Welding & Fabrication

Welding & Fabrication Level I

National Vocational Qualification

LEVEL 1 WELDING AND FABRICATION

In order to obtain this certificate, a minimum 15 credits is required and may be achieved as follows:

- All the Mandatory credits with a total of 10 credits
- The remaining 5 credits from the optional credits

QUALIFICATION SUMMARY				
UNIT	REF. NO	UNIT TITLE	CREDIT HOUR	REMARKS
UNIT 01	CON/FW/001/LI	Health and Safety	2	Mandatory
UNIT 02	CON/FW/002/LI	Communication System in a work environment	1	Mandatory
UNIT 03	CON/FW/003/LI	Team work	1	Mandatory
UNIT 04	CON/FW/004/LI	Complying with statutory regulations and organisational safety requirements	2	Mandatory
UNIT O5	CON/FW/005/LI	General Fabrication and Welding Applications	2	Mandatory
UNIT O6	CON/FW/006/LI	Marking out components for metal work	2	Mandatory
UNIT 07	CON/FW/007/LI	Producing fillet welded joints using a manual welding process	3	Optional
UNIT 08	CON/FW/008/LI	Assembly Components using Mechanical fasteners	3	Optional
UNIT 09	CON/FW/009/LI	Bending and Forming plate using power operated machines	3	Optional
UNIT 10	CON/FW/010/LI	Cutting and Shaping materials using portable thermal cutting equipment	3	Optional
UNIT 11	CON/FW/011/LI	Cutting materials using saws and abrasives	3	Optional
			25 credits	

UNIT 1: HEALTH, SAFETY AND ENVIRONMENT

Unit reference number: CON/FW/001/LI

QCF level: 1

Credit value: 2

Guided learning hours: 20 hours

Unit Purpose:

This unit covers the safe working practices and procedures to be observed when working with the selected welding equipment/general workshop and site safety, appropriate personal protective equipment, fire prevention, protecting other workers from □arc eye□, safety in enclosed/confined space, fume control, accident procedure, statutory requirement, risk assessment procedures and relevant requirements

Unit Assessment requirement:

Assessment of this unit must be at a real practical work environment, simulation is not allowed unless where indicated.

Unit assessment requirements/evidence requirements:

- Simulation
- Observation
- Work Product
- Professional Discussion
- Question and Answer

Unit 1: Health, Safety and Environment

LO (Learning outcome)	Criteria:-		Evidence Type					Evidence Ref Page number			
LO1 Work safely at all times, complying with health and safety and other relevant regulations and guidelines	1.1	Explain safe working practices and procedures to be observed when working with welding equipment .									
	1.2	List personal protective equipment									
	1.3	Identify personal protective equipment									
	1.4	Identify unsafe condition									
	1.5	Use personal protective equipment									
	1.6	Use appropriate tools in the workshop									
LO2 Safety regulations											
	2.1	Identify safety signs and codes in the workshop									
	2.2	Observe and adhere to health and safety as well as code and regulations at all times.									
	2.3	Interpret safety signs and codes									
	2.4	Explain safety signs and codes									
	2.5	Work safely to protect self and others									
	2.6	Identify unsafe acts									
	2.7	Report any incident immediately using appropriate log book.									

LO.3 Emergency procedure	3.1	Explain emergency and fire procedure									
	3.2	Demonstrate understanding of the fire extinguisher usage.									
	3.3	Follow fire and safety procedure e.g. evacuation.									
	3.4	Identify and explain the use of First aid									
	3.5	List the items in the First aid box and First aider									
	3.6	Apply First-Aid on minor injuries									

Learners Signature:	**Date:**
Assessors Signature:	Date:
IQA Signature (if sampled)	Date:
EQA Signature (if sampled)	Date:

UNIT 2: COMMUNICATION SYSTEM IN A WORK ENVIRONMENT

Unit reference number: CON/FW/002/LI

QCF level: **1**

Credit value: **1**

Guided learning hours: **10 hours**

Unit Purpose:

This unit is to establish a quality communication system that is responsive and subject to change in meeting workers and employers need in work environment.

Unit Assessment requirement

Assessment of this unit must be at a real practical work environment, simulation is not allowed unless where indicated.

