SEG Awards ABC Level 2 Certificate in Fabrication and Welding Techniques and Skills

Qualification Guidance

Level 2 Certificate – 603/5751/4

This is a live document and as such will be updated when required. It is the responsibility of the approved centre to ensure the most up-to-date version of the Qualification Guide is in use. Any amendments will be published on our website and centres are encouraged to check this site regularly.

About us

At the Skills and Education Group Awards (ABC Awards)[1] we continually invest in high quality qualifications, assessments and services for our chosen sectors. As a UK leading sector specialist we continue to support employers and skills providers to enable individuals to achieve the skills and knowledge needed to raise professional standards across our sectors.

Skills and Education Group has an on-line registration system to help customers register learners on its qualifications, units and exams. In addition it provides features to view exam results, invoices, mark sheets and other information about learners already registered.

The system is accessed via a web browser by connecting to our secure website using a username and password: https://ors.skillsandeducationgroupawards.co.uk/

Sources of Additional Information

The Skills and Education Group Awards website https://skillsandeducationgroupawards.co.uk/ provides access to a wide variety of information.

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Specification Code, Date and Issue Number

The specification code is C5706-02

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Issue	Date	Details of change	Section/page
1	1/4/2020	Original document	n/a
2	8/10/2020	Progression Opportunities updated	Page 6
3	07/07/2025	Review date amended to 31/08/2027	Page 8

[1] ABC Awards is a brand of the Skills and Education Group Awards, a recognised awarding organisation and part of the Skills and Education Group. Any reference to ABC Awards, its registered address, company or charity number should be deemed to mean the Skills and Education Group Awards.

Contents

Introduction

- At Skills and Education Group Awards we have updated our suite of Fabrication and Welding qualifications to include the latest fabrication and welding techniques, materials, processes and practices. They are assessed in line with industry demands, which include updated rigorous practical assessments and online on-demand assessments.

- The qualification structures have been developed with the typical learner in mind, to ensure the units contained within them are relevant and facilitate progression, whether that is onto higher levels of learning, employment or specialist fabrication and welding procedures.

The qualifications have been developed in conjunction with academia and industry experts and informed by the work of professional bodies in the fabrication and welding field. At Level 2 and Level 3, the qualifications have been designed to complement the recently developed Apprenticeship Standards in Welding.

This qualification, along with the rest of the suite, has been endorsed by Lincoln Electric.

Aims

Raise a learner's skill level and enhance their underpinning knowledge to promote progression from basic welding and fabrication skills to a more highly developed understanding of equipment functions and how materials behave when subjected to fabrication and welding process.

Educate the learner in the observation of the correct and safe procedures that are paramount in the fabrication and welding industry.

Target Group

The target group includes, but is not limited to:

- young people who are following an apprenticeship programme
- young people who are new entrants to the industry
- adults wishing to specialise or upskill by pursuing single units
- the self-employed

Qualification Structure

Rules of Combination:

Learners must achieve a minimum of 29 credits

11 credits must be from Group A
6 credits must be from Group B
6 credits must be from Group C
6 credits can come from Group B, C or D

Units	Unit Number	Level	M/O	Credit Value	GLH
Group A					
1. Health and Safety in a Fabrication and Welding Environment	T/618/0753	2	M	3	20
2. Materials, Science and Calculations for Fabrication and Welding Practice	F/616/1266	2	M	8	80
Group B					
3. Manual Metal-Arc Welding – Low Carbon Steel, Stainless Steel or Aluminium	J/616/1267	2	O	6	50
4. Metal-Arc Gas Welding – Low Carbon Steel, Stainless Steel or Aluminium	L/616/1268	2	O	6	50
5. Tungsten Inert Gas Shielded Welding – Low Carbon Steel, Stainless Steel or Aluminium	R/616/1269	2	O	6	50
Group C					
6. Fabrication Processes – Plate	J/616/1270	2	O	6	50
7. Fabrication Processes – Sheet Metal	L/616/1271	2	O	6	50
Group D					
8. Engineering Drawing Using Manual and CAD Techniques	R/616/1272	2	O	6	50

GLH: 250 hours, TQT: 290 hours, Credit value: 29

Assessment

In order to successfully achieve this qualification a learner must fully meet all of the learning outcomes. This is done by completing the Skills and Education Group Awards' practical and online multiple-choice assessments.

All centres are required to have internal quality assurance processes in place. Assessment workbooks are available on the Skills and Education Group Awards website for learners to complete to form the internal assessment requirements for each unit. The practical tasks in the workbooks are graded at a pass, merit or distinction.

The Science and Calculations unit is assessed via an externally set and externally assessed multiple choice question (MCQ) assessment. The examination provides the grade for this unit at a:

- Pass – 60%
- Merit – 70% or
- Distinction – 80%.

