Level 1 Certificate in Engineering (2850-10)

Qualification handbook for centres
QAN 600/0879/9
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Level 1 Certificate in Engineering (2850-10)

Qualification handbook for centres

Version 1.3
City & Guilds

Skills for a brighter future

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1 About this document

This document contains the information that centres need to offer the following certificate:

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<th>Level 1 Certificate in Engineering</th>
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<tr>
<td>City &amp; Guilds qualification number</td>
<td>2850-10</td>
</tr>
<tr>
<td>Qualification accreditation number</td>
<td>QAN 600/0879/9</td>
</tr>
<tr>
<td>Last registration and certification dates</td>
<td>See Online Catalogue/Walled Garden for last dates</td>
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This award is designed to contribute towards the knowledge and understanding for the Level 1 Certificate in Engineering (City & Guilds 2850),

This certificate is aimed at candidates who:

- wish for career progression within engineering
- wish to develop the skills learnt from other qualifications

It is expected that candidates should have sufficient levels of numeracy and literacy to be able to satisfactorily complete the course of study.

1.1 Qualification structure

This qualification can be obtained by completing 3 units. Learners must complete unit 101 (mandatory) plus any additional two units of their choice (102-116). The total credit value to achieve this qualification is 21 credits

<table>
<thead>
<tr>
<th>UAN</th>
<th>City &amp; Guilds unit number</th>
<th>Unit title</th>
<th>Mandatory/optional for full qualification</th>
<th>Credit value</th>
</tr>
</thead>
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<td>Y/503/0141</td>
<td>2850-101</td>
<td>Working in engineering</td>
<td>M</td>
<td>7</td>
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<tr>
<td>D/503/0142</td>
<td>2850-102</td>
<td>Carrying out basic fitting techniques</td>
<td>O</td>
<td>7</td>
</tr>
<tr>
<td>H/503/0143</td>
<td>2850-103</td>
<td>Carrying out basic milling techniques</td>
<td>O</td>
<td>7</td>
</tr>
<tr>
<td>K/503/0144</td>
<td>2850-104</td>
<td>Carrying out basic turning techniques</td>
<td>O</td>
<td>7</td>
</tr>
<tr>
<td>A/503/0147</td>
<td>2850-105</td>
<td>Carrying out mechanical assembly</td>
<td>O</td>
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<tr>
<td>F/503/0151</td>
<td>2850-106</td>
<td>Carrying out electronics assembly</td>
<td>O</td>
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<tr>
<td>UAN</td>
<td>City &amp; Guilds unit number</td>
<td>Unit title</td>
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<td>Credit value</td>
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<tr>
<td>L/503/0153</td>
<td>2850-107</td>
<td>Carrying out electrical assembly</td>
<td>O</td>
<td>7</td>
</tr>
<tr>
<td>R/503/0154</td>
<td>2850-108</td>
<td>Working with sheet metals</td>
<td>O</td>
<td>7</td>
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<tr>
<td>H/503/0157</td>
<td>2850-109</td>
<td>Carrying out manual arc welding techniques</td>
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<td>7</td>
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<tr>
<td>Y/503/0169</td>
<td>2850-110</td>
<td>Carrying out MIG welding processes</td>
<td>O</td>
<td>7</td>
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<tr>
<td>L/503/0170</td>
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<tr>
<td>R/503/0171</td>
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<td>O</td>
<td>7</td>
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<tr>
<td>A/503/0164</td>
<td>2850-114</td>
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### 1.2 Opportunities for progression

These are a platform for progression to other City & Guilds qualifications, 2850 Level 2 Certificate in Engineering.

On completion of this qualification candidates may progress into employment or to the following City & Guilds qualifications:
- Level 2 Certificate in Engineering (2850)

### 1.3 Qualification support materials

City & Guilds also provides the following publications and resources specifically for this qualification:

<table>
<thead>
<tr>
<th>Description</th>
<th>How to access</th>
</tr>
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<tbody>
<tr>
<td>Assignment guide for centres</td>
<td><a href="http://www.cityandguilds.com">www.cityandguilds.com</a></td>
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<tr>
<td>Assignments (102 to 116)</td>
<td><a href="http://www.cityandguilds.com">www.cityandguilds.com</a> (password protected)</td>
</tr>
<tr>
<td>SmartScreen</td>
<td><a href="http://www.smartscreen.co.uk">www.smartscreen.co.uk</a></td>
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</table>
2 Course design and delivery

Tutors/assessors should familiarise themselves with the structure and content of the award before designing an appropriate course.

City & Guilds does not itself provide courses of instruction or specify entry requirements. As long as the requirements for the award are met, tutors/assessors may design courses of study in any way that they feel best meets the needs and capabilities of the candidates. Centres may wish to introduce other topics as part of the programme which will not be assessed through the qualifications, e.g. to meet local needs.

It is recommended that centres cover the following in the delivery of the course, where appropriate:

- Health and safety considerations, in particular the need to impress to candidates that they must preserve the health and safety of others as well as themselves
- Key Skills (such as Communication, Application of Number, Information technology, Working with others, Improving own learning and performance, Problem solving)
- Equal opportunities
- Spiritual, moral, social and cultural issues
- Environmental education, related European issues.

Access to assessment

City & Guilds’ guidance and regulations on access to assessment are designed to facilitate access for assessments and qualifications for candidates who are eligible for adjustments to assessment arrangements. Access arrangements are designed to allow attainment to be demonstrated. For further information, please see Access to assessment and qualifications, available on the City & Guilds website.

2.1 Initial assessment and induction

Centres will need to make an initial assessment of each candidate prior to the start of their programme to ensure they are entered for an appropriate type and level of qualification.

The initial assessment should identify:

- any specific training needs the candidate has, and the support and guidance they may require when working towards their qualification. This is sometimes referred to as diagnostic testing.
- any units the candidate has already completed, or credit they have accumulated which is relevant to the qualification they are about to begin.

City & Guilds recommends that centres provide an induction programme to ensure the candidate fully understands the requirements of the qualification they will work towards, their responsibilities as a candidate, and the responsibilities of the centre. It may be helpful to record the information on a learning contract.

2.2 Recommended delivery strategies

Centre staff should familiarise themselves with the structure, content and assessment requirements of the qualification before designing a course programme.
Centres may design course programmes of study in any way which:
- best meets the needs and capabilities of their candidates
- satisfies the requirements of the qualification.

When designing and delivering the course programme, centres might wish to incorporate other teaching and learning that is not assessed as part of the qualification. This might include the following:
- literacy, language and/or numeracy
- personal learning and thinking
- personal and social development
- employability

Where applicable, this could involve enabling the candidate to access relevant qualifications covering these skills.

<table>
<thead>
<tr>
<th>Resource</th>
<th>How to access</th>
</tr>
</thead>
<tbody>
<tr>
<td>SmartScreen</td>
<td><a href="http://www.smartscreen.co.uk">www.smartscreen.co.uk</a></td>
</tr>
<tr>
<td>Downloadable assignments</td>
<td><a href="http://www.cityandguilds.com">www.cityandguilds.com</a></td>
</tr>
</tbody>
</table>
3  Assessment

The mandatory core unit 101 – Working in engineering is assessed by an online multiple-choice assessment. All other units are assessed by an assignment which contains practical and knowledge tasks.

Assignments (one per unit) assess practical activities. City & Guilds provides an assignment for assessors which contains all information required.

As assignments are designed to sample practical activities, it is essential that the centres ensure that candidates cover the content of the whole unit.

Assessment components are graded (Pass, Merit, Distinction). A pass is the achievement level required for the knowledge and understanding and generally represents the ability to follow instructions and procedures. Merit and distinction represent increasing levels of ability to adapt to changing circumstances and to independently resolve problems.

3.1  Summary of assessment methods

For this qualification, candidates will be required to complete the following assessments:
- one online multiple-choice assessment for the mandatory unit
- one assignment for each chosen optional unit which contains practical and knowledge tasks.
4 Units
Unit 101  Working in engineering

Level: 1  
Credit value: 7  
UAN number: Y/503/0141

Unit aim
This unit will encourage candidates to find out about working in engineering. It covers the basic skills and knowledge needed to enter engineering or manufacturing sectors.

This will cover the need to recognise and use safe working practices, consideration of the environment and working effectively as a part of a team. It includes the basic materials that engineers use in their everyday work as well as the information technology that is used.

Learning outcomes
There are six learning outcomes to this unit. The learner will:
1. know safe working practices
2. know the engineering environment
3. understand the importance of maintaining working relationships
4. know the sectors within engineering
5. know key engineering materials
6. know basic engineering information technology requirements

Guided learning hours
It is recommended that 60 hours should be allocated for this unit, although patterns of delivery are likely to vary.

Assessment
This unit will be assessed by an online multiple-choice assessment.
Unit 101  Working in engineering
Outcome 1. know safe working practices

Assessment Criteria
The learner can:
1. state the basic safety legislation that applies in a workshop
2. state the employers and employees responsibility towards safety
3. state health and safety emergency procedures
4. state essential operator and bystander safety requirements
5. Identify health and safety signs that are used in an engineering/manufacturing workshop
6. state first aid procedures
7. state the procedures to be followed in the event of the sounding of an emergency alarm
8. define the fire triangle model
9. name types of fire extinguishers and state their application
10. state sources of health and safety information
11. state how to act responsibly in the workshop
12. state the importance of good housekeeping methods
13. identify potential hazards in the workshop
14. state the steps for dealing with health and safety issues.