Unit assessment requirements/evidence requirements

- Observation
- Work Product
- Professional Discussion
- Question and Answer

Unit 2: Communication system in work environment

LO (Learning outcome)		Criteria:-	Evidence Type					Evidence Ref Page number				
	1.1	Use verbal and non verbal means to convey necessary information e.g. body language, signs.										
	1.2	Interpret symbols and signs appropriately										
LO2 Develop the ability to identify the source of information in a work environment												
	2.1	Identify the source of information in the work environment										
	2.2	Relate effectively with the source of information										
	2.3	Use the different information flow systems in a work environment										
	2.4	Use information gathered to avoid challenges in a work situation										
	2.5	Report findings appropriately in accordance with laid down procedure in the work environment										
LO.3 Demonstrate the use of various communication means in a work environment												
	3.1	Locate the various communication equipment in the work environment										
	3.2	Use effectively the various communication equipment in a work environment.										
	3.3	Pass information effectively to the right personal.										
	3.4	Pass information effectively using symbols, signs and codes.										
	3.5	Obey instructions in line with ethics of the work environment.										

Learners Signature:	**Date:**
Assessors Signature:	Date:
IQA Signature (if sampled)	Date:
EQA Signature (if sampled)	Date:

UNIT 3: TEAMWORK

Unit reference: CON/FW/003/L1

QCF level: 1

Credit value: 1

Guided learning hours: 10 hours

Unit Purpose:

The purpose for this unit is to impact into the learner the necessary skills, knowledge and understanding required to develop team spirit and positive working relationship with colleagues.

Unit Assessment requirement

Assessment of this unit must be at a real practical work environment, simulation is not allowed unless where indicated.

Unit assessment requirements/evidence requirements

- Observation
- Work Product
- Professional Discussion
- Question and Answer

Unit 3: Teamwork

LO (Learning outcome)		Criteria:-	Evidence Type					Evidence Ref Page number			
LO 1 Positive working relationship with colleagues	1.1	Identify the need for developing positive working relationship with colleagues									
	1.2	Recognize the importance of relating with other people in a way that makes them feel valued and respected									
	1.3	Assist team members when required.									
	1.4	Communicate information to colleagues about own work that might affect others.									
	1.5	Report to the personnel when request for assistance fall outside area of responsibility.									
LO 2 Take responsibility within the team											
	2.1	Recognize own role and responsibilities within team									
	2.2	Perform individual tasks in line with the team rules and regulations.									
	2.3	Participate effectively in teamwork.									
LO.3 Compliance with policy of organization											
	3.1	Explain organizational code of conduct									
	3.2	Use organizational code of practice									
	3.3	Work in line with organizational standard.									

Learners Signature:	**Date:**
Assessors Signature:	Date:
IQA Signature (if sampled)	Date:

UNIT 4: COMPLYING WITH STATUTORY REGULATIONS AND ORGANISATIONAL SAFETY REQUIREMENTS

Unit reference number: CON/FW/004/LI

QCF level: 1

Credit value: 2

Guided learning hours: 20 hours

Unit Purpose:
This unit identifies the competencies you need to deal with statutory and organisational safety requirements in accordance with approved regulations, codes of practice and procedures

Unit Assessment requirement:
Assessment of this unit must be at a real practical work environment, simulation is not allowed unless where indicated.

Unit assessment requirements/evidence requirements:
- Simulation
- Observation
- Work Product
- Professional Discussion
- Question and Answer

Unit 4: Complying with statutory regulations and organisational safety requirements

LO (Learning outcome)	Criteria:-		Evidence Type					Evidence Ref Page number			
LO1 Comply with own duties and obligations as defined in the Health and Safety at Work Act	1.1	List Personal Protective Equipment, e.g. hard hat, welding shield, hand gloves, etc									
	1.2	Identify Personal Protective Equipment									
	1.3	Explain uses of Personal Protective Equipment									
	1.4	Explain sources of getting Personal Protective Equipment									
LO2 Present self in the workplace suitably prepared for the activities to be undertaken	2.1	Identify Personal Protective Equipment (PPE) needed for own role									
	2.2	Explain the uses of PPE as it relates to work at hand									
	2.3	Dress correctly in Personal Protective Equipment (PPE)									
LO.3 Accident and Emergencies	3.1	Define accident									
	3.2	List causes of accident									
	3.3	Explain ways of preventing accident									
	3.4	Prevent accident within capacity in work environment.									
	3.5	Report accident (possible/pending) to the appropriate personnel									
LO.4 Controlling hazards in the workplace	4.1	Identify possible prone hazards within work environment.									
	4.2	List causes of hazards									
	4.3	Identify and locate and first aider									
LO. 5 Using correct manual lifting and carrying techniques	5.1	List possible items requiring lifting within the work environment									
	5.2	Identify lifting and carrying procedures adopted within work environment									
	5.3	Comply with workplace laid down procedures in manual lifting and carrying techniques									

