



City & Guilds Level 3 Certificate of Competence in Utility Arboriculture Basic Electrical Knowledge (0038-30)

March 2022 Version 1.1

**Assessment Pack – Centre and Candidate
Version**

Version and date	Change detail	Section
1.0 December 2021	First version	
1.1 March 2022	Corrected formatting and typographical errors	Throughout
	Added 'In areas where different voltages are used to the ones listed within this guidance, regional variation may be applied.'	Page 4
	Activity 6 Amended to 'All PPE should conform to latest standards'	Practical observation descriptor table

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Introduction

This assessment relates to the units in the Qualification Handbook. The assessment(s) can be achieved at pass grade only. If any task is not achieved the candidate is unsuccessful.

This assessment is for unit 301 Utility Arboriculture Basic Electrical Knowledge covering the following learning outcome:

1. Understand Basic Electrical Knowledge for Utility Arboriculture

General guidance on the requirements for assessment can be found in the Assessor Guidance document available on the City & Guilds web site www.nptc.org.uk

The assessor must complete the Practical Table mark sheet for each candidate which should be kept by the assessor for a minimum period of twelve months.

Record of assessment (ROA)

A prepopulated record of assessment must be completed by the assessor following an assessment. The number of learning outcomes is listed above, these must be ticked in the relevant 'met' or 'not met' sections of the ROA.

ARAS Forms

An Assessment Result Advice Slip (ARAS form) must be completed by the assessor following an assessment. The ARAS is not a certificate but, based on the evidence of the candidate's performance, is a recommendation to City & Guilds that the candidate has either met or not met the assessment criteria. All feedback is to be recorded by the assessor on the feedback section of the ARAS form.

Assessment Time

The expected assessment time for this qualification is 30 minutes -1 hour.

Site/workshop requirements:

None

Equipment/Machinery:

None

Consumables:

None

This is a closed book assessment.

In areas where different voltages are used to the ones listed within this guidance, regional variation may be applied.

Practical observation descriptor table

Unit 301 Utility arboriculture basic electrical knowledge

Activity number and description from check list		Assessment criteria
1	Explain the risk assessment process	<p>The risk assessment process may contain the following five steps:</p> <ul style="list-style-type: none"> • identify the hazards • decide who might be harmed and how • evaluate the risks and decide on precautions • record the findings and implement them • review and update the assessment as necessary
2	Identify the hazards, risks and controls associated with the site and task	Identify hazards, risks, and controls relevant to the site and task
3	Explain the requirements of risk assessment for safe tree working in proximity to overhead electric lines	<p>The requirements of risk assessment for safe tree working in proximity to overhead electric lines may include:</p> <p>Generic risk assessments:</p> <ul style="list-style-type: none"> • often repeated tasks and procedures • use of chainsaws and machinery e.g., woodchipper • procedures for working at height • procedures for live line or deadline working • other <p>Site specific risk assessment:</p> <ul style="list-style-type: none"> • details hazards that are specific to the site, tasks, and work • safety of public, property and environment • details of trainees and supervisory levels • other <p>Electrical risk assessment:</p> <ul style="list-style-type: none"> • electrical and tree related hazards clearly separated • justification for any live working proposed • category of tree works clearly defined • other

4	State the requirements for appropriate site supervision	<p>Requirements for appropriate site supervision may include:</p> <ul style="list-style-type: none"> • name of operative(s) being supervised- age if relevant • operations being supervised • the supervisor(s) • the level of supervision • details documented e.g., within risk assessment • arrangements agreed with network operator • other
5	Outline emergency planning relevant to the working area	<p>Emergency planning relevant to a work site may include:</p> <ul style="list-style-type: none"> • site location • grid reference • what three words • designated meeting place • nearest access point • street name/district • type of access (public road/light vehicles, four-wheel drive) • suitable helicopter landing area • phone number of nearest doctors • location of nearest accident and emergency hospital and phone number • works manager contact details • your own contact number/mobile number • other
6	State personal protective equipment requirements whilst on the work site in order to comply with instructions and associated legislation	<p>PPE that is required where appropriate maybe:</p> <ul style="list-style-type: none"> • high visibility clothing • head protection • eye protection • hand protection • foot protection • hearing protection • specialist equipment as specified by the network operator • all PPE should conform to latest standards