Range
Basic safety legislation: Health and Safety at Work etc. Act, Control of Substances Hazardous to Health Regulations, Personal Protective Equipment at Work Regulations
Employers and employees responsibility: Health and Safety at Work etc. Act, Control of Substances Hazardous to Health Regulations, Personal Protective Equipment at Work Regulations
Emergency procedures: fire alarm, fire drill
Safety requirements: Personal Protective Equipment (PPE), screening
Health and safety signs: warning, information, mandatory, prohibition, fire
First aid: location of facilities, requirements of qualified first aiders
Sounding of an emergency alarm: evacuation, escape routes, assembly points
Fire extinguishers: water, foam, powder, CO₂ gas, fire blankets
Health and safety information: sources of information: booklets/leaflets, posters, supervisors/managers, trade unions, Internet
Act responsibly: walking not running, proper behaviour, correct dress, follow instructions
Good housekeeping: tidy work areas, removal of waste, storage of materials, tools and equipment, maintaining access and egress: walkways, emergency exits, fire doors
Potential hazards: working at heights, slippery surfaces or spillages, uneven surfaces, waste material, flammable materials, faulty or missing machine guards, faulty, material handling or transportation, noise
Health and safety issues: reporting, lines of reporting, responsibilities, follow up actions

Additional Guidance
Fire triangle model: fuel, oxygen, source of ignition
Unit 101  Working in engineering
Outcome 2.  know the engineering environment

Assessment Criteria
The learner can:
1. state the benefits of different sources of energy and resources
2. state the impact on the environment from different methods of waste disposal
3. state the importance of working with colleagues to improve work practices
4. state the benefits gained from working in an environmentally responsible manner.

Range
Energy and resources: energy: carbon fuels (coal, gas, oil, diesel, petrol), electricity, water, wind, compressed air, steam, nuclear, solar; resources: human, water, materials, equipment, time
Waste disposal: recycling, landfill, incineration
Working in an environmentally responsible manner: environmental impact, preservation of resources, cost, energy savings, efficiency.
Unit 101  Working in engineering
Outcome 3. understand the importance of maintaining working relationships

Assessment Criteria
The learner can:
1. state the roles and responsibilities within an organisation structure chart for a workplace
2. state the communication systems used in the workplace
3. describe how to seek assistance to clarify instructions
4. describe when to approach a supervisor, trainer or colleague when experiencing difficulties with a task
5. state expectations with regard to conduct in the workplace
6. state the importance of maintaining good customer relationships.

Range
Communication systems: verbal, written, drawings, electronic, signs, charts
How to seek assistance: approach a supervisor, trainer or colleague
When to approach: when needing clarification of instructions, when experiencing difficulties with a task,
Conduct in the workplace: walking not running, proper behaviour, correct dress, follow instructions.
Unit 101 Working in engineering
Outcome 4. know the sectors within engineering

Assessment Criteria
The learner can:
1. state the different sectors of engineering
2. name products and services associated with the different engineering sectors

Range
Sectors of engineering: maintenance/installation, manufacture/processing mechanical, electrical, electronic, chemical, energy generation and distribution, automotive engineering, aerospace, nuclear engineering, medical engineering, civil engineering, marine engineering, telecommunications
Unit 101  Working in engineering
Outcome 5.  know key engineering materials

Assessment Criteria
The learner can:
1. classify engineering materials
2. Identify forms of supply of materials
3. Identify materials by their physical properties
4. state the applications of key engineering materials.

Range
Classify engineering materials: metals (ferrous, non-ferrous), plastics, ceramics, composites, wood, rubber
Forms of supply: bar and section, sheet, wire, plate, castings and mouldings, forgings, extrusions, tube/pipe
Materials: colour, density, simple workshop tests – eg magnetism, spark tests
Applications: metals (ferrous, non-ferrous), plastics, ceramics, composites, wood, rubber
Unit 101 Working in engineering  
Outcome 6. know basic engineering information technology requirements

Assessment Criteria  
The learner can:
1. identify the **hardware requirements** of a computer system  
2. state how to **check** that equipment is safe for use and correctly set up  
3. state the **health and safety requirements** relating to the use of workstations and VDU equipment  
4. define the need for safe file **storage**  
5. state the importance of making and keeping back-up copies  
6. state the need for **good housekeeping**.

Range  
**Hardware requirements:** CPU, monitor, keyboard, mouse, printer, scanner  
**Check:** visual off-load checks  
**Health and safety requirements:** lighting, seating, sitting and positioning of equipment, dangers of trailing leads, safe and tidy work area, screen filters  
**Good housekeeping:** organisation of files into folders, closing down equipment correctly.

Additional Guidance  
**Storage:** may include - paper, storage media: hard disk drive, CD ROM, DVD ROM, USB removable storage, the Internet
Unit 102  Carrying out basic fitting techniques

Level: 1  
Credit value: 7  
UAN number: D/503/0142

Unit aim  
This unit will introduce candidates to the safe use of hand tools and fitting activities that are required in the engineering and manufacturing sectors. It covers the basic skills and knowledge needed to produce components for assembly using appropriate tools, materials and checking techniques to achieve the required sizes and specifications, whilst complying with health and safety legislation and regulations.

Learning outcomes  
There are three learning outcomes to this unit. The learner will:
1. be able to prepare for fitting activities
2. be able to use simple fitting techniques to produce components
3. be able to check components for correct size

Guided learning hours  
It is recommended that 60 hours should be allocated for this unit, although patterns of delivery are likely to vary.

Assessment  
This unit will be assessed by an assignment which contains practical and knowledge tasks.
Unit 102 Carrying out basic fitting techniques

Outcome 1
be able to be able to prepare for fitting activities

Assessment Criteria
The learner can:
1. state the key health and safety requirements that apply to fitting
2. read and interpret basic engineering drawings/sketches
3. produce a sequence of operations
4. identify and check marking out equipment
5. identify types of work and tool holding devices
6. use methods of marking out
7. use work datums.

Range
Health and safety requirements: emergency stop procedures, Personal Protective Equipment (PPE) applicable to fitting, employers' and employees' duties, barrier cream, manual handling, handling sharp tools, entanglement with revolving parts, safe methods of removal of swarf (continuous chip), coolant (soluble oil, compounds), use of guards (fixed, adjustable, interlocking), safety signs
Engineering drawings/sketches: isometric, oblique, first angle projection, third angle projection
Marking out equipment: rules, scribe, scribing block, engineer's square, dividers, dot and centre punches, odd-leg callipers
Marking out: straight and parallel lines, angles, arcs and circles
Work and tool holding devices: bench vice, machine vice, hand vice, direct clamping, vee blocks
Work datum: face, centre, corner, edge.
Unit 102  
Outcome 2  
Carrying out basic fitting techniques  
be able to be able to use simple fitting techniques to produce components

Assessment Criteria  
The learner can:  
1. use hand tools safely to produce simple components  
2. produce simple forms using fitting techniques  
3. select drilling machines and prepare for drilling operation  
4. state how spindle speeds for specific diameters are obtained from charts and graphs  
5. produce internal and external threads  
6. operate the drilling machine safely  
7. check components are within limits  
8. restore the work area using the correct procedures for the disposal of waste.

Range  
Hand tools: files (sizes, forms, cuts, applications), chisels (types, applications), saws (types, size of blades), hammers and mallets  
Forms: flat faces, parallel faces, square faces, steps/shoulders, angled faces, drilled holes, radii  
Drilling machines: types, applications, bits (parallel, taper shank), reamers  
Internal and external threads: stocks and dies, taps and tap wrenches  
Correct procedure for disposal of waste to include: ferrous metals, non-ferrous metals, cloths, paper, coolant

Additional Guidance  
Spindle speeds: revolutions per minute  
Restore the work area: tools and equipment returned to stores, swarf removal, clean machines and work area, method of holding taps and dies
Unit 102  Carrying out basic fitting techniques
Outcome 3  be able to check components for correct size

Assessment Criteria
The learner can:
1. use measuring equipment to check components are within the set tolerances
2. state the accuracy of the measuring equipment
3. record measurements taken against size requirements.

Range
Tolerances: ±0.5 mm / ±2°, fits (clearance, interference)
Measuring equipment: rule, outside callipers, digital vernier callipers/protractor/height gauge, engineers’ square
Unit 103  Carrying out basic milling techniques

Level: 1
Credit value: 7
UAN number: H/503/0143

Unit aim
This unit is concerned with the underlying process in setting and operating a milling machine, following safe working practices and checking simple components for size.
The candidate will be able select the required Personal Protective Equipment and state the requirements for safe operation of the equipment.
They will be able to select the appropriate speeds and tools to achieve the desired outcome and recognise and use the appropriate items of measuring equipment to achieve the desired outcome.

Learning outcomes
There are three learning outcomes to this unit. The learner will:
1. be able to prepare for milling activities
2. be able to use a milling machine to produce simple components
3. be able to check milled components for correct size

Guided learning hours
It is recommended that 60 hours should be allocated for this unit, although patterns of delivery are likely to vary.

Assessment
This unit will be assessed by an assignment which contains practical and knowledge tasks.
Unit 103 Carrying out basic milling techniques

Outcome 1 be able to be able to prepare for milling activities

Assessment Criteria
The learner can:
1. state key health and safety requirements that apply to milling
2. identify individual machine parts, their location and state their function
3. identify types of cutting tools and state their function
4. identify the method of mounting cutters, their position and state the benefits of each
5. identify types of work and tool holding devices and state their function
6. use work datums.