LO.6 Applying safe working practices and procedures	6.1	Observe proper housekeeping in compliance with work environment procedure										
	6.2	Put on appropriate Personal Protective equipment (PPE) always										
	6.3	Carry put duties in compliance to work place procedures										

Learners Signature:	**Date:**
Assessors Signature:	Date:
IQA Signature (if sampled)	Date:
EQA Signature (if sampled)	Date:

UNIT 5: GENERAL FABRICATION AND WELDING APPLICATIONS

Unit reference number: **CON/FW/005/L1**

QCF level: **1**

Credit value: **2**

Guided learning hours: **20 hours**

Purpose:
This standard covers a broad range of basic fabrication, assembly and welding competences that will prepare you for entry into the engineering or manufacturing sectors, creating a progression between education and employment, or that will provide a basis for the development of additional skills and occupational competences in the working environment.
You will be expected to carry out practical exercises in order to gain an understanding of how these fabrication, assembly and welding activities are undertaken, the type of equipment used and the manufacturing techniques and operating and safety procedures that are required.

Unit Assessment requirement:
Assessment of this unit must be at a real practical work environment, simulation is not allowed unless where indicated.

Unit assessment requirements/evidence requirements:
- Observation
- Work Product
- Professional Discussion
- Question and Answer

Unit 5: General Fabrication and Welding Applications

LO (Learning outcome)		Criteria:-	Evidence Type					Evidence Ref Page number			
LO1 Work safely at all times, complying with health and safety and other relevant regulations and guidelines	1.1	Describe safe working practices and procedures to be observed when working with the selected marking out equipment.									
	1.2	List personal protective equipment									
	1.3	Identify personal protective equipment									
	1.4	Identify hazards in workplace									
	1.5	Handle personal protective equipment									
	1.6	Use personal protective equipment									
LO2 Use welding procedure specification											
	2.1	Explain welding procedure specifications i.e. drawings, methods, materials, current, thickness, position, et.c									
	2.2	Determine what has to be done and how you are going to do it.									
	2.3	Read relevant information to own role									
LO3 Select appropriate tools and equipment for the fabrication and welding processes.											
	3.1	List the equipment relevant to welding and fabrication									
	3.2	Identify the equipment relevant to welding and fabrication processes									
	3.3	Use the tools and equipment for the welding and fabrication operations.									
LO4 Using appropriate tools and techniques											
	4.1	Identify tools for marking out.									
	4.2	Use standard marking out tools									
	4.3	Observe standard marking out techniques									
	4.4	Cut and shape the materials to the required specification, using appropriate tools and techniques									
	4.5	Cut given materials according to specifications									
LO.5 Couple assembling.	5.1	Use the appropriate methods and techniques to assemble and secure the components in their correct positions									
	5.2	Measure and check that all dimensional and geometrical aspects of the component are to the specification									
	5.3	Identify proper tools for measurement									

Unit 5: General Fabrication and Welding Applications

LO 6 Dealing with difficult problems	6.1	List problems encountered during the fabrication and welding processes									
	6.2	Report problems that are unsolved to a higher authority									
	6.3	Record problems and log accordingly									
LO.7 Proper housekeeping	7.1	Perform shut down of all equipment and machineries according to laid down procedures									
	7.2	Carry out proper housekeeping									
	7.3	Gather and return tools to their proper positions									
	7.4	Leave the work area in a safe and tidy condition on completion of the manufacturing activities									

Learners Signature:	**Date:**
Assessors Signature:	Date:
IQA Signature (if sampled)	Date:
EQA Signature (if sampled)	Date:

UNIT 6: MARKING OUT COMPONENTS FOR METAL WORK

Unit reference number: CON/FW/006/L1

QCF level: **1**

Credit Value: **2**

Guided learning hours: **20 hours**

Unit Purpose:

This standard identifies the competencies you need to mark out sheet and plate work (including simple templates), and rolled sections in accordance with approved procedures. You will be required to select the required materials to use and the appropriate marking out tools and equipment based on the information presented to you and the accuracy to be achieved. Marking out will be the preparation required for cutting, shaping and forming sheet materials, plate and sections as is appropriate to the application and will include marking out work pieces datums, centre lines, angles and curved details, cutting and bending details including bending allowances and hole centering and outlining details

Unit Assessment requirement:

Assessment of this unit must be at a real practical work environment, simulation is not allowed unless where indicated.