7	Explain Proximity Zones one and two	<p>Definitions of Proximity Zone one to include:</p> <ul style="list-style-type: none"> includes all the trees that are to be felled that are within two tree lengths of any live equipment <p>Proximity Zone two:</p> <ul style="list-style-type: none"> includes all the trees that are to be dismantled, pruned, or have other arboricultural work carried out on them that are within: <ul style="list-style-type: none"> 9m of any live equipment up to and including 66kV 15m of any live equipment greater than 66kV Only certified and competent operatives may work within Proximity Zones without appropriate supervision of the network operator
8	State the factors to consider when applying the Proximity Zone distances to a task	<p>Factors to consider when applying the Proximity Zone distance to a task:</p> <p>When felling:</p> <ul style="list-style-type: none"> network operator must be advised if work is to take place within the proximity zones distance is measured horizontally from a point directly beneath the nearest conductor to the base of the tree <p>Where machinery is being used:</p> <ul style="list-style-type: none"> stated distances will be measured to the nearest point to the line that any part of the machine or load can reach <p>On sloping ground:</p> <ul style="list-style-type: none"> increase the distance to allow for the effect of the slope so that task can still be carried out safely the distance must be reassessed on the re-commencement of work
9	State the definition of the Vicinity Zone	<p>Definition of the Vicinity Zone:</p> <ul style="list-style-type: none"> the zone around an exposed live circuit conductor which if maintained will prevent the danger of burn or electric shock the Live Zone is included within the measurement of the Vicinity Zone

10	State the Vicinity Zone distances for the range of voltages	<p>The Vicinity Zone distances for the following range of voltages are:</p> <ul style="list-style-type: none"> • LV = 1m • 11kV = 2m • 33kV = 2.5m • 66kV = 3m • 132 kV = 3.5m • 275 kV = 4m • 400 kV = 5m
11	State the factors to consider when applying the Vicinity Zone distance to a task	<p>Factors to consider when applying the Vicinity Zone distance to a task maybe:</p> <ul style="list-style-type: none"> • different measurements for different voltages • the higher the voltage the greater the distance so always select the greater distance if there is doubt about the voltage • if the Vicinity Zone distance is maintained, it will prevent injury • other
12	State the definition of the Live Zone	<p>Definition of the Live Zone is:</p> <ul style="list-style-type: none"> • the zone around an exposed live circuit conductor where there is danger of burn or electric shock if any part of a person's body or non-insulated tools, they are using enters the zone
13	State the Live Zone distances for the range of voltages	<p>The Live Zone distances for the range of voltages are:</p> <ul style="list-style-type: none"> • **LV = 0.3m • **11kV = 0.8m • **33kV = 0.8m • 66kV = 1.0m • 132kV = 1.4m • 275kV = 2.4m • 400kV = 3.1m
14	State how to prevent injury to site personnel and damage to equipment	<p>How to prevent injury to site personnel may include:</p> <ul style="list-style-type: none"> • ensure the work is carried out as defined by the risk assessment / method statement • maintain safety distances • always maintain awareness of Vicinity Zones, particularly when moving and handling timber and branches • locate underground cables and protect where necessary (steel plates, blocks of wood) • locate other utilities (gas, plant water, sewer)

<p style="text-align: center;">15</p>	<p>State the factors to consider when working in the designated area and when leaving the site safe for others</p>	<p>Factors to consider may include:</p> <ul style="list-style-type: none"> • ensure work does not interfere with other parties • always maintaining the general safe condition of the site during and after work • ensure logs/brush/chippings are stacked clear of the line • access points/egress points kept clear • remove site spoil where appropriate • fences, ditches, paths, young trees, badger setts etc. must be left undamaged • tools and equipment are removed from site • any hanging branches removed • other
<p style="text-align: center;">16</p>	<p>State the factors to consider when carrying out ground-based operations</p>	<p>Factors to consider when carrying out ground-based operations maybe:</p> <ul style="list-style-type: none"> • do not point chipper discharge shoot towards conductors or equipment • do not leave long branches on site where there is a possibility of them being handled later and breaching the Vicinity Zone • ensure that a clear path is left under conductors to allow access for future patrols and maintenance • do not stack timber adjacent to substation boundary fences that may allow climbing access • ensure that hanging branches are not left as a hazard for others • other
<p style="text-align: center;">17</p>	<p>State how the tree type and condition may change the electrical danger</p>	<p>Tree type and condition may change the electrical danger because:</p> <ul style="list-style-type: none"> • species – different sap levels e.g., Willow high sap • spring - rising sap levels • full leaf/dead tree • trees in leaf may come into contact with the overhead line • other