The overall qualification is graded as pass/fail however, unit achievements at pass, merit or distinction are shown on the qualification transcript.

For further information around assessment including reasonable adjustments and special considerations please review the Access to Assessment Policy here: https://skillsandeducationgroupawards.co.uk/policies-and-procedures/

Practice Assessment Material

Skills and Education Group Awards will make paper-based, multiple choice, practice tests available for learners prior to undertaking the online knowledge test. These questions will be of a comparable level and cover the same subject areas as listed above in the 'assessment' section, but they will not be the same questions as those presented during the online knowledge test.

Teaching Strategies and Learning Activities

Centres should adopt a delivery approach which supports the development of all individuals. The aims and aspirations of all the learners, including those with identified special needs or learning difficulties/disabilities, should be considered and appropriate support mechanisms put in place.

Progression Opportunities

Learners who successfully achieve this qualification could progress into employment within a fabrication and welding environment or a manufacturing environment.

Tutor/Assessor Requirements

Skills and Education Group Awards require those involved in the assessment process to be suitably experienced and/or qualified. In general terms, this usually means that the Tutor/Assessor must be knowledgeable in the subject/occupational area to at least the level they are delivering/assessing at.

Those responsible for Internal Quality Assurance (IQA) must be knowledgeable of the subject/occupational area to a suitable level to carry out accurate quality assurance practices and processes.

Resource Requirements

Centres must provide access to sufficient equipment in the centre or workplace to ensure learners have the opportunity to cover all of the practical activities.

For external assessments the examination should be conducted at the Centre where the course delivery has taken place and should be carried out in accordance with the examination requirements of Skills and Education Group Awards.

Language

These specifications and associated assessment materials are in English only.

Qualification Summary

SEG Awards ABC Level 2 Certificate in Fabrication and Welding Techniques and Skills								
Qualification Number	603/5751/4							
Regulated	The qualification identified above is regulated by Ofqual, Qualifications Wales and CCEA Regulation.							
Assessment	• Internally set, internally assessed • Externally set, internally assessed • Externally set, externally assessed • Internal and external moderation							
Grading	Pass							
Operational Start Date	01/09/2020							
Review Date	31/08/2027							
Skills and Education Group Awards Sector	Engineering							
SSA Sector	4.1 Engineering							
Contact	See the Skills and Education Group Awards website for Customer Support Officer responsible for these qualifications.							
Qualification Purpose	C. Prepare for employment C1. Prepare for employment in a broad occupational area							
Entry Requirements	There are no formal pre-requisites for entry onto this qualification. Each centre is required to notify the awarding body of its policies on access and equality of opportunity. Within the parameters of these policies, a centre is expected to recruit with integrity on the basis of a learner's ability to contribute to and successfully complete the qualification.							
Age Range	Pre 16		16 - 18	✓	18+	✓	19+	✓

Recommended GLH	Level 2 Certificate – 250
Recommended TQT	Level 2 Certificate – 290
Credit Value	Level 2 Certificate – 29
Learning Aims Reference	See Learning Aim Reference Service (LARS) website: https://data.gov.uk/dataset/learning-aim-reference-service
Type of Funding Available	See Learning Aim Reference Service (LARS) website
Qualification Fee	See Skills and Education Group Awards website for current fees and charges.
Additional Information	See Skills and Education Group Awards website for resources available for this qualification.

Unit Details

1. Health and Safety in a Fabrication and Welding Environment

Unit Reference	T/618/0753
Level	2
Credit Value	3
Guided Learning Hours	20
Unit Summary	In this unit, learners will find out about health and safety legislation, and the application of safe working practices within a workplace. They will explore hazards and precautions, signs and symbols and basic safety procedures. Health and Safety must be an integral part of every learner's programme. It is expected that the outcomes listed will be integrated as appropriate into each unit of this qualification. Skills and Education Group Awards has produced a workbook which learners can use to provide evidence of achievement against the learning outcomes and assessment criteria. The workbook is available on the ABC website. Skills and Education Group Awards also provides Learner Achievement Checklists to record achievement. These are also available on ABC's website.
Learning Outcomes The learner will:	Assessment Criteria The learner can:
1. Know about health and safety responsibilities	1.1. Identify the basic responsibilities of employer and employee with regard to Health and Safety at Work Act 1974 (where legislation, regulations do not apply in the jurisdiction, relevant ones should be applied) 1.2 Identify the statutory requirements and legislation of the Health and Safety at Work in a fabrication and welding work environment