Range
Health and safety requirements: emergency stop procedures, Personal Protective Equipment (PPE) applicable to milling, employers' and employees' duties, barrier cream, lifting heavy vices, handling sharp cutting tools, entanglement with revolving parts, safe methods of removal of swarf (continuous chip), coolant (soluble oil, compounds), use of guards (fixed, adjustable, interlocking)

Machine parts: vertical, horizontal and universal milling machines

Types of cutting tools: side and face cutters, slab/cylindrical cutters, slotting cutters, slitting saws, form cutters, end mills, slot drills

Mounting cutters: arbour, chucks (auto lock, jacobs), pull collets

Work and tool holding devices: machine vice (fixed jaw, swivel and universal), direct clamping, vee blocks

Work datum: face, centre, corner, edge
Unit 103  
Outcome 2  
Carrying out basic milling techniques
be able to be able to use a milling machine to produce simple components

Assessment Criteria
The learner can:
1. apply methods of tool setting for milling
2. secure work for milling
3. indicate how spindle speeds for specific diameters are obtained from charts and graphs
4. name types of material
5. operate the lathe safely to shape material to form simple components within dimensional tolerances
6. identify measuring equipment
7. operate equipment safely
8. restore the work area using the correct procedures for the disposal of waste.

Range
Material: high speed steel for cutting tools, material being cut (bright mild steel, aluminium alloy, brass)
Shape: flat faces, parallel faces, square faces, steps/shoulders, open-ended slots, angled faces, drilled holes
Measuring equipment: rule, outside callipers, digital vernier callipers/protractor, engineer’s square
Correct procedure for disposal of waste to include: ferrous metals, non-ferrous metals, cloths, paper, coolant

Additional Guidance
Spindle speeds: revolutions per minute
Restore the work area: tools and equipment returned to stores, swarf removal, clean machine and work area
Unit 103  
Carrying out basic milling techniques

Outcome 3
be able to check milled components for correct size

Assessment Criteria
The learner can:
1. use measuring equipment to check components are within the set tolerances
2. state the accuracy of the measuring equipment
3. record measurements taken against size requirements.

Range
Tolerances: ±0.25 mm / ±1°, fits (clearance, interference)
Accuracy: rule, outside callipers, digital vernier callipers/protractor, engineer’s square
Unit 104  Carrying out basic turning techniques

Level: 1
Credit value: 7
UAN number: K/503/0144

Unit aim
This unit is concerned with the underlying process in setting and operating a centre lathe, following safe working practices and checking simple components for size. The candidate will be able select the required Personal Protective Equipment and state the requirements for safe operation of the equipment. They will be able to select the appropriate speeds and tools to achieve the desired outcome and be able to recognise and use the appropriate items of measuring equipment to achieve the desired outcome.

Learning outcomes
There are three learning outcomes to this unit. The learner will:
1. be able to prepare centre lathe for turning operations
2. be able to use the lathe to produce simple components
3. be able to check turned components for correct size

Guided learning hours
It is recommended that 60 hours should be allocated for this unit, although patterns of delivery are likely to vary.

Assessment
This unit will be assessed by an assignment which contains practical and knowledge tasks.
Unit 104  Carrying out basic turning techniques
Outcome 1  be able to prepare centre lathe for turning operations

Assessment Criteria
The learner can:
1. state the key health and safety requirements that apply to turning
2. identify individual lathe parts and their location
3. state the function of lathe parts
4. identify types of lathe tool, drill, tap and die
5. identify type of work and tool holding devices
6. identify different types of self centring chucks and state how they are mounted and their function.

Range
Health and safety requirements: emergency stop procedures, Personal Protective Equipment (PPE) applicable to turning, employers' and employees' duties, barrier cream, lifting heavy chucks onto the lathe without damaging the bed, handling sharp cutting tools, entanglement with revolving parts, safe methods of removal of swarf (continuous chip), coolant (soluble oil, compounds), use of guards
Lathe parts: headstock (all geared, spindle, speed selection), tailstock (barrel, Morse taper), bed, carriage (saddle, cross slide, compound slide, tool post [quick change]), apron (hand feed wheel), stop and start, coolant system (pump, tank, control valve)
Function of lathe parts: tailstock, saddle, cross slide, compound slide, tool post, apron, determination of spindle speeds (use of: graph, charts)
Types of lathe tool, drill, tap and die: tools (facing, knife, undercut, knurling, form [chamfer]), drills (centre, jobber [parallel shank], taps (taper, intermediate [second], plug), dies (slip), thread metric
Work and tool holding devices: three jaw self centring chuck, revolving centre, quick change tool post, Jacobs chuck
Unit 104  
Carrying out basic turning techniques
Outcome 2  
be able to be able to use the lathe to produce simple components

Assessment Criteria
The learner can:
1. use methods of setting cutting tools on centre
2. secure work in three jaw self centring chuck
3. indicate how spindle speeds for specific diameters are obtained from charts and graphs
4. identify types of material
5. operate the lathe safely to shape material to form simple components within dimensional tolerances
6. identify measuring equipment
7. operate equipment safely
8. restore the work area using the correct procedures for the disposal of waste.

Range
Setting cutting tools: overhang, method of centring (tailstock centre, gauge, facing, rule between work and tool)
Material: high speed steel for cutting tools, material being cut (bright mild steel, aluminium alloy, brass)
Shape: face ends, centre drill, drill and tap holes, generate and form surfaces, undercut, die threads
Measuring equipment: rules, callipers, outside, inside, digital vernier.
Correct procedure for disposal of waste: ferrous metals, non-ferrous metals, cloths, paper, coolant

Additional Guidance
Spindle speeds: revolutions per minute
Restore the work area: tools and equipment returned to stores, clean machine and work area, remove and dispose of swarf and coolant correctly
Unit 104  
Outcome 3  
**Carrying out basic turning techniques**
be able to check turned components for correct size

**Assessment Criteria**
The learner can:
1. use measuring equipment to check components are within the set **tolerances**
2. state the accuracy of the **measuring equipment**
3. record measurements taken against size requirements.

**Range**
**Tolerances:** ±0.25 mm
**Measuring equipment:** rule, outside callipers, digital vernier callipers
Unit 105  Carrying out mechanical assembly

Level: 1
Credit value: 7
UAN number: A/503/0147

Unit aim
This unit will introduce candidates to mechanical assemblies that are required in the engineering and manufacturing sectors. It will cover the skills and knowledge needed to carry out simple sub and final assemblies.

Candidates will be able to identify, select and check appropriate tools and interpret simple assembly drawings. It also covers compliance with relevant health and safety regulations.

Learning outcomes
There are two outcomes to this unit. The candidate will:
1. be able to plan and prepare for mechanical assembly
2. be able to apply techniques for the purpose of mechanical assembly

Guided learning hours
It is recommended that 60 hours should be allocated for this unit, although patterns of delivery are likely to vary.

Assessment
This unit will be assessed by an assignment which contains practical and knowledge tasks.
Unit 105  Carrying out mechanical assembly
Outcome 1  be able to be able to plan and prepare for mechanical assembly

Assessment Criteria
The learner can:
1. prepare the work area prior to assembly operations
2. use Personal Protective Equipment (PPE) appropriate to the various stages of the coating process
3. use safe procedures to prevent injury to skin
4. state the need to comply with Manual Handling Regulations
5. identify and interpret information on drawings
6. identify types, sizes and shapes of tools/equipment used for assembling mechanical components
7. refer to charts for information
8. state the procedures for preparing the work area.

Range
Information: drawings (orthographic, pictorial, sketching, assembly, exploded)
Tools/equipment: spanners (open ended, ring, socket), allen keys, screwdrivers, pliers, grips, hammers (ball pein, cross and straight pein), mallets (copper, hide, plastic), lifting equipment (levers, wedges, jacks, pulley blocks, trucks and skids)
Charts: seals and gaskets, lubrication and screw threads, etc.
Unit 105  
Carrying out mechanical assembly  
Outcome 2  
be able to be able to apply techniques for the purpose of mechanical assembly

Assessment Criteria
The learner can:
1. plan the sequence of operations
2. remove protective packaging and clean component parts before assembly
3. state the general rules for assembly
4. carry out component checks for assembly
5. state type, size, operation and application of digital measuring instruments
6. state types and effects of forces generated in assembly
7. identify types of fit and state their function
8. identify methods of sealing joints
9. identify methods of producing non-permanent joints
10. identify different types of locking devices and state their function
11. assemble component parts
12. check that the final assembly meets the specification
13. restore the work area using the correct procedures for the disposal of waste.

Range
Rules for assembly: cleanliness of component parts, tools and equipment, planning the sequence of operations before starting to assemble, drawings/specifications must be followed, use of appropriate tools, periodic checking with specifications
Checks: lengths, angles, hole sizes, threads
Measuring instruments: digital metric depth, inside and outside micrometer, digital metric vernier caliper and height gauge, metric feeler gauges, metric thread gauges, engineer's square
Effects of forces: effects of over-tightening, shear load on pins, tensile and compressive loads on component parts
Types of fit: clearance, interference
Sealing joints: tape, compounds
Non-permanent joints: nuts, bolts, studs, screws, pins and keys
Locking devices: lock nuts, fibre nuts, castle nuts, and split pins, spring and serrated washers
Specification: rotating parts are free, nuts and bolts are tight, freedom from leaks
Dispose of waste: Cloths, Paper/Card, Chemicals, Oils

Additional Guidance
Restore the work area: tools and equipment returned to stores, clean machine and work area
Unit 106  Carrying out electronics assembly

Level: 1
Credit value: 7
UAN number: F/503/0151

Unit aim
The unit is concerned with the processes and equipment essential to building and testing electronic circuits and includes the use of tools and equipment.

Learning outcomes
There are two learning outcomes to this unit. The learner will:
1. be able to prepare for building electronic circuits
2. be able to build electronic circuits

Guided learning hours
It is recommended that 60 hours should be allocated for this unit, although patterns of delivery are likely to vary.

