NATIONAL BOARD FOR TECHNICAL EDUCATION

KADUNA

NATIONAL SKILLS QUALIFICATIONS

(NSQ)

WELDING AND FABRICATION

AUGUST, 2021

OVERVIEW

This qualification is for those interested in developing a career in welding industry for the award of National Skills Qualifications (NSQ). It is aimed at producing Welder Assistant at NSQ level 1, Intermediate Welder at NSQ level 2 and Welder at NSQ level 3&4 with the competencies to read drawing, produce sound weld, carry out weld repair, fabrications and supervision.

This qualification is subject to review based on the requirements of the relevant sector.

WELDER ASSISTANT

NSQ LEVEL 1

QUALIFICATION PURPOSE

This qualification is for those interested in developing a career in welding industry. It is aimed at the ability of the learner acquiring sufficient knowledge and skills in the work environment to produce sound welds, carry out basic repairs and fabrication, and support experienced workers in the industry.

NSQ LEVEL: 1

At the end of the Units within this level, the Learner should be able to:

1. Understand and demonstrate safe work practices and instructions
2. Communicate effectively in work environment.
3. Work effectively in a team.
4. Understand basic welding science
5. Demonstrate knowledge and skills in the use of basic tools in welding and fabrication.
6. Measure and mark-out for welding operation.
7. Carry out cutting and grinding operations.
8. Sketch and interpret simple drawings for welding and fabrication.
9. Carry out basic manual metal arc (MMA) welding operations.
10. Carry out basic gas welding operations.
11. Carry out simple plastic welding operations.

NSQ LEVEL 1 – WELDER ASSISTANT

Unit No	Reference Number	NOS Title	Credit Value	Guided Learning Hours	Remark
01	ENGG/WF/001/L1	Health, safety and environment	1	10	Mandatory Unit
02	ENGG/WF/002/L1	Communication system in the work environment	1	10	Mandatory Unit
03	ENGG/WF/003/L1	Team work	1	10	Mandatory Unit
04	ENGG/WF/004/L1	Basic Welding Science	2	20	Mandatory Unit
05	ENGG/WF/005/L1	Basic Tools	2	20	Mandatory Unit
06	ENGG/WF/006/L1	Measurement and Marking Out	2	20	Mandatory Unit
07	ENGG/WF/007/L1	Cutting and Grinding Operation	2	20	Mandatory Unit
08	ENGG/WF/008/L1	Basic Drawing and Interpretation	2	20	Mandatory Unit
09	ENGG/WF/009/L1	Arc Welding (MMA)	4	40	Mandatory Unit
10	ENGG/WF/010/L1	Gas Welding I	3	30	Mandatory Unit
11	ENGG/WF/011/L1	Plastic Welding I	2	20	Mandatory Unit
TOTAL			22	220	

NOTE: This is a 22 credit unit qualification. To achieve this qualification; Learners are required to achieve all credits units. Each Credit is equivalent to 10 Guided Learning Hours (GLH). The Total Learning Hours will therefore consist of the GLH *plus* the independent learning hours of the candidate, which is generally 50% – 150% of the GLH. ***The actual Total Learning Hours for each Credit will then be a minimum of 15 hours***.

GENERAL GUIDE

Unit title	Provides a clear explanation of the content of the unit.
Unit number	The unique number assigned to the unit
Unit reference	The unique reference number given to each unit at qualification approval by NBTE
Unit level	Denotes the level of the unit within the National Skills Qualifications Framework NSQF.
Unit credit value	The value that has been given to the unit based on the expected learning time for an average learner. 1 credit = 10 learning hours
Unit aim	Provides a brief outline of the unit content.
Learning Outcome	A statement of what a learner will know, understand or be able to do, as a result of learning process.
Assessment criteria	A description of the requirements a learner must achieve to demonstrate that a learning outcome has been met.
Unit assessment guidance	Any additional guidance provided to support the assessment of the unit.
Unit guided learning hours	The average number of hours of supervised or directed study time or assessment required to achieve a qualification or unit of a qualification.