<p style="text-align: center;">18</p>	<p>State factors to consider when using ladders adjacent to overhead lines</p>	<p>Factors to consider when using ladders adjacent to overhead lines may include:</p> <ul style="list-style-type: none"> • do not use metal ladders • wet/dirt on wooden ladders increases conductivity • fiber glass ladders may offer better protection but are not rated as insulated • always carry in a horizontal position as close to the ground as possible • never allow ladders to enter the Vicinity Zone • ladders must be of a type/ construction approved by the network operator and only used in accordance with permitted procedures • other
<p style="text-align: center;">19</p>	<p>State safety considerations when using ropes adjacent to overhead lines</p>	<p>Safety considerations when using ropes adjacent to overhead lines may include:</p> <ul style="list-style-type: none"> • rope material – no ropes are rated as insulated • wet ropes increase conductivity • dirty ropes increase conductivity • other
<p style="text-align: center;">20</p>	<p>State ways to reduce the danger when working with ropes near to overhead lines</p>	<p>Ways to reduce the danger when working with ropes near to overhead lines may include:</p> <ul style="list-style-type: none"> • ropes should only be placed in trees using insulated rods • never use lines/throw bags • never throw ropes from the ground • all ropes in use must be secured so that they do not enter the Vicinity Zone • all ropes used in climbing must be used on the side of the tree away from the line • other
<p style="text-align: center;">21</p>	<p>State the actions to be taken in the event of an emergency in the workplace.</p>	<p>Actions to be taken in the event of an emergency in the workplace may include:</p> <ul style="list-style-type: none"> • stop work • assess the situation • do not endanger yourself or other people • inform first aiders • follow emergency procedures • contact emergency services • contact the network operator/landowner • informing supervisor • other

22	Identify the emergency equipment required on site.	Emergency equipment required on site may include: <ul style="list-style-type: none"> • telephone (with signal) • first aid kit • fire extinguisher • spill kit • rescue equipment • other
23	State the emergency action required following contact by either machinery, trees, equipment or personnel with live overhead lines or underground cables	Emergency action required following contact by either machinery, trees, equipment or personnel with live overhead lines or underground cables may include: <ul style="list-style-type: none"> • keep everyone at least five meters away from the scene of the incident • do not become a victim by going too close or attempting a rescue • be aware that the high voltage auto re-closer circuit breaker may have switched power back on and there will be a voltage gradient in the ground • post a watchperson (if applicable) • do not touch any broken conductors or equipment • contact network operator/owner of overhead line so the line can be made dead • only approach a casualty after the overhead line has been proven dead and earthed by the network operator • contact supervisor/line manager • other
24	State the action to take when rescuing a person from a low voltage line	The action to take when rescuing a person from a low voltage line is: <ul style="list-style-type: none"> • consider pulling the persons or conductors clear using approved insulated rods – minimum of three 1.2m sections
25	State the action to take when rescuing a person from a high voltage line	The action to take when rescuing a person from a high voltage line is: <ul style="list-style-type: none"> • no attempt should be made to rescue the person if they are in contact with a high voltage line • the circuit may auto-re-close and there will be a voltage gradient in the ground • only approach a casualty after the overhead line has been proven dead and earthed by the network operator