Assessment
This unit will be assessed by an assignment which contains practical and knowledge tasks.
Unit 106  
Carrying out electronics assembly

Outcome 1  
be able to be able to prepare for building electronic circuits

Assessment Criteria
The learner can:
1. collect, read and interpret information
2. plan and prepare for electronic activities
3. state how to identify basic electronic components and list their values.

Range
Interpret information: circuit, block, layout and schematic diagrams, data sheets
Plan and prepare: appropriate tools and components from data sheets, catalogues
Electronic components: resistors, diodes, capacitors, inductors, transistors, light emitting diodes, switches and relays, fuses and circuit breakers.
**Unit 106**  
**Carrying out electronics assembly**  
**Outcome 2**  
be able to be able to build electronic circuits

**Assessment Criteria**
The learner can:
1. carry out **preparatory work** to assemble electronic circuits
2. prepare a list of **components** and tools required
3. check the **availability** of all tools and test equipment
4. **assemble and build** electronic circuits
5. **test electronic circuits**
6. prove **functionality** of built assembly
7. restore the **work area** using the correct procedures for the **disposal of waste**

**Range**

**Preparatory work**: Safety checks, establish work area and circuit to be assembled, diagrams, manufacturers catalogues, data sheets, protective personal equipment (PPE), prevention of damage, anti-static devices, isolating transformers and Residual-Current Devices RCD’s

**Components**:
Components as per designated circuit,
Tools: pliers, long nose pliers, drills.
Extraction and insertion tools: cable strippers, screwdrivers, soldering iron, desoldering wick, heatsink.

**Assemble and build**:
Electronic circuits of a build and energise type.
Bridge rectifier circuits, transistor switching circuits with light controls, etc.
Simple motorspeed/light dimmer control.

**Test electronic circuits**: Multimeters, oscilloscopes, signal generators, signal injectors

**Disposal of waste**: Identify materials requiring special disposal methods e.g. chemicals, sprays, flux.

**Additional Guidance**

**Check availability**: of components and source from alternatives if required. Safety checks on tools and components. Damaged components and tools. Electrical safety checks.

**Functionality**: Prove functionality and operation

**Restore the work area**: tools and equipment returned to stores, clean machine and work area
Unit 107  Carrying out electrical assembly

Level: 1  
Credit value: 7  
UAN number: L/503/0153

Unit aim  
The unit provides the basic knowledge required for learners to be able to read and interpret data from diagrams and data sheets. It will enable learners to identify basic electrical components and their use.

Learning outcomes  
There are three learning outcomes to this unit. The learner will:
1. be able to prepare for building electrical circuits
2. be able to build electrical circuits
3. be able to check completed circuits

Guided learning hours  
It is recommended that 60 hours should be allocated for this unit, although patterns of delivery are likely to vary.

Assessment  
This unit will be assessed by an assignment which contains practical and knowledge tasks.
Unit 107  Carrying out electrical assembly
Outcome 1  be able to prepare for building electrical circuits

Assessment Criteria
The learner can:
1. identify electrical components from information sources
2. plan and prepare for electrical assembly.

Range
Information sources: manufacturers catalogues, data sheets, specifications, circuit, wiring, block and schematic diagrams
Plan and prepare: Work plans, risk assessment, electrical components/accessories for domestic/commercial and industrial installation types, fixed wiring as per BS 7671, flexible cords, fixings or solid and hollow surfaces, fuses, circuit breakers, control gear, containment systems, conduit, trunking, tray, basket, radial and ring final circuits, principles of earthing and bonding, circuit diagrams for one and two way lighting circuits, radial and ring final circuits.
The learner can:
1. prepare a list of required **tools**
2. prepare a **requisition** of required cables, accessories and fittings
3. carry out **safety checks** on tools and work area
4. build a series of **electrical circuits**
5. **restore the work area** using the correct procedures for the **disposal of waste**

**Range**

**Tools:** Screwdrivers, pliers, side cutters, spanners, hammers, conduit dies, battery and mains drills, rivet tools, drill bits, hacksaws, tape measures, squares.

**Requisition:** To include: cables, accessories, fixings and fittings.

**Safety checks:** Carry out visual inspections to ensure that hand and power tools are safe to use, for signs of damage, check area is safe.

**Electrical circuits:**
- Mark out circuits.
- Construct lighting and power circuits using a range of cables and containment systems, conduit, trunking and PVC flat multicore cables.
- Connect components.

**Disposal of waste:** Identify items to be recycled and returned to store and those for disposal.

**Additional Guidance**

**Restore work area:** leave the work area free of unused consumables, clean the work area, put tools and equipment into safe storage, identify and record finished work.
Unit 107  Carrying out electrical assembly
Outcome 3  be able to check completed circuits
Outcome 3  be able to check completed circuits

Assessment Criteria
The learner can:
1. carry out checks to ensure that the completed circuit meets appropriate regulations and operational requirements
2. prove installation dead by approved methods.

Range
Checks: Visual inspection, dead tests, continuity of protective conductors, ring final circuit, insulation resistance, polarity, functional tests.
Unit 108 Working with sheet metals

Level: 1
Credit value: 7
UAN number: R/503/0154

Unit aim
This unit is concerned with the processes and technology associated with working with sheet metal to make simple assemblies. It covers a range of cutting, forming and joining techniques that are used in sheet metal working.

Candidates will be able to identify appropriate tools and methods of working for the desired result. The health and safety requirements common to the use of this process are also covered.

Learning outcomes
There are three outcomes to this unit. The candidate will:
1. be able to prepare sheet metal work equipment, tools and materials
2. be able to use equipment and tools for metal work forming operations
3. be able to produce fabrications using sheet metalwork assembly techniques

Guided learning hours
It is recommended that 60 hours should be allocated for this unit, although patterns of delivery are likely to vary.

Assessment
This unit will be assessed by an assignment which contains practical and knowledge tasks.
Unit 108  Working with sheet metals
Outcome 1  be able to prepare sheet metal work equipment, tools and materials

Assessment Criteria
The learner can:
1. state the **health and safety measures** in the workplace that relate to sheet metal fabrication
2. state the **fire hazards** associated with hot working
3. state the hazards from **electricity**
4. use simple methods of **marking out**
5. select Personal Protective Equipment (PPE)
6. use sheet metalwork **cutting equipment** to produce simple shapes
7. use sheet metalwork **cutting tools** to produce simple shapes
8. use safe working practices
9. identify health and safety hazards.

Range
**Health and safety measures:** Personal Protective Equipment (PPE) (application to sheet metal working processes, employers’ duties, employees’ duties, function of items of Personal Protective Equipment)

**Fire hazards:** sources of combustion, burns, hot metal (identification of hazard ['HOT’ and date and time], use of tools tongs for moving and manipulation, use of PPE)

**Electricity:** shock, fire, burns, methods of avoiding shock hazards

**Marking out:** use of datum line, edge, centre point,

**Cutting equipment:** drills, rotary shears, nibblers (shear type, punch type), guillotines (treadle, mechanical, back stops, front stops), fly press, portable angle grinders/sanders

**Cutting tools:** hand shears (straight, left hand, right hand), bench shears (hand lever), tin man's hand-level punch.
Unit 108  
Outcome 2  
Working with sheet metals  
be able to be able to use equipment and tools for metal work forming operations

Assessment Criteria
The learner can:
1. use sheet metalwork fabrication **forming tools**
2. use sheet metalwork fabrication **forming equipment**
3. use techniques to produce **simple forms**
4. **restore the work area** using the correct procedures for the disposal of waste.

**Range**
**Forming tools:** hammers (types), planishing hammers, mallets (types), wooden blocks, range of bench stakes
**Forming equipment:** jennys (stiffening techniques, swaging, beading), rolling machines (pyramid type, pinch type, slip rolls, hand-operated), folding machines (box and pan, universal swing-beam), fly press (tooling, dies, forming tools)
**Simple forms:** square, rectangular, cylindrical, boxed.

Additional Guidance
**Restore the work area:** tools and equipment returned to stores, clean machine and work area
Unit 108 Working with sheet metals
Outcome 3 be able to be able to produce fabrications using sheet metalwork assembly techniques

Assessment Criteria
The learner can:
1. use simple methods of fabrication assembly
2. assemble simple non self-secured joints
3. assemble simple self-secured joints
4. use mechanical joining methods
5. use soft soldering techniques
6. use the resistance spot welding process
7. state the need for good housekeeping in the workplace
8. use equipment safely
9. produce sheet metalwork assembly
10. restore the work area using the correct procedures for the disposal of waste.

Range
Fabrication assembly: holding methods, clamping
Non self-secured joints: lap, corner, butt, tee, flanged butt, lock seem
Self-secured joints: grooved seam, panned down
Mechanical joining methods: hollow/solid riveting, threaded fastenings
Soft soldering: preparing the joint, cleaning the joint, types of soft solder, types of fluxes, types of soldering iron, heat sources (electrical, flame)
Spot welding: fixed and staticl, portable

Additional Guidance
Restore the work area: tools and equipment returned to stores, clean machine and work area, remove waste materials and reuse/recycle correctly
Unit 109  Carrying out manual arc welding techniques

Level: 1
Credit value: 7
UAN number: H/503/0157

Unit aim
This unit is concerned with the underlying process technology associated with manual metal arc (MMA) welding at low carbon steel. It covers a range of joints and simple welding positions used in industry that reflect the level of the qualification.
The candidate will be able to select the appropriate tools and working methods to achieve the desired outcome.
The candidate will be able to state the risks involved in MMA welding and how to mitigate them.

Learning outcomes
There are three outcomes to this unit. The candidate will:
1. be able to prepare manual metal arc welding equipment and tools for safe use
2. know how to use equipment safely for manual metal arc welding low carbon steel
3. be able to produce welded joints safely using manual metal arc welding.