UNIT 1: HEALTH, SAFETY AND ENVIRONMENT

Unit Reference Number: ENGG/WF/001/L1

NSQ Level 1: WELDER ASSISTANT

Credit Value: 1

Guided Learning Hour: 10 hours

Unit Purpose: This unit is designed to provide the trainee with the knowledge and skills required for health and safety in work environment.

Objectives:

At the end of this unit, the learner should be able to:

1. Understand work environment
2. Know Safety rules and regulations in a work place.
3. Understand first aid procedures

Unit Assessment Requirements/ Evidence Requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 1: Health, Safety and Environment

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 Know work environment	1.1	Explain work environment									
	1.2	Explain workshop layout: • Gangway • Work Area • Store • Changing room • Entrance and Exit points • Muster Point • Emergency Exit									
	1.3	Identify safety signs and symbols in a workshop									
	1.4	Identify the positions of the following in the workshop: • First aid box • Fire extinguisher • Sand bucket • Mains switches									
LO 2 Know Safety rules and regulations in a work place	2.1	Explain the importance of working safely in a work environment									
	2.2	List Personal Protective Equipment (PPE) in welding operations									
	2.3	Identify Personal Protective Equipment (PPE)									
	2.4	Explain causes of accident in the workshop • Horseplay • Spills • Poor housekeeping • Loose electrical fittings • Inappropriate use of tools and equipment									
	2.5	Explain how to prevent hazards in work environment									
	2.6	Demonstrate how to prevent hazards in work environment									

LO 3 Know first aid procedure	3.1	Define first aid									
	3.2	List the items in the first aid box									
	3.3	Explain how to administer simple first aid.									
	3.4	Report accident or near-miss to appropriate authority									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 2: **COMMUNICATION SYSTEM IN WORK ENVIRONMENT**

Unit Reference Number: **ENGG/WF/002/L1**

NSQ Level 1: **WELDER ASSISTANT**

Credit Value: 1

Guided Learning Hour: 10 hours

Unit Purpose: This unit is aimed at providing the trainee with basic knowledge and skills for effective communication in work place.

Objectives:

At the end of this unit, the learner should be able to:

1. Communicate effectively in the work environment
2. Develop the ability to identify the source of information in a work environment
3. Know the various communication means in a work environment

Unit Assessment Requirements/ Evidence Requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 2: Communication System in Work Environment

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 Communicate effectively in the work environment	1.1	Define communication in work environment.									
	1.2	List methods of communication in work environment.									
	1.3	Explain verbal communication in work environment									
	1.4	Explain non-verbal communication in work environment									
LO 2 Develop the ability to identify the source of information in a work environment	2.1	List the sources of information in the work environment									
	2.2	Explain the different information flow systems in a work environment									
	2.3	Report findings correctly as expected in the work environment									
LO 3 Know the various communication means in a work environment	3.1	List communication equipment									
	3.2	Use effectively the various communication equipment in a work environment									
	3.3	Apply appropriate workplace terminologies and jargons									
	3.4	Pass information correctly									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
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Name of the Organisation submitting the unit	
Guided Learning Hours	

UNIT 3: TEAMWORK

Unit Reference Number: ENGG/WF/003/L1

NSQ Level 1: WELDER ASSISTANT

Credit Value: 1

Guided Learning Hour: 10 hours

Unit Purpose: This unit is designed to acquaint the learner with necessary knowledge and skills required to develop team spirit and positive working relationship with co-workers.

Objectives:

At the end of this unit, the learner should be able to:

1. Develop good working relationship with co-workers
2. Take responsibility within the team
3. Comply with rule of the organisation

Unit Assessment Requirements/ Evidence Requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 3: Teamwork

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 Develop good working relationship with co-workers	1.1	Define teamwork									
	1.2	List the importance of teamwork									
	1.3	List the qualities of a team player									
LO 2 Take responsibility within the team	2.1	List own roles and responsibilities within a team.									
	2.2	Perform tasks in line with the team rules and regulations.									
	2.3	work well in a group.									
LO 3 Comply with rule of organisation	3.1	Explain code of conduct in work environment									
	3.2	Use organisational code of practice									
	3.3	Work in line with organisational standard.									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
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Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 4: **BASIC WELDING SCIENCE**

Unit Reference Number: **ENGG/WF/004/L1**

NSQ Level 1: **WELDER ASSISTANT**

Credit Value: 2

Guided Learning Hour: **20 Hours**

Unit Purpose: This unit is designed to acquaint the learner with necessary knowledge on basic welding science.