Unit assessment requirements/evidence requirements:

- Observation
- Work Product
- Professional Discussion
- Question and Answer

Unit 6: Marking out components for metal work

LO (Learning outcome)		Criteria:-	Evidence Type					Evidence Ref Page number			
LO1 Work safely at all times, complying with health and safety and other relevant regulations and guidelines	1.1	Describe safe working practices and procedures to be observed when working with the selected marking out equipment (general workshop and site safety, appropriate personal protective equipment, fire prevention, protecting other workers from `arc eye', safety in enclosed/confined spaces; fume control; accident procedure; statutory requirements, risk assessment procedures and relevant requirements of Health and Safety at Work etc. ACT, 1974 (HASAWA), Control of Substances Hazardous to Health (COSHH) and Work Equipment Regulations; safe disposal of waste materials)									
	1.2	List personal protective equipment									
	1.3	Identify personal protective equipment									
	1.4	Identify hazards in workplace									
	1.5	Handle personal protective equipment									
	1.6	Use personal protective equipment									
LO2 Using correct information for marking out											
	2.1	Sketch a rough work of what is to be marked									
	2.2	Determine the dimensions to be marked out									
	2.3	Selecta a proper cutting procedure.									
	2.4	Use correct information for marking out									
LO.3 Preparing suitable datums and marking out surfaces											
	3.1	Make a rough sketch of the components to be cut out									
	3.2	Ensure cut out are dimensionaly accurate									
	3.3	Use recognized marking out conventions									

	3.4	Produce mark out components in accordance to company standard									
		code of practice									
	3.5	Prepare suitable datums and marking out									
LO 4 Methods of marking out	4.1	Use steel chalks for marking out in order to ensure a straight cut									
	4.2	Ensure dimensional check of cut-out product in line with drawing.									
	4.3	Observe procedures of job instructions									
	4.4	Interpret 1st and 3rd angle projection									
	4.5	Mark out using appropriate methods									
LO.5 Marking out in compliance with specification.	5.1	Initiate marking out in accordance to specification									
	5.2	Use procedures that enhance clarity, accuracy and safety while marking out.									
	5.3	Observe principles of marking out and developing basic shapes									
	5.4	Identify material characteristics while marking out									
LO. 6 Deal promptly and effectively with problems within your control and report those that cannot be resolved	6.1	Enumerate difficulties encountered that require attention such as if electrodes were damp.									
	6.2	Report problems that cannot be solved to higher authority									

Learners Signature:	**Date:**
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EQA Signature (if sampled)	Date:

UNIT 7: PRODUCING FILLET WELDED JOINTS USING A MANUAL WELDING PROCESS

Unit reference number: CON/FW/007/LI

QCF level: 1

Credit value: 3

Guided learning hours: 30 hours

Unit Purpose:

This unit covers the skill and knowledge needed to produce fillet welds in plate, sheet or sections, and/or fillet welded joints in pipe/tube, using a manual welding process such as manual metal arc, MIG, MAG, TIG, flux- cored wire, inert shield or gas welding equipment, in accordance with instructions and/or approved welding procedures.

This unit will require a learner to demonstrate his capability to produce the fillet welds of the required quality, and this could be through tests according to BS 4872 ,EN 287, IOS, NIS or AWS

Unit Assessment requirement:

Assessment of this unit must be at a real practical work environment, simulation is not allowed unless where indicated.

Unit assessment requirements/evidence requirements:

- Observation
- Work Product
- Professional Discussion
- Question and Answer

Unit 7: Producing fillet welded joints using a manual welding process

LO (Learning outcome)		Criteria:-	Evidence Type					Evidence Ref Page number			
LO1 Work safely at all times, complying with health and safety and other relevant regulations and guidelines	1.1	Describe safe working practices and procedures to be observed when working with the selected welding equipment (general workshop and site safety, appropriate personal protective equipment, fire prevention, protecting other workers from `arc eye', safety in enclosed/confined spaces; fume control; accident procedure; statutory requirements.,									
	1.2	Explain risk assessment procedures and relevant requirements of HASAWA, COSHH and Work Equipment Regulations; safe disposal of waste materials)									
	1.3	Identify Personal Protective Equipment (PPE)									
	1.4	Identify hazards in workplace									
	1.5	Handle personal protective equipment in accordance with manufacturers regulations.									
	1.6	Use personal protective equipment as it relates to your own role.									
LO2 Follow the relevant joining procedure and job instructions	2.1	Select materials to be joined for preparation									
	2.2	Identify materials for preparing joints for weld									
	2.3	Select methods to prepare joints for weld e.g. grinding, filing									
LO3 Edge preparation	3.1	Select tools/equipment to prepare joint for welding e.g. grinding machine									
	3.2	Grind edge to remove burns									
	3.3	Use brush to remove impurities									
LO4 Joining related equipment and consumables.	4.1	Select appropriate electrode for welding									
	4.2	Select appropriate weld current									
	4.3	Tack to hold materials together									
	4.4	Select suitable position for the weld									
	4.5	Run the weld									
LO 5 Make the joints as specified using the appropriate thermal joining technique	5.1	Select materials to be joined									
	5.2	Prepare joint									
	5.3	Select the appropriate electrode for the welding									