2. Know how to avoid risks in a fabrication and welding work environment	2.1. Identify and describe where potential health and safety hazards may occur within a fabrication and welding work environment 2.2 Identify potential hazards and the necessary precautions in a fabrication and welding environment for each of the following • when moving and handling materials • when using hand and power tools • when using thermal processes
3. Undertake a risk assessment of fabrication and welding work environment	3.1 Identify the five steps of a risk assessment 3.2 Conduct a risk assessment of a fabrication and welding work environment 3.3 Report findings to an appropriate person in line with organisational requirements
4. Know how to protect themselves in a work environment	4.1 State reasons why protective clothing and equipment should be worn 4.2 Identify common safety guards, screens and fences within a workshop situation 4.3 Locate fire extinguishers, emergency switches and exits in the work environment 4.4 Describe how waste materials should be dealt with to comply with current laws and regulations
5. Know about accident and emergency procedures	5.1 Describe their organisational accident and emergency procedures in relation to • injury to self or others • fire • malfunctions of equipment • problems with hazardous substances
6. Understand safety signs	6.1 Identify safety signs within the following groups • mandatory • warning • safe condition • prohibited

2. Materials, Science and Calculations for Fabrication and Welding Practice

Unit Reference	F/616/1266
Level	2
Credit Value	8
Guided Learning Hours	80
Unit Summary	Learners will understand differences in various metals, the way in which they are identified and the properties each have which will allow them to be used for certain applications and how materials are supplied to industry in different forms, sizes and profiles. Introductions to the application and use of welding terms and symbols are covered relating to fillet and butt welded joints. Simple applications of science are covered to enable the learner to understand how materials behave during the application of heat. This unit also covers the basic application of mathematics related to welding and fabrication activities and at a level that the learner should be able to understand and use confidently. This unit is assessed by a 30 question externally set MCQ (multiple choice question) examination.

Learning Outcomes The learner will:	Assessment Criteria The learner can:
1. Know about ferrous and non-ferrous materials	1.1 Identify the difference between ferrous and non-ferrous materials 1.2 Identify the use of ferrous materials, to include: • low, medium and high carbon steels • grey cast iron • stainless steel 1.3 Define the constituent elements in the ferrous materials listed in 1.2. 1.4 Identify the use of non-ferrous materials, to include: • aluminium • copper

	1.5 Define the melting point of the non-ferrous materials listed in 1.4
2. Know about physical and mechanical properties of materials	2.1. Define the physical properties of the materials listed in 1.2 and 1.4, to include: • colour • weight • thermal conductivity • electrical conductivity • corrosion resistance • ability to be magnetised 2.2. Define the mechanical properties of the materials listed in 1.2 and 1.4, to include: • strength (tensile, compressive and shear) • malleability • elasticity • ductility • plasticity • hardness • brittleness • toughness
3. Know about forms of supply	3.1. Define forms of supply in terms of size and shape, to include: • sheet • plate • pipe/tube • wires and rods • equal angle section • channel sections • square and rectangular hollow section • extrusions • forgings
4. Know about the effects of heat	4.1. Define heat transfer, to include: • conduction • convection • radiation 4.2. Explain the effects of heat relating to welding activities: • thermal conductivity in materials • expansion/distortion • rapid cooling • effects on mechanical properties of low carbon steel
5. Know about gases used in welding	5.1. Identify gases found in each of the groups listed: • inert • flammable • reactive 5.2. State the flame temperatures of common flammable gases when mixed with oxygen

	5.3. State the advantages of gas mixtures when using gas shielded welding processes
6. Be able to carry out calculations relating to welding and fabrication activities	6.1. Perform calculations, to include: • area • length • volume • cost 6.2. Use calculations that include: • decimals • percentages • averages • ratios 6.3. Perform simple calculations relating to welding costs
7. Know about welding symbols	7.1. Identify welding symbols that meet current standards when used on butt and fillet welded joints, to include: • symbolic representation • weld size (leg length) • position of welding • site weld • weld all round

3. Manual Metal-Arc Welding – Low Carbon Steel, Stainless Steel or Aluminium

Unit Reference	J/616/1267
Level	2
Credit Value	6
Guided Learning Hours	50
Unit Summary	The unit covers the equipment and consumables required for manual metal-arc (MMA) welding and the techniques used to produce welds that meet the quality standard required. Practical weld samples covering butt and fillet welds must be welded in the flat (PA) or horizontal vertical (PB) welding positions. These are rigorously tested to show that the completed welds are structurally sound. Welding inspection techniques are also covered to give the learner the information and skills to carry out weld inspection.

	Health and safety is an integral part of this unit as learners need to be aware of the dangers of fires and the importance of wearing correct PPE.