26	State the information that needs to be given to the network operator for the line to be made dead in case of emergency	Information that needs to be given to the network operator for the line to be made dead may include: <ul style="list-style-type: none"> • your name • explain what has happened • ask for the line to be made dead • give accurate location • give an accurate grid reference/W.3.W • give name and or number of overhead line • give pole numbers/equipment ID • transformer/switch name/number • describe damage you can see • other
27	State the additional information that needs to be given to the emergency services in the event of an injury	Additional information that needs to be given to the emergency services in the event of an injury may include: <ul style="list-style-type: none"> • nature of the incident • details of casualties • accurate grid reference/what three words • access/meeting points • other
28	State why emergency procedures need to be documented	Reasons why emergency procedures need to be documented may include: <ul style="list-style-type: none"> • emergency services can find casualty quickly • network operator can de-energise line quickly • emergency services can be contacted quickly • minor casualties can be taken to A&E quickly • all operatives to have access to emergency procedure • other
29	State a suitable location where the emergency procedure should be kept	Suitable location where the emergency procedure should be kept may include: <ul style="list-style-type: none"> • kept on site in an easily accessible place • contained within the risk assessment • somewhere everybody can access it • other
30	State what conditions must be met for a Permit to Work (PTW)/ Permit for Work (PFW) to be issued	What conditions must be met for a Permit to Work (PTW)/ Permit for Work (PFW) to be issued are: <ul style="list-style-type: none"> • issued for work on dead, earthed, high voltage equipment

31	State the key aspects of a Permit to Work	<p>Key aspects of a Permit to Work maybe:</p> <ul style="list-style-type: none"> • issued by a network operator appointed person • received by a network operator appointed person • describes the work to be carried out • describes the limit of the work and safety precautions to be applied • it describes the equipment (spans etc.) which can be worked on safely • shows limitations of the work area • identifies that the overhead line is earthed • it shows where the high voltage is isolated • shows the location of the circuit main earth • when all work is complete, document is cleared, and staff informed
32	State points to consider when working under the control of a safety document	<p>Points to consider when working under the control of a safety document may include:</p> <ul style="list-style-type: none"> • know the limits of the work area identified • cease work immediately following instruction from the safety document holder • leave site only after agreement with the holder of the safety document • report back to safety document holder on returning to the site (The work arrangements may have changed, or the line may have been re-energized) • everyone on the site working under the safety document needs to understand its contents • other
33	State safety points when proving the line dead and applying earths	<p>Safety points when proving the line dead and applying earths may include:</p> <ul style="list-style-type: none"> • demonstrates that the overhead line is dead and safe for work • must be applied before work starts • must be seen from the point of work. • any equipment without an earth must be treated as live • circuit main earths must not be disturbed during work • additional earths may be moved to cover the works

34	<p>State the minimum ground clearances for the following overhead lines</p> <ul style="list-style-type: none"> • LV • 11kV • 33kV • over roads • Jumpers 	<p>Minimum ground clearances for overhead lines are:</p> <ul style="list-style-type: none"> • LV = 5.2m • 11kV = 5.2m • 33kV = 5.2m • Roads = 5.8m • Jumpers = 4.3m
35	<p>Explain how trees are electrically categorised when located in proximity to an overhead line and in which document these can be referenced</p>	<p>Category A:</p> <ul style="list-style-type: none"> • trees within the Vicinity Zone (including the Live Zone) at or above the level of conductors or associated equipment <p>Category B:</p> <ul style="list-style-type: none"> • trees outside but capable of breaching the Vicinity Zone (including the Live Zone) adjacent to conductors or associated equipment <p>Category C:</p> <ul style="list-style-type: none"> • trees within the Vicinity Zone (including the Live Zone) that are beneath the conductors or associated equipment <p>Category D:</p> <ul style="list-style-type: none"> • trees outside the Vicinity Zone with no potential of breaching the Vicinity Zone <p>Documents for reference may be:</p> <ul style="list-style-type: none"> • G55 • Distribution Safety Rules (DSR's) • Operational Practice Manual (OPM's)
36	<p>State the dangers that must be considered when working on trees where any part is in the Live Zone</p>	<p>Dangers that must be considered when working on trees where any part is in the Live Zone may include:</p> <ul style="list-style-type: none"> • trees may be live at ground level • trees may be weakened by charring or could catch fire • overhead line conductors maybe damaged • other
37	<p>State the reasons for assessing clearance distances accurately</p>	<p>Reasons for assessing clearance distances accurately may include:</p> <ul style="list-style-type: none"> • maintain and determine safety distances • accurately categorise trees • remove cut material to specified lengths • other