Guided learning hours
It is recommended that 60 hours should be allocated for this unit, although patterns of delivery are likely to vary.

Assessment
This unit will be assessed by an assignment which contains practical and knowledge tasks.
Unit 109  Carrying out manual arc welding techniques
Outcome 1  be able to prepare manual metal arc welding equipment and tools for safe use

Assessment Criteria
The learner can:
1. state the health and safety measures in the workplace that relate to welding process
2. state the methods of avoiding and removing welding fumes
3. state the methods of avoiding hazards associated with the process
4. state hazards commonly encountered in the welding environment
5. select Personal Protective Equipment (PPE) for manual metal arc (MMA) welding
6. follow safe working practices.

Range
Health and safety measures: Personal Protective Equipment (PPE) (application to welding process, employers’ duties, employees’ duties, function of items of Personal Protective Equipment [headshield, filter lens, cover lens, gauntlets, protective footwear, eye protection, flame retardant overalls])
Welding fumes: use of extraction, natural ventilation (e.g. On-site), air-fed headshields, respirator
Hazard: fire (sources of combustion, burns), electric shock (shock hazards, welding lead, welding return, welding earth, insulation), arc radiation (visible light, infra-red, ultra-violet), arc-eye, glare, methods of avoiding (Personal Protective Equipment, screening), hot metal/slag (identification of hazard ['HOT' and date and time], use of tools tongs for moving and manipulation, use of PPE)
Unit 109  Carrying out manual arc welding techniques
Outcome 2  know how to use equipment safely for manual metal arc welding low carbon steel

**Assessment Criteria**
The learner can:
1. identify manual metal arc (MMA) welding equipment and state its function
2. state the safe use of equipment used for preparing and finishing materials and welded joints
3. state common types of consumable electrodes
4. state the types of welding current
5. identify electrode sizes
6. relate welding current for flat and horizontal/vertical welding to electrode sizes
7. define welding practices
8. identify the types of joint
9. define the welding positions as they relate to current standards
10. state the appropriate assembly and distortion control methods
11. state the post welding cleaning activities
12. state the need for good housekeeping in the workplace.

**Range**
**Welding equipment:** alternating current (a.c.), direct current (d.c.), welding leads (welding, return, earth), electrode holders, return clamps
**Equipment:** angle grinders, finishers, files, chipping hammer, wire brushes, hammer and chisel
**Electrodes:** rutile, basic, cellulosic
**Welding current:** alternating (a.c.), direct (d.c.) (electrode positive, electrode negative)
**Electrode sizes:** ø2.5 mm, ø3.2 mm, ø4.0 mm
**Welding practices:** arc striking, crater filling at the end of a weld, stop/restart, stringer beading, weaving
**Types of joint:** butt, lap, tee, corner
**Welding positions:** flat, horizontal/vertical
**Assembly and distortion control methods:** clamping, alignment jigs, run on/off plates, tack welds
**Cleaning activities:** slag removal, spatter removal, wiring brushing, removal of excess weld metal where required, checking welds for signs of defects
**Housekeeping:** leave the work area free of unused consumables, clean the work area, put tools and equipment into safe storage, identify and record finished work.
Unit 109  Carrying out manual arc welding techniques
Outcome 3  be able to produce welded joints safely using manual metal arc welding.

Assessment Criteria
The learner can:
1. use equipment for a welding operation safely
2. produce sufficient tack welded joints to enable welding
3. produce fillet welded joints in 3 to 6 mm thick low carbon steel safely in welding positions
4. use low carbon steel for a welding operation
5. use welding consumables safely
6. carry out weld cleaning and checking safely
7. restore work area using the correct procedure for the disposal of waste.

Range
Joints: lap, tee, corner
Welding positions: flat, horizontal/vertical
Welding operation: arc striking, crater filling at the end of a weld, stop/restart, stringer beading, weaving
Weld cleaning and checking: slag removal, spatter removal, wiring brushing, removal of excess weld metal where required, checking welds for signs of defects

Additional Guidance
Restore work area: leave the work area free of unused consumables, clean the work area, put tools and equipment into safe storage, identify and record finished work.
Unit 110  Carrying out MIG welding processes

Level: 1  
Credit value: 7  
UAN number: Y/503/0169

Unit aim
This unit is concerned with the underlying process technology associated with Metal Inert Gas (MIG) welding at low carbon steel. It covers a range of joints and simple welding positions used in industry that reflect the level of the qualification.
The candidate will be able to select the appropriate tools and working methods to achieve the desired outcome.
The candidate will be able to state the risks involved in MIG welding and how to mitigate them.

Learning outcomes
There are three outcomes to this unit. The candidate will:
1. know how to prepare MIG welding equipment and tools for safe use
2. know how to use equipment safely for MIG welding low carbon steel
3. be able to produce welded joints safely using MIG welding.

Guided learning hours
It is recommended that 60 hours should be allocated for this unit, although patterns of delivery are likely to vary.

Assessment
This unit will be assessed by an assignment which contains practical and knowledge tasks.
Unit 110 Carrying out MIG welding processes
Outcome 1 know how to prepare MIG welding equipment and tools for safe use

Assessment Criteria
The learner can:
1. state the health and safety measures in the workplace that relate to the welding process
2. state the methods of avoiding and removing welding fumes
3. state the methods of avoiding hazards associated with the process
4. identify hazards commonly encountered in the welding environment
5. define safe working practices.

Range
Health and safety measures: Personal Protective Equipment (PPE) (application to welding process, employers’ duties, employees’ duties, function of items of Personal Protective Equipment [headshield, filter lens, cover lens, gauntlets, protective footwear, eye protection, flame retardant overalls])

Welding fumes: use of extraction, natural ventilation (e.g. On-site), air-fed headshields, respirator

Hazards: fire (sources of combustion, burns), electric shock (shock hazards, welding lead, welding return, welding earth, insulation), arc radiation (visible light, infra-red, ultra-violet), arc-eye, glare, methods of avoiding (Personal Protective Equipment, screening), hot metal (identification of hazard ['HOT' and date and time], use of tools tongs for moving and manipulation.
Unit 110  
Carrying out MIG welding processes  
know how to use equipment safely for MIG welding low carbon steel

Assessment Criteria
The learner can:
1. identify MIG welding equipment
2. state the function of welding equipment
3. state the safe use of equipment used for preparing and finishing materials and welded joints
4. identify common types of shielding gases
5. state the type of welding current and polarity
6. identify electrode sizes
7. relate process variables to flat and horizontal/vertical welding of joints
8. define welding practices
9. identify the types of joint
10. state the welding positions as they relate to current standards
11. name the appropriate assembly and distortion control methods
12. state the post welding cleaning activities
13. state the need for good housekeeping in the workplace

Range
Welding equipment: direct current (d.c.) power source, welding leads (welding, return, earth), welding gun, wire feed unit, shielding gas supply return clamps  
Equipment: angle grinders, finishers, files, wire brushes, hammer and chisel
Shielding gases: argon/oxygen/carbon dioxide mixtures, carbon dioxide  
Welding current: direct (d.c.) Electrode positive
Electrode sizes: Ø0.8mm, Ø1.0 mm
Variables: voltage, wire feed speed, gas flow rate, inductance
Welding practices: arc striking, crater filling at the end of a weld, stop/restart, stringer beading, weaving
Types of joint: butt, lap, tee, corner
Welding positions: flat, horizontal/vertical
Assembly and distortion control methods: clamping, alignment jigs, run on/off plates, tack welds
Cleaning activities: spatter removal, wiring brushing, removal of excess weld metal where required, checking welds for signs of defects
Unit 110  Carrying out MIG welding processes
Outcome 3  be able to produce welded joints safely using MIG welding.

Assessment Criteria
The learner can:
1. use Personal Protective Equipment (PPE) effectively for MIG welding
2. use equipment for a welding operation safely
3. produce sufficient tack welded joints to enable welding
4. produce fillet welded joints in 3 to 6 mm thick low carbon steel safely in simple welding positions
5. use low carbon steel for a welding operation
6. use welding consumables safely
7. carry out weld cleaning and checking safely
8. restore work area using the correct procedure for the disposal of waste.

Range
Joints: lap, tee, corner
Welding positions: flat, horizontal/vertical
Welding operation: arc striking, crater filling at the end of a weld, stop/restart, stringer beading, weaving
Weld cleaning and checking: spatter removal, wire brushing, removal of excess weld metal where required, checking welds for signs of defects

Additional Guidance
Restore work area leave the work area free of unused consumables, clean the work area, put tools and equipment into safe storage, identify and record finished work.
Unit 111  Carrying out TIG welding processes

Level: 1  Credit value: 7  UAN number: L/503/0170

Unit aim
This unit is concerned with the underlying process technology associated with Tungsten Inert Gas (TIG) welding at low carbon steel. It covers a range of joints and simple welding positions used in industry that reflect the level of the qualification.
The candidate will be able to select the appropriate tools and working methods to achieve the desired outcome.
The candidate will be able to state the risks involved in TIG welding and how to mitigate them.

Learning outcomes
There are three outcomes to this unit. The candidate will:
1. know how to prepare TIG welding equipment and tools for safe use
2. be able to use equipment safely for TIG welding low carbon steel
3. be able to produce simple welded joints safely using TIG welding.

Guided learning hours
It is recommended that 60 hours should be allocated for this unit, although patterns of delivery are likely to vary.