Learning Outcomes The learner will:	Assessment Criteria The learner can:
1. Know about safe working practices when using MMA welding equipment	1.1 Identify the need to use appropriate PPE (personal protective equipment) when carrying out manual metal welding activities 1.2 Identify associated risks when welding with MMA, to include: • arc radiation burns • arc eye • burns from handling hot materials • welding fumes • electric shocks • fire • sparks 1.3 Identify fire prevention and emergency procedures required in the workplace, to include: • causes of fire • types of fire extinguisher used • evacuation procedures 1.4 Identify the main groups of safety signs, to include: • warning • prohibition • mandatory • information signs
2. Know about the equipment used for MMA welding	2.1. Identify the function of the listed equipment when used with MMA welding activities: • transformer/generators • transformer/rectifiers • welding lead • welding return lead • welding earth • electrode holders 2.2. Identify ancillary equipment used when welding with the MMA welding process
3. Know about welding consumables used in MMA welding	3.1. Identify suitable storage conditions for manual metal welding electrodes 3.2. Identify the electrode in terms of: • size by electrode diameter • flux coating type
4. Know about material preparation and the	4.1. Identify appropriate safety checks on MMA welding equipment prior to use

setting up of MMA welding equipment	4.2. Prepare to carry out MMA welding to produce welded joints in the PA or PB positions, to include: • production of the correct welding preparation • identify distortion control methods to be used • select the correct electrode type/size • set the correct welding current • produce suitable tack welds • weld the joint • post weld cleaning 4.3. Identify welding parameters to be used when completing welded joints using MMA welding, to include: • welding current • electrode slope and tilt angles • arc length • electrode polarity
5. Be able to complete a weld on either low carbon steel, stainless steel or aluminium using the MMA welding process	5.1. Identify suitable safety checks on welding equipment prior to use 5.2. Complete a weld on: • low carbon steel greater than 6 mm in thickness or • stainless steel in materials greater than 3mm in thickness or • aluminium in materials greater than 3mm in thickness using the MMA welding process, to include as a minimum: • lap joint • open outside corner • single vee butt joint • tee fillet weld Welds to be completed in the PA or PB position
6. Know how to carry out and report on the inspection of butt and fillet welded joints	6.1. Describe the limitations of visual inspection on completed welded joints using the MMA welding process 6.2. Identify and describe typical welding defects that may be found in MMA welded joints, to include: • undercut • cracks • slag inclusions • porosity • arc craters • lack of penetration 6.3. Check completed welds for: • weld size to include leg length and throat thickness • weld profile • weld appearance and uniformity • absence of surface defects

	6.4. Complete the requirements for a report document on welds produced
7. Know how to carry out destructive tests on completed MMA welded joints	7.1. Prepare and carry out a destructive test on a fillet weld in accordance with the supplied drawing of the welded joint, to include: • nick break test 7.2. Prepare and carry out destructive tests on a completed single vee butt weld in accordance with the supplied drawing of the welded joint, to include: • face bend test • root bend test • fracture test
8. Know about documentation relating to welding activities	8.1. Identify appropriate documentation relating to welding activities, to include: • welding procedure specifications (WPS) • weld inspection report

4. Metal-Arc Gas Shielded Welding – Low Carbon Steel, Stainless Steel or Aluminium

Unit Reference	L/616/1268
Level	2
Credit Value	6
Guided Learning Hours	50
Unit Summary	The unit covers the equipment and consumables required for metal-arc gas shielded (MAGS) welding and the techniques used to produce welds that meet the quality standard required. Practical weld samples covering butt and fillet welds must be welded in the flat (PA) or horizontal vertical (PB) welding positions. These are rigorously tested to show that the completed welds are structurally sound. Welding inspection techniques are also covered to give the learner the information and skills to carry out weld inspections. Health and safety is an integral part of this unit covering MAGS welding activities. Learners need to be aware of the dangers of fires and the need to wear correct PPE.

Learning Outcomes The learner will:	Assessment Criteria The learner can:
1. Know about safe working practices when using MAGS welding equipment	1.1 Identify the need to use appropriate PPE (personal protective equipment) when carrying out MAGS welding activities 1.2 Identify the risks associated when welding with MAGS, to include: • arc radiation burns • arc eye • burns from handling hot materials • welding fumes • electric shocks • fire • sparks 1.3 Identify fire prevention and emergency procedures required in the workplace, to include: • causes of fire • types of fire extinguisher used • evacuation procedures 1.4 Identify the main groups of safety signs, to include: • warning • prohibition • mandatory • information signs
2. Know about the equipment used for MAGS welding	2.1. Identify the function of the listed equipment when used with MAGS welding activities: • power source unit • welding lead • welding return lead • welding earth • welding torch • wire feed unit • shielding gas supply, regulator and flow meter 2.2. Identify ancillary equipment used when welding with the MAGS welding process
3. Know about welding consumables used in MAGS welding	3.1. Identify suitable storage conditions for MAGS welding wires 3.2. Identify the electrode wires in terms of: • size by electrode diameter • weight of spool • copper coated type
4. Know about material preparation and the setting up of MAGS welding equipment	4.1. Identify appropriate safety checks on MAGS welding equipment prior to use 4.2. Prepare to carry out the MAGS welding process to produce welded joints in the PA or PB positions, to include: • production of the correct welding preparation