Objectives:

At the end of this unit, the learner should be able to:

1. Understand Basic Electricity
2. Understand Heat and its effects
3. Understand Change of state
4. Understand Basic Chemical reactions during welding
5. Know types of metals

Unit Assessment Requirements/ Evidence Requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 4: Basic Welding Science

LO (Learning Outcome)		Criteria	Evidence type					Evidence reference page number			
LO1 Understand Basic Electricity	1.1	Define Electricity									
	1.2	Explain Electrons and Ions									
	1.3	Define Energy									
	1.4	State different types of energy and how they are converted									
	1.5	Define: • Electric current and types • Voltage and types • Resistance • Electric power									
	1.6	Differentiate between AC and DC									
	1.7	Define polarity									
	1.8	Explain change in polarity									
LO2 **Understand Heat and its effect**	2.1	Define temperature									
	2.2	State units of temperature									
	2.3	Explain instruments used in measuring temperature									
	2.4	State the melting points of metals such as mild steels, stainless steels, aluminum, copper etc.									
	2.5	Define heat energy									
	2.6	Explain the following: • Expansion • Contraction • Heating • Quenching									
	2.7	Define conductor and insulator									

	2.8	Identify conductors and Insulators									
LO3 **Understand Change of state**	3.1	Define matter									
	3.2	List states of matter									
	3.3	Explain how matter changes from one state to another									
	3.4	Explain how metal change from Solid state to Liquid and from Liquid to Solid									
LO4 Understand Basic Chemical reaction during welding	4.1	Define bonding									
	4.2	State types of bonding									
	4.3	Explain how metals bond together during welding									
	4.4	Explain effect of hydrogen, oxygen and nitrogen gas in metal during welding									
LO 5 Know types of metals	5.1	Define metals and non-metals									
	5.2	Explain classes of metals									
	5.3	List the different shapes of metals									
	5.4	List properties of metal									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
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Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 5: BASIC TOOLS

Unit Reference Number: **ENGG/WF/005/L1**

NSQ Level 1: **WELDER ASSISTANT**

Credit Value: 2

Guided Learning Hour: **20 hours**

Unit Purpose: This unit is designed to provide the trainee with the knowledge and skills to use basic tools for welding and fabrication operations

Objectives:

At the end of this unit, the learner should be able to:

1. Use basic tools
2. Know maintenance and care of tools
3. Know tools requisition method

Unit Assessment Requirements/ Evidence Requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 5: Basic Tools

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 **Use basic tools**	1.1	Explain basic tools									
	1.2	List 5 basic tools for the following fitting operations: measuring, marking out, cutting, grinding and handling.									
	1.3	Apply appropriate tools for measuring and marking - out operations									
	1.4	Apply appropriate tools for cutting operation									
	1.5	Apply appropriate tools for grinding operations activities									
	1.6	Apply appropriate tools for handling activities									
	1.7	Apply safe use of tools in 1.3 - 1.6 above									
LO 2 **Know maintenance and care of tools**	2.1	Check tools for defects before use.									
	2.2	Describe pressure requirement on application of tools.									
	2.3	Explain proper care of tools.									
	2.4	Identify appropriate lubricant for tools protection									
	2.5	Lubricate tools against corrosion									
	2.6	Store properly in: toolbox, metal cabinet, holder(chisels)									
LO 3	3.1	Explain how to fill tool requisition form									

Know tools requisition record	3.2	State the procedure for tool requisition									
	3.3	Request tools for cutting operation									
	3.4	Return tools after use									

Learner's Signature:	Date:
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Additional information about the unit	
Unit aim(s)	
Unit expiry date	
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Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 6: **MEASUREMENT AND MARKING OUT**

Unit Reference Number: **ENGG/WF/005/L1**

NSQ Level 1: **WELDER ASSISTANT**

Credit Value: 2

Guided Learning Hour: **20 Hours**

Unit Purpose: This unit is aimed at providing the basic knowledge and skills for measurement and marking – out operation.