	5.4	Select the appropriate current for the weld									
	5.5	Run the weld									
LO.6 Produce joints of required quality and of specified dimensional accuracy	6.1	Select materials to be joined									
	6.2	Mark materials using appropriate measuring and marking out tools									
	6.3	Cut materials to size									
	6.4	Prepare edges to be joined									
	6.5	Select appropriate electrode									
	6.6	Select appropriate current									
	6.7	Tack to hold									
	6.8	Run the weld									
LO.7 Shutting down of the equipment to a safe condition on completion.	7.1	Return the tools to their proper position									
	7.2	Clean the work environment									
	7.3	Switch-off equipment and machineries from power source									
L.O 8 Deal promptly with excess and waste materials and temporary attachments, in line with approved and agreed procedures	8.1	Dispose waste materials (off-cuts) properly in line with organizational procedure.									
	8.2	Dispose used consumables e .g electrodes, used grinding and cutting disc, etc.									
L.O 9 Deal promptly and effectively with problems within own responsibilities.	9.1	Enumerate difficulties encountered that require attention such as if electrodes were damp									
	9.2	Report problems that cannot be solved to appropriate personnel.									

Learners Signature:	**Date:**
Assessors Signature:	Date:
IQA Signature (if sampled)	Date:
IQA Signature (if sampled)	Date:

UNIT 8: ASSEMBLING COMPONENTS USING MECHANICAL FASTENERS

Unit reference number: CON/FW/008/L1

QCF level: **1**

Credit value: **3**

Guided learning hours: **30 hours**

Purpose:

This unit identifies the competencies you need to undertake the preparation and making of joints between fabricated components, using mechanical means, in accordance with approved procedures. You will be required to produce suitable and appropriate joints, using appropriate methods for the materials to be joined that meet the specified conditions and subsequent operating conditions to be demanded of the joint. Particular care should be exercised in the preparation and finishing of the materials, so that the finished component is fit for purpose and meets the level of accuracy required.

Unit Assessment requirement:

Assessment of this unit must be at a real practical work environment, simulation is not allowed unless where indicated.

Unit assessment requirements/evidence requirements:

- Observation
- Work Product
- Professional Discussion
- Question and Answer

Unit 8: Assembly Components using Mechanical fasteners

LO (Learning outcome)		Criteria:-	Evidence Type					Evidence Ref Page number			
LO1 Work safely at all times, complying with health and safety and other relevant regulations and guidelines	1.1	Identify safety signs and equipment.									
	1.2	Use appropriate personal protective equipment always									
	1.3	Observe safety rules and regulations									
	1.4	Handle personal protective equipment									
	1.5	Use personal protective equipment									
LO2 Assemble drawings and any other specifications	2.1	Produce temporary and permanent assembly									
	2.2	Use proper Personal Protective Equipment (PPE)									
	2.3	Follow the relevant assembly drawings and any other specifications									
LO3 Required components specified components	3.1	Identify the components to be used									
	3.2	Use known assembly methods									
	3.3	Ensure components identified are usable									
LO4 Assembly methods and techniques	4.1	List appropriate methods and techniques in assembling components.									
	4.2	Identify the components to be assembled									
	4.3	Use the appropriate methods and technique to assemble the components in their correct position									
LO 5 Secure the components using the specified connectors and securing devices	5.1	Identify connectors and securing devices									
	5.2	List out connectors and securing devices as specified									
	5.3	Secure assembled materials with quality methods applicable to the standard.									
	5.4	Produce assembled joint that are free and clear off burns under specified conditions.									

