SEG Awards ABC Level 2 Award in Welding Techniques and Skills

Qualification Guidance

Level 2 Award – 603/5758/7



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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1	1/4/2020	Original document	n/a
2	8/10/2020	Progression Opportunities updated	Page 6
3	07/07/2025	Review date updated 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.

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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.

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:

- School learners (14-16 year old) who are looking for an introductory programme of a vocational type of qualification for progression into further education and training
- 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 9 credits
3 credits must come from Group A
6 credits must come from Group B, C or D

Units	Unit Number	M/O	Level	Credit Value	GLH
Group A					
1. Health and Safety in a Fabrication and Welding Environment	T/618/0753	M	2	3	20
Group B					
2. Manual Metal-Arc Welding – Low Carbon Steel	A/618/0754	2	O	6	50
3. Manual Metal-Arc Welding – Stainless Steel	J/618/0756	2	O	6	50
Group C					
4. Metal-Arc Gas Shielded Welding – Low Carbon Steel	L/618/0757	2	O	6	50
5. Metal-Arc Gas Shielded Welding – Stainless Steel	R/618/0758	2	O	6	50
6. Metal-Arc Gas Shielded Welding – Aluminium	Y/618/0759	2	O	6	50
Group D					
7. Tungsten-Arc Gas Shielded Welding – Low Carbon Steel	L/618/0760	2	O	6	50
8. Tungsten-Arc Gas Shielded Welding – Stainless Steel	R/618/0761	2	O	6	50
9. Tungsten-Arc Gas Shielded Welding – Aluminium	Y/618/0762	2	O	6	50

GLH: 70 hours, TQT: 90 hours, Credit value: 9

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 Award in Welding Techniques and Skills								
Qualification Number	603/5758/7							
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 Award – 70
Recommended TQT	Level 2 Award – 90
Credit Value	Level 2 Award – 9
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. Manual Metal-Arc Welding – Low Carbon Steel

Unit References	A/618/0754
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
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 setting up of MMA welding equipment	4.1 Identify appropriate safety checks on MMA welding equipment prior to use 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

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

3. Manual Metal-Arc Welding – Stainless Steel

Unit References	J/618/0756
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 setting up of MMA welding equipment	4.1 Identify appropriate safety checks on MMA welding equipment prior to use 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,	5.1 Identify suitable safety checks on welding equipment prior to use

	stainless steel or aluminium using the MMA welding process	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

Unit References	L/618/0757
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	5.1 Identify suitable safety checks on welding equipment prior to use

	either low carbon steel plate, stainless steel or aluminium using the MAGS welding process	5.2 Complete a weld on: • low carbon steel greater than 6 mm in thickness or 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. Metal-Arc Gas Shielded Welding – Stainless Steel

Unit References	R/618/0758
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: • stainless steel 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

7. Metal-Arc Gas Shielded Welding – Aluminium

Unit References	Y/618/0759
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	5.1 Identify suitable safety checks on welding equipment prior to use 5.2 Complete a weld on:

	the MAGS welding process		• 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

7. Tungsten-Arc Gas Shielded Welding – Low Carbon Steel

Unit References	L/618/0760
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 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

8. Tungsten-Arc Gas Shielded Welding – Stainless Steel

Unit References	R/618/0761
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 stainless steel 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

9. Tungsten-Arc Gas Shielded Welding – Aluminium

Unit References	Y/618/0762
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 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

Unit References	A/618/0771
Level	3
Credit Value	7
Guided Learning Hours	60
Unit Summary	This unit covering tungsten inert gas shielded (TAG) welding is designed to further the skills of the learner who has satisfactorily completed and achieved a level 2 qualification in fabrication and welding practice. Learners will further develop skills in the theory of safe working practice and the theoretical aspects of technology associated with this particular welding process. For this qualification all welding is to be carried out in the vertical welding position (PF/PG) covering a range of welded joints. Both the fillet weld and butt joint will be tested to ensure that they are structurally sound.
Learning Outcomes The learner will:	Assessment Criteria The learner can:

1. Understand health and safety legislation and follow safe working practices	1.1. Identify the responsibilities of both the employer and the employee when complying with the Health and Safety at Work Act 1974 1.2. Identify the use of current legislation, to include: • COSHH (Control of Substances Hazardous to Health) • PUWER (Provision and Use of Work Equipment) • RIDDOR (Reporting of Injuries, Diseases, and Dangerous Occurrences Regulations) 1.3. Identify the use of a risk assessment procedure 1.4. Identify safe working practices when using the TAG welding process, to include working: • in a confined space • at an height above 2 metres • with containers that have held chemicals or flammable liquids • in damp or wet conditions • with hazards from using high frequency units

2. Be able to identify and use, in a safe manner, equipment used for TAG welding activities	2.1. Describe the function of the equipment used in the TAG welding process, to include: • rectifier • inverter • high frequency units • welding lead cable and clamp • welding return cable and clamp • secondary earth and connector • torch • tungsten • collet • shroud • cooling system • gas supply, regulator and flow meter 2.2. Identify suitable maintenance checks that would be required on the items listed in 2.1 2.3. State the procedures to be followed for the safe storage of welding equipment when the welding activity has been completed
3. Be able to identify consumables used with the TAG welding process	3.1. Identify a range of tungsten electrodes that are used for the TAG welding process, to include: • types used • size (diameter) • alloying additions • preparation of electrode tip (shape/dimensions) 3.2. Identify a range of filler wires that are used for the TAG welding process, to include: • types used • size (diameter) • alloying additions 3.3. Describe the effects of incorrect storage of tungsten electrode and filler wires 3.4. State the effect of using damaged tungsten electrode and filler wires when carrying out welding activities 3.5. Identify the shielding gas/es used in TAG welding 3.6. Identify the function of the shielding gas used in TAG welding

4. Understand the welding parameters used when carrying out TAG welding in the vertical welding (PF/PG) position	4.1. Identify and select the welding parameters to be used when welding in the vertical welding position (PF/PG): • welding current • torch slope and tilt angles • filler wire slope and tilt angles • shielding gas flow rate • arc length • speed of travel 4.2. Identify the use of autogenous techniques when using the TAG welding process
5. Know about material preparation and the setting up of TAG welding equipment	5.1. Identify suitable welding preparations for the type of joint and material thickness being welded 5.2. Identify terms associated with welding preparations, to include: • included angle • angle of bevel • root face dimension • root gap dimension 5.3. Describe the application of distortion control techniques, to include: • pre-setting • restraint • joint geometry • chills • weld sequence 5.4. Be able to follow instructions given on a WPS (Welding Procedure Sheet)
6. Be able to complete welds in the vertical welding position (PF/PG) using the TAG welding process	6.1. Identify appropriate safety checks on the welding equipment prior to use 6.2. Select suitable welding parameters to enable the listed joints to be welded by the TAG welding process on low carbon steel or stainless steel or aluminium • tee fillet (PF) • butt (PF) • open outside corner (PF or PG) • lap joint (PF or PG)

7. Know how to carry out visual inspection and destructive tests on completed welds	7.1. Carry out visual inspection of completed welds 7.2. Prepare and carry out nick break tests on completed fillet welds 7.3. Prepare and carry out destructive tests on completed butt welds, to include: • face bend • root bend • fracture test 7.4. Record the results of the weld examination as detailed in 7.1, 7.2 and 7.3
8. Know about defects found in welds produced by the TAG welding process	8.1. Identify and describe typical defects found in the TAG welding process joints, to include: • cracks • inclusions • undercut • lack of fusion • arc craters • porosity • lack of penetration 8.2. Identify possible causes of the defects listed in 8.1

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.