38	State methods of accurately assessing clearance distances	Distances can be assessed by: <ul style="list-style-type: none"> • reference to known distances • conductor spacing • length of approved insulated rods • electronic / surveying devices • other
39	State how to work on trees where any part is in the Live Zone safely	Working on trees where any part is in the Live Zone can be carried out safely by: <ul style="list-style-type: none"> • asking the network operator to make the line dead • carrying out work under an approved network operator procedure and where a justification process allows the work to be carried out with the line live
40	Identify a range of extra high voltage, high voltage and low voltage overhead line components and explain the risks when working adjacent to each	High voltage overhead line identified associated risks: <ul style="list-style-type: none"> • high voltage conductors between poles • supporting steelwork at the pole top • stay wires above the 'in-stay' insulator Low voltage overhead line identified associated risk: <ul style="list-style-type: none"> • low voltage conductors between poles • supporting steelwork at the pole top • stay wires above the 'in-stay' insulator • street lighting Transmission tower lines identified associated risks: <ul style="list-style-type: none"> • High-voltage conductors between towers • damaged insulators at each tower • jumpers connecting one part of the line to another Transformer identified associated risks: <ul style="list-style-type: none"> • 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 overhead line ground clearance • vicinity zone close to ground

<p>40 cont.</p>		<p>Cable terminal pole high voltage and low voltage identified associated risks:</p> <ul style="list-style-type: none"> • 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 <p>High voltage and low voltage jumpers identified associated risks:</p> <ul style="list-style-type: none"> • any jumpers that come down the pole and connect to other equipment. • all jumpers that connect one line to another <p>Air brake switch (pole top mounted or under slung) identified associated risks:</p> <ul style="list-style-type: none"> • jumpers that connect the overhead line to the air brake switch. • supporting steelwork at the pole top • operating handle that comes down the pole to ground level • open/closed <p>Aerial bundled conductor identified associated risks:</p> <ul style="list-style-type: none"> • damaged to the conductor insulation • conductor terminations may be exposed • must be always treated as live <p>High voltage and low voltage fuses identified associated risks:</p> <ul style="list-style-type: none"> • fuse unit • live equipment above or inside the fuse unit even when fuse removed <p>Auto reclosers/pole mounted circuit breaker identified associated risks:</p> <ul style="list-style-type: none"> • high-voltage bushings • jumpers connecting the Auto recloser /pole mounted circuit breaker to the overhead line <p>Primary and Grid substation identified associated risks:</p> <ul style="list-style-type: none"> • damage to 'un-climbable' fence • unauthorised access • live equipment at low level • ground mounted high voltage equipment
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<p>40 cont.</p>		<p>Substation (transformer) identified associated risks:</p> <ul style="list-style-type: none"> • damage to any cable connected to the substation high voltage/low voltage • damage to substation plant and equipment <p>Underground cables identified associated risks:</p> <ul style="list-style-type: none"> • shallow cable depth • any cable damage caused by digging, ground anchors, fencing etc • cable damage if suitable methods of locating not used (network operator plans, cable locator e.g., CAT/JENNY) <p>HV high voltage earths and LV low voltage bonds identified associated risks:</p> <ul style="list-style-type: none"> • any equipment without an earth must be treated as live <p>The hazards of high voltage earths:</p> <ul style="list-style-type: none"> • be aware if either; the earth is disconnected at ground level before removal from the overhead line • the earth is disconnected at the ground level during the period of the work
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Practical tables

Unit 301 Utility arboriculture basic electrical knowledge

Candidate name:

Date:

Start time:

Finish time:

All criteria must be achieved.

Activity number and description	Achieved
1. Explain the risk assessment process	
2. Identify the hazards, risks and controls associated with the site and task	
3. Explain the requirements of risk assessment	
4. State the requirements for appropriate site supervision	
5. Outline emergency planning relevant to the working area	
6. State personal protective equipment requirements	
7. Explain Proximity Zones one and two	
8. State the factors to consider when applying the Proximity Zone distances to a task	
9. State the definition of the Vicinity Zone	
10. State the Vicinity Zone distances for the range of voltages	
11. State the factors to consider when applying the Vicinity Zone distance to a task	
12. State the definition of the Live Zone	
13. State the Live Zone distances for the range of voltages	
14. State how to prevent injury to site personnel and damage to equipment	
15. State the factors to consider when working in the designated area	
16. State the factors to consider when carrying out ground-based operations	
17. State how the tree type and condition may change the electrical danger	
18. State factors to consider when using ladders adjacent to overhead lines	
19. State factors to consider when using ropes adjacent to overhead lines	
20. State how to reduce the danger when using ropes near overhead lines	
21. State the actions to be taken in the event of an emergency	
22. Identify the emergency equipment required on site	
23. State the emergency action required following contact with the electrical network	
24. State the action to take when rescuing a person from a low voltage line	
25. State the action to take when rescuing a person from a high voltage line	
26. State the information given to the network operator in an emergency	
27. State the information given to the emergency services in the event of an injury	