Objectives:

At the end of this unit, the learner should be able to:

1. Carry out measurement operations
2. Carry out marking out operations
3. Demonstrate care for marking and measuring tools

Unit Assessment Requirements/ Evidence Requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 6: Measurement and Marking Out

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 **Carry out measurement operation**	1.1	Define measurement									
	1.2	Explain units of measurements.									
	1.3	Convert imperial to SI units for the following: length, mass, area, volume and. temperature									
	1.4	Measure length using SI units.									
	1.5	List basic measurement tools such as steel rule, measuring tape, vernier caliper and micrometer screw-gauge.									
	1.6	Use the tools in 1.5 above to carry out measurement of length, diameter and thickness									
	1.7	Explain the importance of accuracy in measurement									
	1.8	Explain tolerance in measurement									
LO 2 **Carry out marking out operation**	2.1	Define marking-out									
	2.2	List basic marking out tools such as chalk, pencil, divider, scriber, center punch, tri-square, steel rules and compass.									
	2.3	List various methods of marking out such as datum, straight line, circles and arcs.									
	2.4	Apply tools in 2.2 above to perform marking out operation									
	2.5	Explain the use of template in marking-out operation									

LO 3 **Demonstrate care for marking and measuring tools**	3.1	Explain how to care for measuring tools									
	3.2	Carry out care of the measuring tools									
	3.3	Explain how to care for marking-out tools									
	3.4	Carry out care for marking out tools									

Learner's Signature:	Date:
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EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 7: CUTTING AND GRINDING OPERATIONS

Unit Reference Number: ENGG/WF/007/L1

NSQ Level 1: WELDER ASSISTANT

Credit Value: 2

Guided Learning Hour: 20 hours

Unit Purpose: This unit is designed to provide trainee with basic knowledge and skills in cutting and grinding operations.

Objectives:

At the end of this unit, the learner should be able to:

1. Demonstrate cutting operations
2. Demonstrate grinding operations
3. Demonstrate the proper handling of cutting and grinding tools

Unit Assessment Requirements/ Evidence Requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 7: Cutting and Grinding Operations

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 **Demonstrate cutting operations**	1.1	Explain cutting operation									
	1.2	List various methods of cutting									
	1.3	List cutting tools such as straight snips, side cutting pliers, hacksaw, power hacksaw, chisel and guillotine.									
	1.4	Explain the right cutting technique and posture									
	1.5	Carry out cutting operation using tools in 1.3 above									
	1.6	Apply safe use of cutting tools									
LO 2 **Demonstrate grinding operations**	2.1	Define grinding operation									
	2.2	Explain the importance of grinding operations									
	2.3	List types of grinding operations (electrical and manual)									
	2.4	List grinding tools such as files, emery cloths, angle grinder, pedestal, table-mounted									
	2.5	Perform manual grinding operation									
	2.6	Perform electrical grinding operation.									
	2.7	Apply safe use of grinding tools									

LO 3 **Demonstrate the proper handling of cutting and grinding tools**	3.1	Explain the procedure for changing worn out cutting and grinding disc									
	3.2	Carry out replacement of worn out cutting and grinding disc									
	3.3	Explain the care for various cutting tools listed in 1.3 above									
	3.4	Explain the care for various grinding tools listed in 2.4 above									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 8: **BASIC DRAWING AND INTERPRETATION**

Unit Reference Number: **ENGG/WF/008/L1**

NSQ Level 1: **WELDER ASSISTANT**

Credit Value: 2

Guided Learning Hour: **20 hours**

Unit Purpose: This unit is aimed to provide the trainee with the knowledge and skills in sketching and interpretation of drawings.