	• identify distortion control methods to be used • select the correct wire size • select correct gas flow rates • set the correct welding current • produce suitable tack welds • weld the joint • post welding cleaning 4.3. Identify welding parameters to be used when completing welded joints using MAGS welding, to include: • welding current • gas type and flow rates • welding torch slope and tilt angle
5. Be able to complete a weld on either low carbon steel plate, stainless steel or aluminium using the MAGS welding process	5.1. Identify suitable safety checks on welding equipment prior to use 5.2. Complete a weld on: • low carbon steel greater than 6 mm in thickness or • stainless steel in materials greater than 3mm in thickness or • aluminium in materials greater than 3mm in thickness using the MAGS welding process, to include as a minimum: • lap joint • open outside corner • single vee butt joint • tee fillet weld Welds to be completed in the PA or PB position
6. Know how to carry out and report on the visual inspection of butt and fillet welded joints	6.1. Describe the limitations of visual inspections on completed welded joints when using the MAGS welding process 6.2. Identify and describe typical welding defects that may be found in MAGS welded joints, to include: • undercut • cracks • inclusions • porosity • arc craters • lack of fusion • lack of penetration 6.3. Check completed welds for: • weld size to cover leg length and throat thickness. • weld profile • weld appearance and uniformity • absence of surface defects

	6.4. Complete the requirements for a report document on welds produced
7. Know how to carry out destructive tests on completed MAGS welded joints	7.1. Prepare and carry out a destructive test on a fillet weld in accordance with the supplied drawing of the welded joint, to include: • nick break test 7.2. Prepare and carry out destructive tests on a completed single vee butt weld in accordance with the supplied drawing of the welded joints, to include: • face bend test • root bend test • fracture test
8. Know about documentation relating to welding activities	8.1. Identify appropriate documentation relating to welding activities, to include: • welding procedure specifications (WPS) • weld inspection report

5. Tungsten-Arc Gas Shielded Welding – Low Carbon Steel, Stainless Steel or Aluminium

Unit Reference	R/616/1269
Level	2
Credit Value	6
Guided Learning Hours	50
Unit Summary	The unit covers the equipment and consumables required for tungsten-arc gas shielded (TAGS) welding and the techniques used to produce welds that meet the quality standard required. Practical weld samples covering butt and fillet welds must be welded in the flat (PA) or horizontal vertical (PB) welding positions. These are rigorously tested to show that the completed welds are structurally sound. Welding inspection techniques are also covered to give the learner the information and skills to carry out weld inspections. Health and safety is an integral part of this unit covering TAGS welding activities. Learners need to be aware of the dangers of fires and the need to wear correct PPE.

Learning Outcomes The learner will:	Assessment Criteria The learner can:
1. Know about safe working practices when using TAGS welding equipment	1.1. Identify the need to use appropriate PPE (personal protective equipment) when carrying out TAGS welding activities 1.2. Identify the risks associated when welding with TAGS, to include: • arc radiation burns • arc eye • burns from handling hot materials • welding fumes • dangers of using high frequency systems • electric shocks • fire 1.3. Identify fire prevention and emergency procedures required in the workplace, to include: • causes of fire • types of fire extinguisher used • evacuation procedures 1.4. Identify the main groups of safety signs, to include: • warning • prohibition • mandatory • information signs
2. Know about the equipment used for TAGS welding	2.1. Identify the functions of the listed equipment when used with TAGS welding activities, to include: • transformer/generators • transformer/rectifiers • welding inverters • high frequency units • cooling systems • welding lead • welding return lead • welding earth • welding torch • welding shrouds 2.2. Identify ancillary equipment used when welding with the TAGS welding process
3. Know about welding consumables used in TAGS welding	3.1. Identify suitable storage conditions for TAGS filler wires 3.2. Identify the filler wires in terms of: • size by diameter • alloying additions 3.3. Identify the electrode in terms of: • size by electrode diameter • type of electrodes - alloying additions