Assessment
This unit will be assessed by an assignment which contains practical and knowledge tasks.
Unit 111  Carrying out TIG welding processes
Outcome 1 know how to prepare TIG welding equipment and tools for safe use

Assessment Criteria
The learner can:
1. state the health and safety measures in the workplace that relate to the welding process
2. state the methods of avoiding and removing welding fumes
3. state the methods of avoiding hazards associated with the process
4. identify hazards commonly encountered in the welding environment
5. define safe working practices.

Range
Health and safety measures: Personal Protective Equipment (PPE) (application to welding process, employers’ duties, employees’ duties, function of items of Personal Protective Equipment [headshield, filter lens, cover lens, gauntlets, protective footwear, eye protection, flame retardant overalls])
Welding fumes: use of extraction, natural ventilation (e.g. On-site), air-fed headshields, respirator
Hazards: fire (sources of combustion, burns), electric shock (shock hazards, welding lead, welding return, welding earth, insulation), arc radiation (visible light, infra-red, ultra-violet), arc-eye, glare, methods of avoiding (Personal Protective Equipment, screening), hot metal (identification of hazard [‘HOT’ and date and time], use of tools tongs for moving and manipulation
Unit 111  Carrying out TIG welding processes
Outcome 2  be able to use equipment safely for TIG welding low carbon steel

Assessment Criteria
The learner can:
1. identify TIG welding equipment
2. state the function of welding equipment
3. state the safe use of equipment used for preparing and finishing materials and welded joints
4. identify common shielding gas
5. state the type of welding current and polarity
6. identify electrode sizes
7. state tungsten electrode types
8. identify filler wire sizes
9. relate process variables to flat and horizontal/vertical welding of joints
10. state welding practices
11. identify the types of joint
12. name the welding positions as they relate to current standards
13. state the appropriate assembly and distortion control methods
14. list the post welding cleaning activities
15. state the need for good housekeeping in the workplace.

Range
Welding equipment: direct current (d.c.) power source, welding leads (welding, return, earth), welding torch, shielding gas supply return clamps
Equipment: angle grinders, linishers, files, wire brushes, hammer and chisel, shielding gas: argon
Welding current and polarity: direct (d.c.) Electrode negative
Electrode sizes: $0.6 \text{ mm}, \ 0.4 \text{ mm}$
Electrode types: thoriated, ceriated, lanthanated
Filler wire sizes: $0.6 \text{ mm}, \ 0.4 \text{ mm}$
Variables: welding current, gas flow rate
Welding practices: arc striking, crater filling at the end of a weld, stop/restart, stringer beading, weaving
Types of joint: butt, lap, tee, corner
Welding positions: flat, horizontal/vertical
Assembly and distortion control methods: clamping, alignment jigs, run on/off plates, tack welds
Cleaning activities: wiring brushing, removal of excess weld metal where required, checking welds for signs of defects
Unit 111  Carrying out TIG welding processes
Outcome 3 be able to produce simple welded joints safely using TIG welding.

Assessment Criteria
The learner can:
1. use Personal Protective Equipment (PPE) effectively for TIG welding
2. use equipment for a welding operation safely
3. produce sufficient tack welded joints to enable welding
4. produce fillet welded joints in 1.5 to 3 mm thick low carbon steel safely in simple welding positions
5. use low carbon steel for a welding operation
6. use welding consumables safely
7. carry out weld cleaning and checking safely
8. restore work area using the correct procedures for the disposal of waste.

Range
Joints: lap, tee, corner
Welding positions: flat, horizontal/vertical
Welding operation: arc striking, crater filling at the end of a weld, stop/restart, stringer beading, weaving
Weld cleaning and checking: wiring brushing, removal of excess weld metal where required, checking welds for signs of defects

Additional Guidance
Restore work area: leave the work area free of unused consumables, clean the work area, put tools and equipment into safe storage, identify and record finished work.
Unit 112  Carrying out OXY-Acetylene welding processes

Level: 1
Credit value: 7
UAN number: R/503/0171

Unit aim
This unit is concerned with the underlying process technology associated with oxy-acetylene (gas) welding at low carbon steel. It covers a range of joints and simple welding positions used in industry that reflect the level of the qualification.
The candidate will be able to select the appropriate tools and working methods to achieve the desired outcome.
The candidate will be able to state the risks involved in oxy-acetylene welding and how to mitigate them.

Learning outcomes
There are three outcomes to this unit. The candidate will:
1. know how to prepare oxy-acetylene welding equipment and tools for safe use
2. know how to use equipment safely for oxy-acetylene welding low carbon steel
3. be able to produce welded joints safely using oxy-acetylene welding.

Guided learning hours
It is recommended that 60 hours should be allocated for this unit, although patterns of delivery are likely to vary.

Assessment
This unit will be assessed by an assignment which contains practical and knowledge tasks.
Unit 112  Carrying out OXY-Acetylene welding processes

Outcome 1  know how to prepare oxy-acetylene welding equipment and tools for safe use

Assessment Criteria

The learner can:
1. state the **health and safety measures** in the workplace that relate to the welding process
2. state the methods of avoiding and removing **welding fumes**
3. state the methods of avoiding **hazards** associated with the process
4. state the safe start-up and shutdown procedures
5. state the procedure for dealing with a backfire
6. list the procedure for dealing with a flashback
7. state hazards commonly encountered in the welding environment
8. define safe working practices

Range

**Health and safety measures:** Personal Protective Equipment (PPE) (application to welding process, employers' duties, employees' duties, function of items of Personal Protective Equipment [goggles, filter lens, cover lens, gloves, protective footwear, eye protection, flame retardant overalls, leather apron])

**Welding fumes:** use of extraction, natural ventilation (e.g. on-site), respirator

**Hazards:** fire (sources of combustion, burns), glare, methods of avoiding (PPE, screening), hot metal (identification of hazard ['HOT' and date and time], use of tools tongs for moving and manipulation, use of PPE), hazards from compressed gas cylinders (safe storage conditions, safe handling/moving, safe use)
Unit 112  

Carrying out OXY-Acetylene welding processes  

Outcome 2  
know how to use equipment safely for oxy-acetylene welding low carbon steel  

Assessment Criteria  
The learner can:  
1. identify oxy-acetylene welding equipment  
2. state the function of welding equipment  
3. state the safe use of equipment used for preparing and finishing materials and welded joints  
4. identify filler rod sizes  
5. relate process variables to flat and horizontal/vertical welding of joints  
6. identify the neutral flame condition  
7. identify the gases used  
8. identify welding practices  
9. identify the types of joint  
10. state how the welding positions relate to current standards  
11. name the appropriate assembly and distortion control methods  
12. list the post welding cleaning activities  
13. state the need for good housekeeping in the workplace.  

Range  
Welding equipment: cylinders, pressure regulators, flashback arrestors, hoses, hose check-valves, hose connectors, blowpipe/torch, nozzles  
Function: cylinders (oxygen, acetylene, colour coding), pressure regulators, flashback arrestors, hoses, hose check-valves, blowpipe/torch, economisers, nozzles (sizes), use of left hand and right hand threaded connections (identification)  
Equipment: angle grinders, finishers, files, chipping hammer, wire brushes, hammer and chisel  
Filler rod sizes: Ø1.6mm, Ø2.4 mm  
Process variables: gas pressures, nozzle sizes, welding technique (leftward)  
Neutral flame: inner cone, outer envelope, hottest point of the flame, other conditions (oxidising, reducing/carburising)  
Gases: types (oxygen, acetylene, cylinder colour, hose colour, hazards associated with its use and how to avoid them)  
Welding practices: flame ignition and setting, crater filling at the end of a weld, stop/restart, stringer beading, weaving  
Types of joint: butt, lap, tee, corner  
Welding positions: flat, horizontal/vertical  
Assembly and distortion control methods: clamping, alignment jigs, run on/off plates, tack welds, types of distortion (longitudinal contraction, transverse contraction, angular, longitudinal angular distortion and buckling)  
Cleaning activities: wiring brushing, removal of excess weld metal where required, checking welds for signs of defects.
Unit 112  Carrying out OXY-Acetylene welding processes

Outcome 3 be able to produce welded joints safely using oxy-acetylene welding.

Assessment Criteria
The learner can:
1. use Personal Protective Equipment (PPE) effectively for oxy-acetylene welding
2. use equipment for a welding operation safely
3. produce sufficient tack welded joints to enable welding
4. produce fillet welded joints in 1.0 to 3.0 mm thick low carbon steel safely in welding positions
5. use low carbon steel for a welding operation
6. use welding consumables safely
7. carry out weld cleaning and checking safely
8. restore the work area using the correct procedures for the disposal of waste.

Range
Joints: lap, tee, corner
Welding positions: flat, horizontal/vertical
Welding operation: flame ignition and setting, crater filling at the end of a weld, stop/restart, stringer beading, weaving
Weld cleaning and checking: wiring brushing, removal of excess weld metal where required, checking welds for signs of defects

Additional Guidance
Restore work area: leave the work area free of unused consumables, clean the work area, put tools and equipment into safe storage, identify and record finished work.
Unit 113  Carrying out surface finishing techniques

Level: 1
Credit value: 7
UAN number: M/503/0162

Unit aim
This unit will introduce candidates to basic surface finishing operations. It will cover the skills and knowledge needed to prepare for and carry out simple surface finishing activities. The candidate will be able to identify the surface finishing techniques required and their application to simple tasks. All relevant health and safety considerations are covered.

Learning outcomes
There are two outcomes to this unit. The candidate will:
1. be able to prepare for surface finishing
2. be able to apply surface coatings.

Guided learning hours
It is recommended that 60 hours should be allocated for this unit, although patterns of delivery are likely to vary.