Objectives:

At the end of this unit, the learner should be able to

1. Know basic elements of drawing
2. Know simple dimensions in drawing
3. Carry out interpretation of simple drawing

Unit Assessment Requirements/ Evidence Requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 8: Basic Drawing and Interpretation

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 **Know basic elements of drawing**	1.1	Define drawing									
	1.2	Explain types of lines in drawing									
	1.3	Explain simple isometric shapes									
	1.4	Explain the use of angles and symbols in drawing									
	1.5	Sketch a simple drawing									
LO 2 **Know simple dimensions in drawing.**	2.1	Explain dimensions									
	2.2	List types of dimensions									
	2.3	Produce a simple drawing with dimensions									
LO 3 **Carry out interpretation of simple drawing**	3.1	Explain how to interpret simple drawing.									
	3.2	Obtain information on pattern from a given drawing									
	3.3	Obtain information on dimension from a given drawing									
	3.4	Obtain information on materials from a given drawing									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 9: ARC WELDING (MMA)

Unit Reference Number: ENGG/WF/009/L1

NSQ Level 1: WELDER ASSISTANT

Credit Value: 4

Guided Learning Hour: 40 hours

Unit Purpose: This unit is designed to provide the trainee with the basic knowledge and skills of manual metal arc (MMA) welding process.

Objectives:

At the end of this unit, the learner should be able to:

1. Know safety precautions in arc welding
2. Know the fundamentals of arc welding processes
3. Know MMA welding machines
4. Know welding consumables
5. Know the range of materials
6. Demonstrate the use of MMA welding Machine
7. Know basic costing and quotation

Unit Assessment Requirements/ Evidence Requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 9: Arc Welding (MMA)

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 **Know safety precautions in arc welding**	1.1	Explain safety precautions in arc welding									
	1.2	List the Personal Protective Equipment's (PPE) used in arc welding processes									
	1.3	Explain the features of arc welding equipment: • AC/DC Welding Machine • Hammer • Chipping Hammer • Welding Goggle • Face Shield • Face Mask • Welding Tong • Electrode Holder • Welding Return Lead • Workbench • Wire Brush • Jigs and Fixtures • Grinders									
	1.4	Explain the safety precautions in handling arc welding equipment: • Avoid oil/grease on work piece • Ensure proper connection of power cables • Ensure avoidance of moisture/wet surface on machines and work environment • Ensure safe handling of machines and equipment									

	1.5	Take appropriate action to minimize exposure to welding fumes, rays, etc.									
LO 2 **Know the fundamentals of arc welding Processes**	2.1	Define welding									
	2.2	List types of arc welding processes such as Manual Metal Arc (MMA), Tungsten Inert Gas (TIG), Flux Cored Arc Welding (FCAW), Metal-Inert Gas/Metal-Active Gas (MIG/MAG).									
	2.3	Explain the advantages and disadvantages of arc welding processes in 2.2 above									
LO 3 **Know MMA welding machines**	3.1	Explain types of MMA welding machines									
	3.2	Explain the operational features of types of MMA (AC and DC) welding machines									
	3.3	Explain the operational sequence of MMA welding machines									
	3.4	Identify various welding machine									
	3.5	Set appropriate current in 3.1 above									
LO 4 **Know welding consumables**	4.1	Explain welding consumables									
	4.2	List consumables for welding such as; electrodes, cutting, grinding and polishing discs									
	4.3	Select appropriate welding consumables for a given task									
LO 5	5.1	List types of materials for arc welding such as sheet metal, angle iron, flat bar, rods and pipes									

Know the range of materials	5.2	Identify types of materials for arc welding									
	5.3	Select appropriate sizes of materials									
LO 6 Demonstrate the use of MMA welding Machine	6.1	Set up MMA welding machine									
	6.2	Set up the appropriate variables in the welding machine									
	6.3	Prepare material for welding									
	6.4	Select the appropriate electrodes for welding									
	6.5	Carry out tack welding operation									
	6.6	Carry out complete welding operation									
LO 7 **Know basic costing and quotation**	7.1	Explain costing and quotation									
	7.2	Explain how to compute welding estimate for a given job									
	7.3	Carry out costing for a given job									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 10: **GAS WELDING I**

Unit Reference Number: **ENGG/WF/010/L1**

NSQ Level 1: **WELDER ASSISTANT**

Credit Value: 3

Guided Learning Hour: **30 hours**

Unit Purpose: This unit is designed to provide the trainee with the basic knowledge and skills of gas welding process.