Unit 8: Assembly Components using Mechanical fasteners (cont)

LO (Learning outcome)		Criteria:-	Evidence Type					Evidence Ref Page number			
LO.6 Ensuring complete assembly	6.1	List assembled components									
	6.2	List the procedures of preparation to carry out before assembly									
LO.7 Dealing with difficult problems encountered	7.1	List the problems encountered during assembly									
	7.2	Identify the problems encountered									
	7.3	Record and Report problems encountered to a higher authority									

Learners Signature:	**Date:**
Assessors Signature:	Date:
IQA Signature (if sampled)	Date:
EQA Signature (if sampled)	Date:

UNIT 9: BENDING AND FORMING PLATES USING POWER OPERATED MACHINES

Unit reference number: CON/FW/009/LI

QCF level: **1**

Credit value: **3**

Guided learning hours: **30 hours**

Unit Purpose:

This standard identifies the competencies you need for bending and forming plate (of 3mm and above) for fabrications using power operated equipment such as press brakes, bending machines and power presses, in accordance with approved procedures. The leaner will be required to operate the appropriate bending and forming equipment, in accordance with the instructions for the operations being performed.

The leaner will need to ensure that all the required safety devices are operating correctly, and that the machine guards are in place and correctly adjusted.

Items to be bent and formed may include ferrous and non-ferrous materials, and tasks will include producing bends of various angles, setting plate ends for rolling operations, and producing curved sections.

Unit Assessment requirement:

Assessment of this unit must be at a real practical work environment, simulation is not allowed unless where indicated.

Unit assessment requirements/evidence requirements:

- Observation
- Work Product
- Professional Discussion
- Question and Answer

Unit 9: Bending and Forming plates using power operated machines

LO (Learning outcome)		Criteria:-	Evidence Type					Evidence Ref Page number			
LO1 Work safely at all times, complying with health and safety and other relevant regulations and guidelines	1.1	Identify laid down safety precautions when operating bending and forming machines in a fabrication environment									
	1.2	Use correct protective clothing, and handling precautions to be taken, when working with heavy plate work									
	1.3	List the hazards associated with power operated bending and forming processes (such as handling heavy sheet materials and components; operating moving equipment; using faulty or badly maintained tools and equipment), and how they can be minimised									
LO2 Bending and Forming operations.											
	2.1	List the correct methods of moving or lifting sheet or plate materials.									
	2.2	Identify the safe working practices and procedures required for operating power-operated bending machines, checking their brakes, their roles and power press									
	2.3	List the correct equipment set up in the bending and forming operations.									
LO3 Safe machine operations and control											
	3.1	List the safe working practices and procedures required for operating power-operated bending machines									
	3.2	Identify various types of power-operated bending machines that are used, and their applications									
	3.3	List bending operation to achieve bending at 90^{o}									
	3.4	List operational bending procedures as stipulated.									
	3.5	Carry out simple machine controls safely.									
LO4 Produce components to the required specification											
	4.1	Transfer dimensions from drawings to template									
	4.2	Cut templates to shape									
	4.3	Dull/remove sharp edges from bended and formed components.									
	4.4	Identify marking out conventions applicable to the bending process (centre lines; bending lines)									
	4.5	Identify materials that can be bent/formed.									
	4.6	Identify bending materials									

	4.7	List bending specifications, schedules and procedures.									
LO.5 Problem solving and control. .	5.1	State the need to take care of the bending/forming tools and equipment;									
	5.2	Identify faulty/damaged bending/forming tools									
	5.3	Store bending and forming tools in their respective units.									
	5.4	List the problems encountered during bending and forming activities.									
	5.5	Demonstrate accuracy in bending/forming processes									
	5.6	Report problems encountered to authorized personnel.									
LO.6 Task completion	6.1	List problems encountered during bending and forming processes									
	6.2	Report problems, resolved and unresolved to higher authority.									
	6.3	List the process of shutting down equipment									
	6.4	List the cleaning procedures after carrying out bending activities.									
	6.5	Shut down the equipment to a safe condition on conclusion of the bending activities									
	6.6	Perform cleaning exercises after bending activities in accordance to regulations									

Learners Signature:	**Date:**
Assessors Signature:	Date:
IQA Signature (if sampled)	Date:
EQA Signature (if sampled)	**Date:**

UNIT 10: CUTTING AND SHAPING MATERIALS USING PORTABLE THERMAL CUTTING EQUIPMENT

Unit reference number: CON/FW/010/LI

QCF level: 1

Credit value: 3

Guided learning hours: 30 hours

Unit Purpose:

This unit identifies the competencies needed for cutting and shaping plate (3mm thickness and above), rolled sections, pipe and tube for fabrications using portable thermal cutting equipment in accordance with approved procedures. The equipment to be used will include hand held gas cutting equipment, plasma cutting equipment and simple portable machines running on tracks.