Assessment
This unit will be assessed by an assignment which contains practical and knowledge tasks.
Unit 113  Carrying out surface finishing techniques
Outcome 1  be able to be able to prepare for surface finishing

Assessment Criteria
The learner can:
1. define the employees’ responsibility for Health & Safety
2. state the hazards associated with the coating/treatment process
3. use Personal Protective Equipment (PPE) appropriate to the various stages of the coating process
4. use safe procedures to prevent injury to skin
5. identify surface coating/treatment processes and their applications
6. identify consumables required for surface coating/treatment processes
7. state the factors influencing the selection of a specific surface coating/treatment process
8. identify standard and specialist equipment and consumables required when performing surface preparation operations
9. prepare the work area prior to the surface finishing operation
10. prepare equipment and consumables for surface finishing operation
11. prepare material for simple surface finishing operation
12. apply health and safety procedures and practices.

Range
Hazards: fumes, particles, spillages
Coating/treatment processes: liquid coatings (painting), mechanical treatments (polishing, finishing)
Consumables: cleaning agents, paints, abrasives
Selection: type of material, component size, process availability, cost, work environment
Preparation: steaming, degreasing, grinding and sanding, brushing
Unit 113 Carrying out surface finishing techniques
Outcome 2 be able to be able to apply surface coatings.

Assessment Criteria
The learner can:
1. state the reasons for the application of the coating/treatment
2. state the factors affecting coating applications
3. select consumables to apply to surface coatings/treatments
4. apply the surface coating treatment
5. restore work area using the correct procedures for the disposal of waste.

Range
Reasons for the application: protective, decorative, wear resistance, insulation, type of material
Factors affecting coating applications: temperature, humidity, viscosity, time
Surface coatings/treatments: either liquid coatings (painting) or mechanical treatments (polishing or finishing)

Additional Guidance
Restore work area: leave the work area free of unused consumables, clean the work area, put tools and equipment into safe storage, identify and record finished work.
Unit 114  
Carrying out mechanical maintenance

Level: 1  
Credit value: 7  
UAN number: A/503/0164

Unit aim  
This unit is concerned with the routine inspection, lubrication, servicing and maintenance of simple mechanical devices and systems, using the most appropriate tools and equipment in a safe manner. It further deals with dismantling and rebuilding of simple devices and systems, including the replacement of 'lifed' items.

Learning outcomes  
There are three outcomes to this unit. The candidate will:
1. be able to plan and prepare for maintaining simple mechanical devices/systems
2. be able to carry out simple servicing/maintenance in accordance with information from fault-finding
3. know how to check that the device/system conforms to the schedule.

Guided learning hours  
It is recommended that 60 hours should be allocated for this unit, although patterns of delivery are likely to vary.

Assessment  
This unit will be assessed by an assignment which contains practical and knowledge tasks.
Unit 114  Carrying out mechanical maintenance
Outcome 1  be able to plan and prepare for maintaining simple mechanical devices/systems

Assessment Criteria
The learner will be able to:
1. gather and interpret information dealing with maintenance, lubrication, assembly and dismantling of devices and systems
2. list the stages in a typical service/maintenance schedule
3. identify wear and/or damage.

Range
Information: drawings (orthographic, pictorial, sketching, assembly, exploded), charts, tables, maintenance manuals, technical specifications, manufacturers' instructions
Service/maintenance schedule: permit to work, isolation procedure, locking off procedure, sequence of dismantling and assembly, lubrication requirements, lubrication requirements, tools and equipment, spare/replacement components, ‘on-line’ reporting requirements (signing off)
Identify wear and/or damage: bearings and shafts, linkages, drive belts, couplings, clutches, brakes, gearboxes, seals and gaskets
Unit 114  Carrying out mechanical maintenance
Outcome 2  be able to carry out simple servicing/maintenance
in accordance with information from fault-finding

Assessment Criteria
The learner can:
1. select Personal Protective Equipment (PPE) to be used when undertaking dismantling and
   assembly operations
2. list the sequence to be used to dismantle a device or system
3. state the procedure for removing covers
4. state levels of cleanliness necessary when undertaking dismantling operations
5. use cleaning techniques
6. state the need for proof marking during dismantling to aid re-assembly
7. state the appropriate storage requirements for removed parts
8. use hand tools to dismantle mechanical devices/systems
9. separate components by removing mechanical fastenings
10. remove components
11. remove and fit seals, gaskets and packing
12. use release agents for dismantling corroded parts
13. conduct visual checks on dismantled components
14. state the need to check fastening devices for damage
15. check dimensions and clearances of components
16. identify the components to discard and replace
17. set out components in a logical sequence in preparation for re-assembly
18. state the need for packing and shims
19. state how to fit seals and gaskets
20. state how to locate and secure parts
21. check moving parts
22. tighten fastenings in the correct sequence to the correct torque
23. apply lubricant to moving parts
24. restore work area using the correct procedures for the disposal of waste.

Range
PPE: anti-splinter spectacles, skin protection agents, flame proof overalls
Covers: inspection covers, casings, guards
Cleaning: dust (blow, vacuum), dirt (brush, vacuum), grease (degreasing agents, solvents, steam
Hand tools: spanners, socket sets, pin punches, drifts and wedges, grips and pliers, extractors
Mechanical fastenings: nuts and bolts, studs and screws, clips, pins, rivets
Components: bearing extractors, hub pullers, mandrel presses
Fastening devices: studs, bolts and screws, pins and dowels, keys, bearings and shafts, gears,
couplings, circlips, seals and gaskets, springs, washers (flat, tab, spring, taper)
Dimensions and clearances: digital metric inside and outside micrometer, digital metric vernier
   caliper and height gauge, metric feeler gauges, digital metric dial test indicator
Discard and replace: high tensile bolts and load indicating washers, nylon insert nuts, locking
devices, split pins, seals and gaskets
Locate and secure parts: keys, pins and dowels, screws, nuts and bolts, circlips, mechanical
   locking devices, castellated nuts
Lubricant: methods of application, types of lubricants: oil, grease, wax, graphite
Moving parts: sliding, reciprocating, rotating

Additional Guidance
Restore work area: leave the work area free of unused consumables, clean the work area, put tools and equipment into safe storage, identify and record finished work.
Unit 114  Carrying out mechanical maintenance
Outcome 3  know how to check that the device/system conforms to the schedule.

Assessment Criteria
The learner can be able to:
1. state the need to maintain maintenance logs
2. state the need to check the completed system/device complies with the specification
3. state the importance of making visual checks
4. state the mechanisms and faults that can be identified by visual, tactile or audible checks
5. state typical common faults that occur with specific devices or systems
6. state methods for ‘signing-off’ serviced/maintained systems.

Range
Maintenance logs: (service administration information [date, name, findings, notes, etc.] Confirm the serviced/maintained device/system meets the required specification, record the results to confirm achievement of the required operating performance)
Specification: dimensions and tolerances, movement, capacities, appearance, lubrication
Visual, tactile or audible checks: metal fractures or pitting, loose or damaged mechanical fastenings, broken drive belts and/or chains, leaking seals, excessive movement/clearance, excessive temperature of bearings, brakes or drives, unfamiliar noises
Common faults: wear and abrasion, overheating, vibration, out of balance, fractures, corrosion, leakages
Unit 115  Communicating using CAD systems

Level: 1
Credit value: 7
UAN number: F/503/0165

Unit aim
This unit is concerned with forms of communication; an entrant to the field of engineering will need to be familiar with, for progression into the industry. The unit aims are to develop the communication skills of candidates through the study of topics which include: writing, speaking, sketching, CAD, interpreting engineering information, and the use of a range of ICT methods for obtaining, processing and presenting information in oral and written forms.

Learning outcomes
There are three learning outcomes to this unit. The learner will:
1. be able to prepare for communication
2. be able to use CAD software for engineering purposes
3. be able to use communication software for engineering purposes.

Guided learning hours
It is recommended that 60 hours should be allocated for this unit, although patterns of delivery are likely to vary.

Assessment
This unit will be assessed by an assignment which contains practical and knowledge tasks.
Unit 115 Communicating using CAD systems

Outcome 1
be able to be able to prepare for communication

Assessment Criteria
The learner can:
1. state the types of engineering drawing
2. apply the basic information contained within a title block
3. state additional information that may be supplied
4. identify and use systems of projection
5. state types of line and their application
6. define standard abbreviations
7. list sources of engineering data.

Range
Types of engineering drawing: general layout, detail/component, assembly
Title block: name of draughtsperson, date drawn, projection symbol, scale, title, drawing number, unit of measurement, lettering
Additional information: general tolerance, material specifications, surface texture, issue number and revisions, warning notices (if in doubt ask, do not scale, not to scale)
Systems of projection: orthographic (first angle, third angle), pictorial (isometric, oblique), views (sectional, hatching)
Types of line: continuous thick, continuous thin, continuous thin irregular, dashed thin, chain thin, dimension (projection lines, dimension lines, leader lines) dimension types (linear: chain, base line; angular)
Abbreviations: across flats, centre line, chamfer, countersunk, diameter, drawing, hexagon head, material, radius, square, thread, undercut
Engineering data: data sheets, handbooks, reference tables, charts, manufacturers manuals
Unit 115
Outcome 2
Communicating using CAD systems
be able to be able to use CAD software for engineering purposes

Assessment Criteria
The learner can:
1. use CAD system **menus and commands** to amend features of CAD templates
2. use CAD software to produce and output simple basic circuit and detail **drawings**
3. use CAD software to create and output a simple basic **isometric** drawing or view

Range
**Menus and commands**: layers, templates, straight lines, curved lines, circles, ellipses, hatching, dimensioning, text; editing, modification commands (trim, extend, fillet, chamfer, etc.), viewing/navigation features (pan, zoom, etc.)
**Drawings**: inserting commonly used symbols, orthographic drawings for 2D output
**Isometric**: drawings for 2D output
Unit 115  Communicating using CAD systems
Outcome 3  be able to be able to use communication software for engineering purposes.