Objectives:

At the end of this unit, the learner should be able to

1. Know safety precautions in gas welding
2. Carry out gas cutting/heating operation
3. Carry out gas welding operation
4. Know basic costing and quotation

Unit Assessment Requirements/ Evidence Requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 10: Gas welding and Cutting Operation I

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 **Know safety precautions in gas welding**	1.1	Explain safety precautions in gas welding									
	1.2	List the Personal Protective Equipment (PPE) used in gas welding process									
	1.3	Explain the features of gas welding equipment: • Cylinder colour code, • Cylinder threading • Hose colour code • Regulator colour code • Regulator threading • Blow pipe threading • Flash back arrestor									
	1.4	Explain the safety precautions in handling gas cylinders: • Avoid oil/grease on cylinders • Positioning • Cylinder movement/transportation									
	1.5	Explain methods of checking for gas leakages: • Smell • Hissing sound • Soap solution • Gas detector									
LO 2 **Carry out gas cutting/heating operations**	2.1	Define gas cutting									
	2.2	Define gas heating									
	2.3	Describe the procedures for gas cutting/heating operations: • assembling, • testing,									

		• lighting, • shutting down, • Disassembling.									
	2.4	List types of gas for cutting/heating: • Propane • Methane • oxygen • butane • Acetylene									
	2.5	Explain the manifold system									
	2.6	Describe gas cutting flames									
	2.7	Describe gas heating flames									
	2.8	Perform heating operation.									
	2.9	Perform cutting operation									
	2.10	Describe common faults during cutting operation.									
LO 3 **Carry out gas welding operations**	3.1	Describe gas welding as a joining process									
	3.2	Identify gas welding equipment and accessories: • Cylinders, • Pressure Regulator • Gas Hose • Flashback Arrestors • Torches • Tips • Mixer • Spark Lighter									
	3.3	Select consumables for gas welding operations									
	3.4	Select appropriate accessories for gas welding operations									

	3.5	Carry out gas welding operations on sheet metal (3mm carbon steel)									
LO 4 **Know basic costing and quotation**	4.1	Explain costing and quotation									
	4.2	Explain how to compute welding estimate for a given job									
	4.3	Carry out costing for a given job									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 11: PLASTIC WELDING I

Unit Reference Number: ENGG/WF/011/L1

NSQ Level 1: WELDER ASSISTANT

Credit Value: 2

Guided Learning Hour: 20 hours

Unit Purpose: This unit is designed to provide the trainee with the basic knowledge and skills of plastic welding process.

Objectives:

At the end of this unit, the learner should be able to:

1. Know safety precautions in plastic welding
2. Carry out plastic joint preparation
3. Carry out plastic welding operations
4. Know basic costing and quotation

Unit Assessment Requirements/ Evidence Requirements

Direct Observation (DO)

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 11: Plastic welding I

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 **Know safety precautions in plastic welding**	1.1	Explain safety precautions in plastic welding									
	1.2	List the Personal Protective Equipment (PPE) used in plastic welding process									
	1.3	Explain the features of plastic welding equipment: • Compressor • Heating filament • Nozzles									
	1.4	Explain the safety precautions in handling air compressor and fumes.									
LO 2 **Carry out plastic joint preparation**	2.1	Describe categories of plastic that can be welded.									
	2.2	Describe the procedures for plastic joint preparation.									
	2.3	List tools for joint preparation: • Hacksaw (Hand/Powered) • Grinder • Degreaser									
LO 3 **Carry out plastic welding operations**	3.1	Define Plastic Welding									
	3.2	Describe hot air/gas and heated tube plastic welding processes									
	3.3	Identify hot air/gas plastic welding equipment and accessories: • Cylinders • Gas Hose • Torches • Tips									