4. Know about material preparation and the setting up of TAGS welding equipment	4.1. Identify appropriate safety checks on TAGS welding equipment prior to use 4.2. Prepare to carry out the TAGS welding process to produce welded joints in the PA or PB positions, to include: • production of the correct welding preparation • identify distortion control methods to be used • select the correct electrode type/size • select gas type and flow rate • select filler wire type • set the correct welding current • produce suitable tack welds • weld the joint • post welding cleaning 4.3. Identify welding parameters to be used when completing welded joints using TAGS welding, to include: • welding current • electrode slope and tilt angles • filler wire slope and tilt angles • gas flow rates • arc length • electrode polarity
5. Be able to complete a weld on either low carbon steel plate, stainless steel or aluminium using the TAGS welding process	5.1. Identify suitable safety checks on welding equipment prior to use 5.2. Complete welds on low carbon steel, or stainless steel or aluminium 3 mm or greater in thickness using the TAGS welding process, to include as a minimum: • lap joint • open outside corner • single vee butt joint • tee fillet weld Welds to be completed in the PA or PB position
6. Know how to carry out and report on the visual inspection of butt and fillet welded joints using the TAGS welding process	6.1. Describe the limitations of visual inspection on completed welded joints when using the TAGS welding process 6.2. Identify and describe typical welding defects that may be found in TAGS welded joints, to include: • undercut • cracks • tungsten inclusions • porosity • arc craters • lack of fusion • lack of penetration

	6.3. Check completed welds for: • weld size to cover leg length and throat thickness • weld profile • weld appearance and uniformity • absence of surface defects 6.4. Complete the requirements for a report document on welds produced
7. Know how to carry out destructive tests on completed TAGS welded joints	7.1. Prepare and carry out a destructive test on a fillet weld in accordance with the supplied drawing of the welded joint, to include: • nick break test 7.2. Prepare and carry out destructive tests on a completed single vee butt weld in accordance with the supplied drawing of the welded joint, to include: • face bend test • root bend test • fracture test
8. Know about documentation relating to welding activities	8.1. Identify appropriate documentation relating to welding activities, to include: • welding procedure specifications (WPS) • weld inspection report

6. Fabrication Processes – Plate

Unit Reference	J/616/1270
Level	2
Credit Value	6
Guided Learning Hours	50
Unit Summary	This unit embraces all aspects in the production of assemblies in materials greater than 3 mm in thickness. Health and Safety practice is an important aspect of this unit and as such should be prioritised when the learner is using the range of tools and equipment needed to complete the practical elements. In order to produce fabrications to a specified tolerance, the learner will be expected to have the ability to read engineering drawings, mark out materials using a range of equipment, select and use hand tools appropriate to

	the task being covered and apply safe working practices when working on various types of cutting, forming and welding applications.

Learning Outcomes The learner will:	Assessment Criteria The learner can:
1. Know about safe working practices when producing fabricated assemblies in materials greater than 3 mm in thickness	1.1. Identify the need to use appropriate PPE (personal protective equipment) when carrying out fabrication activities 1.2. Identify the risks associated with fabrication activities, to include: • handling and lifting materials greater than 3 mm in thickness • safe storage of plate materials • injuries from sharp edges/burrs on plate • effective guarding of powered machines 1.3. Identify fire prevention and emergency procedures required in the workplace, to include: • causes of fire • types of fire extinguisher used • evacuation procedures 1.4. Identify the main groups of safety signs, to include: • warning • prohibition • mandatory • information signs
2. Be able to read and interpret fabrication drawings	2.1. Interpret information from fabrication drawings, to include: • projection of drawing (first/third angle) • required tolerances • dimensions • scale • symbolic representations
3. Be able to use appropriate marking out instruments and tools on materials greater than 3 mm in thickness	3.1. Identify and use where appropriate the marking out instruments and tools listed: • rules and tapes • dividers • scribers • squares and protractors • centre punch 3.2. Identify methods of marking out, to include: • direct marking • using templates
4. Be able to use hand tools and powered machines to cut materials greater than 3 mm in thickness	4.1. Identify and use where appropriate the hand tools listed to a given tolerance: • hand files • hacksaws • chisels

	4.2. Identify and use where appropriate the power tools/equipment listed to a given tolerance: • mechanical saw • bench drilling machine • grinding machine
5. Be able to use thermal cutting methods to cut materials greater than 3 mm in thickness	5.1. Identify safe working practices when using thermal cutting methods. 5.2. Use ONE of the listed thermal cutting methods to produce cuts in materials greater than 3 mm in thickness to a given tolerance: • oxy/fuel gas cutting equipment • plasma arc cutting equipment
6. Be able to use manual and powered machines to form materials greater than 3 mm in thickness	6.1. Identify and use the following manual or power forming machines: • press brake or manual folding machine to produce bends to specified angles • rolling machine to produce radii and cylinders to specified dimensions 6.2. Determine the bending allowance when folding/bending materials greater than 3 mm in thickness 6.3. Determine the length of a flat material required to produce a cylinder to a given diameter in materials greater than 3 mm in thickness
7. Know about different methods of assembling fabricated components in materials greater than 3 mm in thickness	7.1. Identify and use the following methods of assembly on materials greater than 3 mm in thickness, to include: • tack welding • bolting • drilling and tapping
8. Be able to produce fabricated assemblies in materials greater than 3 mm in thickness	8.1. Work safely to produce a fabricated assembly in materials greater than 3 mm in thickness that meets dimensional accuracy and within the stated tolerances