Assessment Criteria
The learner can:
1. create a spreadsheet to produce a bill of materials from a given assembly
2. create a chart or graph using a spreadsheet
3. send and receive email messages
4. create folders and manage files
5. operate computer / display equipment in compliance with current health and safety legislation.

Range
Spreadsheet: tables, costing, charts, graphs
Folders: files are sorted and backed-up saved into appropriate folders and storage media
Equipment: health and safety legislation relating to the use of VDU equipment and work station environment, understand the user’s responsibilities under the data protection act, software copyright, computer misuse act, procedures for starting up and closing down systems and software, procedure to output hard copies of files.
Unit 116 Producing engineering drawings

Level: 1
Credit value: 7
UAN number: L/503/0167

Unit aim
This unit introduces candidates to methods of drawing and communication that are required in the engineering and manufacturing sectors. It covers the fundamental skills and knowledge needed to prepare and produce engineering drawings, in both orthographic and pictorial form.

Learning outcomes
There are two outcomes to this unit. The candidate will:
1. be able to identify standards for engineering drawings and pictorial views
2. be able to apply techniques to produce drawings and geometrical constructions.

Guided learning hours
It is recommended that 60 hours should be allocated for this unit, although patterns of delivery are likely to vary.

Assessment
This unit will be assessed by an assignment which contains practical and knowledge tasks.
Unit 116 Producing engineering drawings
Outcome 1 be able to be able to identify standards for engineering drawings and pictorial views

Assessment Criteria
The learner will be able to:
1. state the sizes of 'A' series drawing sheets
2. state the types of engineering drawing
3. state the basic information contained within a title block
4. state additional information that may be supplied
5. identify and use systems of projection
6. state types of line and their application
7. define standard abbreviations
8. list sources of engineering data

Range
Types of engineering drawing: general layout, detail/component, assembly
Title block: name of draughtsman, date drawn, projection symbol, scale, title, drawing number, unit of measurement, lettering
Additional information: general tolerance, material specifications, surface texture, issue number and revisions, warning notices (if in doubt ask, do not scale, not to scale)
Systems of projection: orthographic (first angle, third angle), pictorial (isometric, oblique), views (sectional, hatching)
Types of line: continuous thick, continuous thin, continuous thin irregular, dashed thin, chain thin, dimension (projection lines, dimension lines, leader lines) dimension types (linear: chain, base line; angular)
Abbreviations: across flats, centre line, chamfer, countersunk, diameter, drawing, hexagon head, material, radius, square, thread, undercut
Engineering data: data sheets, handbooks, reference tables, charts, manufacturers manuals
Unit 116

Producing engineering drawings

be able to be able to apply techniques to produce drawings and geometrical constructions.

Assessment Criteria

The learner can:
1. state the basic **instruments and equipment** that are used
2. set out a title block
3. apply **drawing scales**
4. set out **orthographic views** using construction lines and other line types
5. use methods of **geometrical construction**
6. use representation of **common features**
7. state the need for tolerances
8. state the need for sectional views.

Range

**Instruments and equipment:** pencils (grades), board (parallel motion), rule, set squares (45°, 30/60°, adjustable), compasses (spring bow), protractor, eraser.

**Drawing scales:** smaller than full size, larger than full size

**Orthographic views:** first angle, third angle

**Geometrical construction:** bisect a line, construct lines parallel to each other and perpendicular, divide an line into equal parts, construct triangles (equilateral, isosceles), construct an ellipse, construct regular polygons (square, hexagon, octagon)

**Common features:** threads (external, internal), knurls (diamond, straight), square

**Sectional views:** elevations and plan, cutting plain line, hatching, parts not hatched (bolts, nuts and washers, pins, keys and keyways, shafts, webs, gussets, spokes.)
Appendix 1   Relationships to other qualifications

Literacy, language, numeracy and ICT skills development

This qualification include opportunities to develop and practise many of the skills and techniques required for success in the following qualifications:

- Functional Skills (England) – see www.cityandguilds.com/functionalskills
- Essential Skills (Northern Ireland) – see www.cityandguilds.com/essentialskillsni
- Essential Skills (Wales).

There might also be opportunities to develop skills and/or portfolio evidence if candidates are completing any Key Skills alongside this qualification.
Appendix 2  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.cityandguilds.com.

Centre Guide – Delivering International Qualifications contains detailed information about the processes which must be followed and requirements which must be met for a centre to achieve ‘approved centre’ status, or to offer a particular qualification. Specifically, the document includes sections on:

• The centre and qualification approval process and forms
• Assessment, verification and examination roles at the centre
• Registration and certification of candidates
• Non-compliance
• Complaints and appeals
• Equal opportunities
• Data protection
• Frequently asked questions.

Providing City & Guilds qualifications – a guide to centre and qualification approval contains detailed information about the processes which must be followed and requirements which must be met for a centre to achieve ‘approved centre’ status, or to offer a particular qualification. Specifically, the document includes sections on:

• The centre and qualification approval process and forms
• Assessment, verification and examination roles at the centre
• Registration and certification of candidates
• Non-compliance
• Complaints and appeals
• Equal opportunities
• Data protection
• Frequently asked questions.

Ensuring quality contains updates and good practice exemplars for City & Guilds assessment and policy issues. Specifically, the document contains information on:

• Management systems
• Maintaining records
• Assessment
• Internal verification and quality assurance
• External verification.

Access to Assessment & Qualifications provides full details of the arrangements that may be made to facilitate access to assessments and qualifications for candidates who are eligible for adjustments in assessment.

The centre homepage section of the City & Guilds website also contains useful information such on such things as:

• Walled Garden
  Find out how to register and certificate candidates on line
• Qualifications and Credit Framework
Contains general guidance about the Framework and how qualifications will change, as well as information on the IT systems needed and FAQs

- **Events**
  Contains dates and information on the latest Centre events

- **Online assessment**
  Contains information on how to register for online assessments.
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Skills for a brighter future

www.cityandguilds.com
## Useful contacts

<table>
<thead>
<tr>
<th>Type</th>
<th>Contact</th>
<th>Query</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK learners</td>
<td>T: +44 (0)20 7294 2800&lt;br&gt; E: <a href="mailto:learnersupport@cityandguilds.com">learnersupport@cityandguilds.com</a></td>
<td>- General qualification information</td>
</tr>
<tr>
<td>International learners</td>
<td>T: +44 (0)20 7294 2885&lt;br&gt; F: +44 (0)20 7294 2413&lt;br&gt; E: <a href="mailto:intcg@cityandguilds.com">intcg@cityandguilds.com</a></td>
<td>- General qualification information</td>
</tr>
<tr>
<td>Centres</td>
<td>T: +44 (0)20 7294 2787&lt;br&gt; F: +44 (0)20 7294 2413&lt;br&gt; E: <a href="mailto:centressupport@cityandguilds.com">centressupport@cityandguilds.com</a></td>
<td>- Exam entries&lt;br&gt; - Registrations/enrolment&lt;br&gt; - Certificates&lt;br&gt; - Invoices&lt;br&gt; - Missing or late exam materials&lt;br&gt; - Nominal roll reports&lt;br&gt; - Results</td>
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<tr>
<td>Single subject qualifications</td>
<td>T: +44 (0)20 7294 8080&lt;br&gt; F: +44 (0)20 7294 2413&lt;br&gt; F: +44 (0)20 7294 2404 (BB forms)&lt;br&gt; E: <a href="mailto:singlesubjects@cityandguilds.com">singlesubjects@cityandguilds.com</a></td>
<td>- Exam entries&lt;br&gt; - Results&lt;br&gt; - Certification&lt;br&gt; - Missing or late exam materials&lt;br&gt; - Incorrect exam papers&lt;br&gt; - Forms request (BB, results entry)&lt;br&gt; - Exam date and time change</td>
</tr>
<tr>
<td>International awards</td>
<td>T: +44 (0)20 7294 2885&lt;br&gt; F: +44 (0)20 7294 2413&lt;br&gt; E: <a href="mailto:intops@cityandguilds.com">intops@cityandguilds.com</a></td>
<td>- Results&lt;br&gt; - Entries&lt;br&gt; - Enrolments&lt;br&gt; - Invoices&lt;br&gt; - Missing or late exam materials&lt;br&gt; - Nominal roll reports</td>
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<tr>
<td>Walled Garden</td>
<td>T: +44 (0)20 7294 2840&lt;br&gt; F: +44 (0)20 7294 2405&lt;br&gt; E: <a href="mailto:walledgarden@cityandguilds.com">walledgarden@cityandguilds.com</a></td>
<td>- Re-issue of password or username&lt;br&gt; - Technical problems&lt;br&gt; - Entries&lt;br&gt; - Results&lt;br&gt; - Online assessments&lt;br&gt; - Navigation&lt;br&gt; - User/menu option problems</td>
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<tr>
<td>Employer</td>
<td>T: +44 (0)121 503 8993&lt;br&gt; E: <a href="mailto:business_unit@cityandguilds.com">business_unit@cityandguilds.com</a></td>
<td>- Employer solutions&lt;br&gt; - Mapping&lt;br&gt; - Accreditation&lt;br&gt; - Development Skills&lt;br&gt; - Consultancy</td>
</tr>
<tr>
<td>Publications</td>
<td>T: +44 (0)20 7294 2850&lt;br&gt; F: +44 (0)20 7294 3387</td>
<td>- Logbooks&lt;br&gt; - Centre documents&lt;br&gt; - Forms&lt;br&gt; - Free literature</td>
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