28. State why emergency procedures need to be documented	
29. State a suitable location where the emergency procedure should be kept	
30. State the conditions for a Permit to Work to be issued	
31. State the key aspects of a Permit to Work	
32. State points to consider when working under the control of a safety document	
33. State safety points when proving the line dead and applying earths	
34. State the minimum ground clearances for overhead lines	
35. Explain how trees are electrically categorised	
36. State the dangers when working on trees where any part is in the Live Zone	
37. State the reasons for assessing clearance distances accurately	
38. State methods of accurately assessing clearance distances	
39. State safety factors when working on trees where any part is in the Live Zone	
40. Identify a range of extra high voltage, high voltage and low voltage overhead line components and explain the risks when working adjacent to each	
	Grade (P/X)

Assessor feedback:

Candidate feedback:

Candidate signature and date	
Assessor signature and date	

Appendix 1 Sources of general information

The following documents contain essential information for centres delivering City & Guilds qualifications. They should be referred to in conjunction with this handbook. To download the documents and to find other useful documents, go to the **Centres and Training Providers homepage** on www.nptc.org.uk

City & Guilds Centre Manual

This document provides guidance for organisations wishing to become City & Guilds approved centres, as well as information for approved centres delivering City & Guilds qualifications. It covers the centre and qualification approval process as well as providing guidance on delivery, assessment and quality assurance for approved centres.

It also details the City & Guilds requirements for ongoing centre and qualification approval, and provides examples of best practice for centres. Specifically, the document includes sections on:

- the centre and qualification approval process
- assessment, internal quality assurance and examination roles at the centre
- registration and certification of candidates
- non-compliance and malpractice
- complaints and appeals
- equal opportunities
- data protection
- management systems
- maintaining records
- internal quality assurance
- external quality assurance.

Our Quality Assurance Requirements

This document explains the requirements for the delivery, assessment and awarding of our qualifications. All centres working with City & Guilds must adopt and implement these requirements across all of their qualification provision. Specifically, this document:

- specifies the quality assurance and control requirements that apply to all centres
- sets out the basis for securing high standards, for all our qualifications and/or assessments
- details the impact on centres of non-compliance

Our Quality Assurance Requirements document encompasses the relevant regulatory requirements of the following documents, which apply to all UK centres working with City & Guilds:

- Ofqual's General Conditions of Recognition

The **centre homepage** section of the City & Guilds website also contains useful information on

- **Walled Garden:** how to register and certificate candidates online
- **Events:** dates and information on the latest Centre events
- **Online assessment:** how to register for e-assessments.

Useful contacts

UK learners General qualification information	E: learnersupport@cityandguilds.com
International learners General qualification information	E: intcg@cityandguilds.com
Centres Exam entries, Certificates, Registrations/enrolment, Invoices, Missing or late exam materials, Nominal roll reports, Results	E: information@cityandguilds.com
Single subject qualifications Exam entries, Results, Certification, Missing or late exam materials, Incorrect exam papers, Forms request (BB, results entry), Exam date and time change	E: singlesubjects@cityandguilds.com
International awards Results, Entries, Enrolments, Invoices, Missing or late exam materials, Nominal roll reports	E: intops@cityandguilds.com
Walled Garden Re-issue of password or username, Technical problems, Entries, Results, e-assessment, Navigation, User/menu option, Problems	E: walledgarden@cityandguilds.com
Employer Employer solutions, Mapping, Accreditation, Development Skills, Consultancy	T: +44 (0)121 503 8993 E: business@cityandguilds.com

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