7. Fabrication Processes – Sheet Metal

Unit Reference	L/616/1271
Level	2
Credit Value	6
Guided Learning Hours	50
Unit Summary	This fabrication unit embraces all aspects in the production of assemblies in materials less than 3 mm in thickness. Health and Safety practice is an important aspect of this unit and as such should be prioritised when the learner is using the range of tools and equipment needed to complete the practical elements. In order to produce fabrications to a specified tolerance, the learner will be expected to have the ability to read engineering drawings, mark out materials using a range of equipment, select and use hand tools appropriate to the task being covered and apply safe working practices when working on various types of cutting, forming and joining applications.

Learning Outcomes The learner will:	Assessment Criteria The learner can:
1. Know about safe working practices when producing fabricated assemblies in materials less than 3 mm in thickness	1.1. Identify the need to use appropriate PPE (personal protective equipment) when carrying out fabrication activities 1.2. Identify the risks associated with fabrication activities, to include: • handling and lifting materials less than 3 mm in thickness • safe storage of plate/sheet materials • injuries from sharp edges/burrs on plate • effective guarding of powered machines 1.3. Identify fire prevention and emergency procedures required in the workplace, to include: • causes of fire • types of fire extinguisher used • evacuation procedures 1.4. Identify the main groups of safety signs, to include: • warning • prohibition • mandatory

	• information signs
2. Be able to read and interpret fabrication drawings	2.1. Interpret information from fabrication drawings, to include: • projection of drawing (first/third angle) • required tolerances • dimensions • scale • symbolic representations
3. Be able to use appropriate marking out instruments and tools on materials less than 3 mm in thickness	3.1. Identify and use where appropriate the marking out instruments and tools listed: • rules and tapes • dividers • scribers • squares and protractors • centre punch 3.2. Identify methods of marking out, to include: • direct marking • using templates
4. Be able to use hand tools and powered machines to cut materials less than 3 mm in thickness	4.1. Identify and use where appropriate the hand tools listed to a given tolerance: • hand files • hacksaws • tin snips 4.2. Identify and use where appropriate the power tools/equipment listed to a given tolerance: • mechanical saw • bench drilling machine • shears • reciprocating shear
5. Be able to use manual and powered machines to form materials less than 3 mm in thickness	5.1. Identify and use the following manual or power forming equipment/machines: • press brake or manual folding machine to produce bends to specified angles • folding bars • rolling machine to produce radii and cylinders to specified dimensions 5.2. Determine the bending allowance when folding/bending materials less than 3 mm in thickness 5.3. Determine the length of a flat material required to produce a cylinder to a given diameter in materials less than 3 mm in thickness
6. Know different methods of assembling fabricated components in materials less than 3 mm in thickness	6.1. Identify and use the following methods of assembly for materials less than 3 mm in thickness, to include: • Self-secured joints • resistance welding techniques • mechanical fasteners

	6.2. Identify methods of stiffening sheet metal components
7. Be able to produce fabricated assemblies in materials less than 3 mm in thickness	7.1. Work safely to produce a fabricated assembly in materials less than 3 mm in thickness that meets dimensional accuracy and within the stated tolerances

8. Engineering Drawing Using Manual and CAD Techniques

Unit Reference	M/503/9511
Level	3
Credit Value	7
Guided Learning Hours	60
Unit Summary	By following this unit, learners will use both manual drawing and CAD systems to produce orthographic drawings of fabricated assemblies. Further drawings using both methods will cover the principles and applications of radial line, parallel line, triangulation, cutting planes and the use of the common central sphere to produce pattern developments for various components. There will be a strong emphasis on presentation and accuracy of completed drawings ensuring they conform to current BS. EN and/or ISO standards

Learning Outcomes The learner will:	Assessment Criteria The learner can:
1. Be able to produce engineering drawings using manual techniques	1.1 Produce drawings of fabricated assemblies using orthographic projection 1.2 Dimension drawings to current BS, EN and/or ISO Standards 1.3 Apply welding symbols to current BS, EN and/or ISO Standards

2. Be able to develop patterns using manual techniques	2.1 Use the parallel line method to produce pattern developments 2.2 Use the radial line method to produce pattern developments 2.3 Use triangulation to produce pattern developments
3. Be able to determine lines of intersection	3.1 Use cutting planes to determine the line of intersection between two sections 3.2 Use the principle of the common centre sphere (CCS) to determine the lines of intersection
4. Produce engineering drawings using CAD software	4.1 Set up the CAD system to include • Layers • Paper sizes • Co-ordinates X-Y • Grid and snap references 4.2 Identify and use commands to facilitate CAD drawings 4.3 Produce drawings of fabricated assemblies using orthographic projection 4.4 Dimension drawings to current NS, EN and/or ISO Standards 4.5 Add text to drawings
5. Develop simple pattern developments using CAD	5.1 Use the parallel line method of development to produce half and full patterns 5.2 Use the radial line method of development to produce half and full patterns
6. Be able to manage file systems	6.1 Save the completed work in a suitable file system 6.2 Retrieve work from files created 6.3 Print/plot completed drawings/patterns

