list-style-type: none"> <li>- Arrange for the DNO to make the overhead line dead (Safety Document issued for HV – shut down).</li> <li>- If the overhead line is live and part of the tree is/could breach the Vicinity Zone agree the safe method of work with the team leader .</li> <li>- Carry out all work from ground level</li> <li>- Always follow the agreed method of work.</li> </ul>	E
4.	Demonstrate knowledge of how the Category of tree and the work to be carried out are linked and how that can change the work	Category type may depend on type of operation: <ul style="list-style-type: none"> <li>- Trees within a tree length of the line is in Category 1 if felled</li> <li>- Could be Category 1, 2 or 3 if pruned or sectioned</li> </ul>	E
5.	Demonstrate knowledge of:  the Live Zone  the dangers and safety factors that must be considered when working on trees where any part is in the Live Zone	Live zone: <ul style="list-style-type: none"> <li>- The zone around an exposed live circuit conductor or supporting insulators where there is danger of burn, shock explosion if any part of a persons body or non insulated tool they are using enters the zone. Dimensions vary between DNO's</li> </ul> Sources of Danger: <ul style="list-style-type: none"> <li>- Trees may be live at ground level</li> <li>- Trees may be weakened by charring or could catch fire</li> <li>- Overhead line conductors maybe damaged</li> </ul> Safety factors: <ul style="list-style-type: none"> <li>- Ask the DNO. to make the line dead</li> <li>- Never carry out work on any trees where any part is touching the live line</li> <li>- Only use a method of work that has been agreed with the team leader/supervisor</li> </ul>	E

	Assessment Activity	Assessment Criteria																						
6.	<p>Demonstrate knowledge of the factors that may change the electrical danger when a tree is in the live zone taking into account:</p> <p>Atmospheric conditions</p> <p>Tree type and condition</p>	<ul style="list-style-type: none"> <li>- Temperature (changes ground clearance)</li> <li>- Rain (increases conductivity)</li> <li>- Dust (increases risk of 'flash over')</li> <li>- Fog/mist (increases conductivity)</li> <li>- Snow/ice (changes ground clearance/may change category of tree)</li> <li>- Electrical storm (very high voltages transmitted)</li> <li>- Wind (blows trees/branches nearer to line)</li> <li>- Species – different sap levels eg Willow high sap</li> <li>- Spring - rising sap levels</li> <li>- Full leaf/Dead tree</li> <li>- Trees with leaves may come into contact with the overhead line</li> </ul>	<p>E</p> <p>E</p> <p>E</p>																					
7.	<p>Demonstrate knowledge of: the Vicinity Zone</p> <p>the Vicinity zones distances for the following range of voltages</p> <p>LV 11kV 33kV 66kV 132kV 275kV 400kV</p> <p>the factors to consider when applying the Vicinity Zone distance to a task</p>	<p>Vicinity zone:</p> <ul style="list-style-type: none"> <li>- The zone around an exposed live circuit conductor which if maintained will prevent the danger of burn or electric shock.</li> <li>- The live zone is included within the measurement of the vicinity zone</li> </ul> <table style="margin-left: 20px;"> <tr><td>- **L.V</td><td>=</td><td>1M</td></tr> <tr><td>- **11kV</td><td>=</td><td>2M</td></tr> <tr><td>- **33kV</td><td>=</td><td>2.5M</td></tr> <tr><td>- 66kV</td><td>=</td><td>3M</td></tr> <tr><td>- 132</td><td>=</td><td>3.5M</td></tr> <tr><td>- 275</td><td>=</td><td>4M</td></tr> <tr><td>- 400</td><td>=</td><td>5M</td></tr> </table> <p>**must be stated</p> <ul style="list-style-type: none"> <li>- Different measurements for different voltages</li> <li>- The higher the voltage the greater the distance so always select the greater distance if there is doubt about the voltage</li> <li>- If the Vicinity Zone distance is maintained it will prevent injury</li> <li>- Distances can be obtained from Training manual, the local DNO, E.S.I. standards e.g. G55/1 etc.</li> </ul>	- **L.V	=	1M	- **11kV	=	2M	- **33kV	=	2.5M	- 66kV	=	3M	- 132	=	3.5M	- 275	=	4M	- 400	=	5M	<p>E</p> <p>E</p> <p>E</p>
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- 66kV	=	3M																						
- 132	=	3.5M																						
- 275	=	4M																						
- 400	=	5M																						
8.	<p>Demonstrate knowledge of Proximity Zones 1 &amp; 2</p> <p>Demonstrate knowledge of the factors to consider when applying the proximity zone distance to a task</p>	<p>Proximity zone 1:</p> <ul style="list-style-type: none"> <li>- Includes all the trees that are to be felled that are within two tree lengths of the overhead line (OHL)</li> </ul> <p>Proximity zone 2:</p> <ul style="list-style-type: none"> <li>- Includes all the trees that are to be sectioned or pruned or have other arboricultural work carried out on them that are within 9 metres of an overhead line supported by poles or are within 15 metres of an overhead line supported by metal towers or pylons</li> </ul> <ul style="list-style-type: none"> <li>- Distance measured is from nearest conductor to the closest part of the tree.</li> <li>- On sloping ground increase the distance to allow for the effect of the slope so that task can still be carried out safely</li> <li>- The distance must be reassessed on the re-commencement of work</li> <li>- DNO must be advised if work is to take place within the Proximity Zone</li> </ul>	<p>E</p> <p>E</p>																					