Unit Assessment requirement:

Assessment of this unit must be at a real practical work environment, simulation is not allowed unless where indicated.

Unit assessment requirements/evidence requirements:

- Observation
- Work Product
- Professional Discussion
- Question and Answer

Unit 10: Cutting and shaping materials using portable thermal cutting equipment

LO (Learning outcome)		Criteria:-	Evidence Type					Evidence Ref Page number			
LO 1 Work safely at all times, complying with health and safety and other relevant regulations and guidelines	1.1	List safety precautions to be adhered to when working with thermal cutting equipment in a fabrication environment.									
	1.2	Use correct personal protective clothing and equipment when working with fabrication and thermal cutting equipment (leather aprons and gloves, eye protection, safety helmets etc.)									
	1.3	Identify the correct methods of moving or lifting plate materials and components									
	1.4	Recognize the hazards associated with thermal cutting equipment in line with relevant codes of practice, procedures and permit to work. (Examples of the hazards include naked flames, fumes and gases, explosive gas mixtures, oxygen enrichment, spatter, hot metal, elevated working, enclosed spaces)									
	1.5	Carry out safe working practices and procedures for using thermal equipment in line with relevant codes of practice, (including setting up procedures, permit to work procedures and emergency shut - down procedures.									
LO.2 Equipment set-up.											
	2.1	List safe working practices and procedures for using thermal equipment in line with relevant codes of practice, to include setting up procedures, permit to work procedures and emergency shutdown procedures									
	2.2	Identify equipment suitable for the operations to be performed									
	2.3	Ensure that the regulators, hoses and valves are securely connected and free from leaks and damage									
	2.4	Ensure that the machine is set up and ready for the machining activities to be carried out									

Unit 10: Cutting and shaping materials using portable thermal cutting equipment (cont)

LO (Learning outcome)		Criteria:-	Evidence Type					Evidence Ref Page number			
LO.3 Equipment control.	3.1	Carry out transfer of drawing to template									
	3.2	Identify relevant engineering symbols and drawings									
	3.3	Perform thermal cutting operations to produce **six** of the following features: - down-hand straight cuts freehand - square/rectangular shapes - round holes - straight cuts track guided - irregular shapes - square holes - vertical cuts - angled cuts - rough cutting (demolition) - overhead cuts - external curved contours - bevelled edge - weld preparations - etc.									
LO.4 Quality checks and control	4.1	Identify various thermal cutting equipment,									
	4.2	Identify thermal cutting activities in accordance to specification such as: - Oxy-acetylene cutting (gas cutting) - Profile cutting equipment - Electrode cutting equipment - etc									
	4.3	Use appropriate holding methods to aid thermal cutting and equipment.									
	4.4	Produce thermal cuts in **four** of the following forms of material (metal of 3mm and above and two different thickness: - plate - rolled sections - structures - bar - pipe/tube									

Unit 10: Cutting and shaping materials using portable thermal cutting equipment (cont)

LO (Learning outcome)		Criteria:-	Evidence Type					Evidence Ref Page number			
	4.5	Produce cut profiles for **one** type of									
		material from the following: □ mild steel □ special steels □ stainless steel □ other appropriate metal									
	4.6	Produce components to the required quality and within the specified dimensional accuracy.									
	4.7	Prepare prior to cutting (checking connections for leaks, setting gas pressures, setting up the material/workpiece, checking cleanliness of materials used)									
	4.8	Observe appropriate setting of operating conditions; flame control and the effects of mixtures and pressures associated with thermal cutting.									
	4.9	Carry out the correct procedure for lighting and extinguishing the flame.									
	4.10	Explain procedures to be followed for cutting specific materials, and why these procedures must always be adhered to.									
LO.5 Effective problem solving.	5.1	Identify problems encountered during cutting and shaping activities									
	5.2	State the need to take care of the bending tools and equipment.									
	5.3	Identify faulty or damaged forming tools.									
	5.4	Store bending and forming tools in their respective units									
	5.5	Carry out dimensional and forming checks on materials, tools and equipment									
	5.6	Identify accuracy and limitation of processes.									