Appendices

Recognition of Prior Learning, Exemption and Credit Transfer

Skills and Education Group Awards policy enables learners to avoid duplication of learning and assessment in a number of ways:

- Recognition of Prior Learning (RPL) – a method of assessment that considers whether a learner can demonstrate that they can meet the assessment requirements for a unit through knowledge, understanding or skills they already possess and do not need to develop through a course of learning.
- Exemption - Exemption applies to any certificated achievement which is deemed to be of equivalent value to a unit within Skills and Education Group Awards qualification but which does not necessarily share the exact learning outcomes and assessment criteria. It is the assessor's responsibility, in conjunction with the Internal Moderator, to map this previous achievement against the assessment requirements of the Skills and Education Group Awards qualification to be achieved in order to determine its equivalence.
  Any queries about the relevance of any certificated evidence, should be referred in the first instance to your centre's internal moderator and then to Skills and Education Group Awards.
  It is important to note that there may be restrictions upon a learner's ability to claim exemption or credit transfer which will be dependent upon the currency of the unit/qualification and a learner's existing levels of skill or knowledge.
  Where past certification only provides evidence that could be considered for exemption of part of a unit, learners must be able to offer additional evidence of previous or recent learning to supplement their evidence of achievement.
- Credit Transfer – Skills and Education Group Awards may attach credit to a qualification, a unit or a component. Credit transfer is the process of using certificated credits achieved in one qualification and transferring that achievement as a valid contribution to the award of another qualification. Units / Components transferred must share the same learning outcomes and assessment criteria along with the same unit number. Assessors must ensure that they review and verify the evidence through sight of:
  - original certificates OR
  - copies of certificates that have been signed and dated by the internal moderator confirming the photocopy is a real copy and make these available for scrutiny be the External Moderator.
- Equivalencies – opportunities to count credits from the unit(s) from other qualifications or from unit(s) submitted by other recognised organisations towards the place of mandatory or optional unit(s) specified in the rule of combination. The unit must have the same credit value or greater than the unit(s) in question and be at the same level or higher.

Skills and Education Group Awards encourages its centres to recognise the previous achievements of learners through RPL, Exemption and Credit Transfer. Prior achievements may have resulted from past or present employment, previous study or voluntary activities.

Centres should provide advice and guidance to the learner on what is appropriate evidence and present that evidence to the external moderator in the usual way.

Further guidance can be found in 'Delivering and Assessing Skills and Education Group Awards Qualifications' which can be downloaded from: https://skillsandeducationgroupawards.co.uk/wp-content/uploads/2017/12/SEG-Awards_Delivering-and-Assessing-Qualifications-19-20.pdf

Certification

Learners will be certificated for all units and qualifications that are achieved and claimed.

Skills and Education Group Awards policies and procedures are available on the Skills and Education Group Awards website.

Glossary of Terms

Guided Learning Hours (GLH)
GLH is where the learner participates in education or training under the immediate guidance or supervision of a tutor (or other appropriate provider of education or training). It may be helpful to think – 'Would I need to plan for a member of staff to be present to give guidance or supervision?'

GLH is calculated at the unit/component level and added up at the qualification level.
Examples of guided learning include:

- Face-to-face meeting with a tutor
- Telephone conversation with a tutor
- Instant messaging with a tutor
- Taking part in a live webinar
- Classroom-based instruction
- Supervised work
- Taking part in a supervised or invigilated assessment
- The learner is being observed.

TQT (Total Qualification Time)
The number of notional hours which represents an estimate of the total amount of time that could reasonably be expected to be required, in order for a learner to achieve and demonstrate the achievement of the level of attainment necessary for the award of a qualification.' The size of a qualification is determined by the TQT.

TQT is made up of the GLH plus all other time taken in preparation, study or any other form of participation in education or training but not under the direct supervision of a lecturer, supervisor or tutor.

TQT is calculated at qualification level and not unit/component level.

Examples of unsupervised activities that could contribute to TQT include:

- Researching a topic and writing a report
- Watching an instructional online video at home/e-learning
- Watching a recorded webinar
- Compiling a portfolio in preparation for assessment
- Completing an unsupervised practical activity or work
- Rehearsing a presentation away from the classroom
- Practising skills unsupervised
- Requesting guidance via email – will not guarantee an immediate response.