Unit 10: Cutting and shaping materials using portable thermal cutting equipment (cont)

LO (Learning outcome)		Criteria:-	Evidence Type					Evidence Ref Page number			
	5.7	Report problems encountered to higher authority									
LO.6 Work completion.	6.1	List problems encountered during bending and forming processes.									
	6.2	Report problems, resolved and unresolved to higher authority.									
	6.3	List the cleaning procedure after carrying out cutting and shaping activities with portable thermal cutting equipment.									
	6.4	Shut down the equipment to a safe condition on conclusion of the machining activities									
	6.5	Perform cleaning exercise after carrying out cutting and shaping activities with portable thermal cutting equipment in accordance to regulations.									

Learners Signature:	**Date:**
Assessors Signature:	Date:
IQA Signature (if sampled)	Date:
EQA Signature (if sampled)	**Date:**

UNIT 11: CUTTING MATERIALS USING SAWS AND ABRASIVES

Unit reference number: CON/FW/011/LI

QCF level: **1**

Credit value: **3**

Guided learning hours: **30 hours**

Unit Purpose:

This unit identifies the competencies you need to cut and shape materials using saws and abrasive discs in accordance with approved procedures.

The learner will be required to select the appropriate equipment for the operations to be carried out and check that it is in a safe and usable condition. In carrying out the cutting and shaping operations, it is expected that the leaner will use both saws and abrasive discs to cut and shape the materials to the required accuracy and specification.

Unit Assessment requirement:

Assessment of this unit must be at a real practical work environment, simulation is not allowed unless where indicated.

Unit assessment requirements/evidence requirements:

- Observation
- Work Product
- Professional Discussion
- Question and Answer

Unit 11: Cutting materials using saws and abrasives discs

LO (Learning outcome)		Criteria:-	Evidence Type					Evidence Ref Page number			
LO 1 Work safely at all times, complying with health and safety and other relevant regulations and guidelines	1.1	List safety precautions to be taken when working in a fabrication environment.									
	1.2	Use correct personal protective clothing and equipment that needs to be worn when carrying out the fabrication activities (leather gloves, eye protection, safety helmets etc.)									
	1.3	Identify safe working practices and procedures when working with the machines including emergency shutdown procedures									
	1.4	List the correct methods of moving or lifting heavy plate or rolled sections									
LO.2 Machine set-up											
	2.1	Identify cutting equipment e.g. - Saws (Manual and Power) - abrasive disc									
	2.2	Ensure that the selected machines are properly connected to power source and ready for use.									
	2.3	Ensure that machine is in a serviceable condition									
	2.4	List any possible obstruction during cutting activities									
	2.5	Ensure that machine is set up and ready for the machining activities to be carried out									
LO.3 Safety and Quality control											
	3.1	Identify necessary drawings for cutting activities. .									
	3.2	Use details from engineering drawings to produce templates.									
	3.3	Perform cutting activities to achieve safety requirement.									
	3.4	Position materials to required angle.									
	3.5	Identify type of disc that are used for cutting.									
	3.6	List safely procedures for carrying out cutting activities.									
	3.7	Measure and cut components to specification.									
	3.8	List safely procedure for carrying out cutting activities									
	3.9	List tools/equipment used to check to ensure dimension and accuracy.									

Unit 11: Cutting materials using saws and abrasives discs

LO (Learning outcome)		Criteria:-	Evidence Type					Evidence Ref Page number			
	3.6	Construct components tin compliance to **one** of the following accuracy standards: dimensional accuracy within specification tolerances cut square, clean and free from excessive burrs angled cuts within specification requirements									
PO.4 Effective problem solving	4.1	Identify problems encountered during cutting activities									
	4.2	State the need to take care of the cutting tools and equipment;									
	4.3	List faulty or damaged cutting tools;									
	4.4	Store cutting tools in their respective units									
	4.5	Report the problems encountered during cutting activities.									
	4.6	Carry out dimensional and cutting checks on materials.									
	4.7	Follow organizational procedures for reporting incidents to higher authority.									
	4.8	Report problems solved and unresolved to the supervisor.									
LO.5 Safe task completion	5.1	List problems encountered during cutting									
	5.2	Communicate problems, resolved and unresolved to higher authority.									
	5.3	Shut down equipment to a safe condition on conclusion of a job schedule.									
	5.4	List the procedure for shutting down machines after carrying out a job schedule i.e. cutting operation using saws and abrasives discs.									

Learners Signature:	**Date:**
Assessors Signature:	Date:
IQA Signature (if sampled)	Date:
EQA Signature (if sampled)	**Date:**