		• Pressure Regulator									
	3.4	Select consumables for plastic welding operation									
	3.5	Select appropriate accessories for plastic welding operations									
	3.6	Carry out plastic welding operations on plastic material									
LO 4 **Know basic costing and quotation**	4.1	Explain costing and quotation									
	4.2	Explain how to compute plastic welding estimate for a given job									
	4.3	Carry out costing for a given job									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
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Location of the unit within the subject/sector classification system	
Name of the Oorganisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

INTERMEDIATE WELDER

NSQ LEVEL 2

QUALIFICATION PURPOSE

This qualification is for those interested in developing a career in welding industry. It is aimed to acquaint the learner with sufficient knowledge and skills in the work environment to produce sound welds, carry out weld repairs and fabrication under supervision.

NSQ LEVEL: 2

At the end of the Units within this level, the Learner should be able to:

1. Understand safe work practices and instructions
2. Communicate effectively in work environment.
3. Work effectively in a team.
4. Interpret fabrication drawings.
5. Understand basic welding metallurgy
6. Carry out fitting operations.
7. Perform fillet and plate welding operations.
8. Carry out gas welding operations.
9. Perform plastic welding operations.

NSQ LEVEL 2 – INTERMEDIATE WELDER

Unit No	Reference Number	NOS Title	Credit Value	Guided Learning Hours	Remark
MANDATORY UNITS					
01	ENGG/WF/001/L2	Health, Safety and Environment	2	20	Mandatory Unit
02	ENGG/WF/002/L2	Communication system in the work environment	2	20	Mandatory Unit
03	ENGG/WF/003/L2	Team Work	2	20	Mandatory Unit
04	ENGG/WF/004/L2	Fabrication Drawing	3	30	Mandatory Unit
05	ENGG/WF/005/L2	Basic Welding Metallurgy	2	20	Mandatory Unit
06	ENGG/WF/006/L2	Fitting Operation	3	30	Mandatory Unit
07	ENGG/WF/007/L2	Structural Welding	6	60	Mandatory Unit
Total			**20**	**200**	
OPTIONAL UNITS					
08	ENGG/WF/008/L2	Gas Welding II	4	40	Optional Unit
09	ENGG/WF/009/L2	Plastic Welding II	4	40	Optional Unit
TOTAL			**8**	**80**	

NOTE: This is a 24 credit unit qualification. To achieve this qualification; Learners are required to achieve 20 Credits from the mandatory and at least 4 credits from the optional units. Each Credit is equivalent to 10 Guided Learning Hours (GLH). The Total Learning Hours will therefore consist of the GLH *plus* the independent learning hours of the candidate, which is generally 50% – 150% of the GLH. ***The actual Total Learning Hours for each Credit will then be a minimum of 15 hours***.

GENERAL GUIDE

Unit title	Provides a clear explanation of the content of the unit.
Unit number	The unique number assigned to the unit
Unit reference	The unique reference number given to each unit at qualification approval by NBTE
Unit level	Denotes the level of the unit within the National Skills Qualifications Framework NSQF.
Unit credit value	The value that has been given to the unit based on the expected learning time for an average learner. 1 credit = 10 learning hours
Unit aim	Provides a brief outline of the unit content.
Learning Outcome	A statement of what a learner will know, understand or be able to do, as a result of learning process.
Assessment criteria	A description of the requirements a learner must achieve to demonstrate that a learning outcome has been met.
Unit assessment guidance	Any additional guidance provided to support the assessment of the unit.
Unit guided learning hours	The average number of hours of supervised or directed study time or assessment required to achieve a qualification or unit of a qualification.

UNIT 1: **HEALTH, SAFETY AND ENVIRONMENT**

Unit Reference Number: **ENGG/WF/001/L2**

NSQ Level 2: **INTERMEDIATE WELDER**

Credit Value: 2

Guided Learning Hour: **20 hours**

Unit Purpose: This unit is designed to provide the trainee with the knowledge and skills of health and safety in work environment.

Objectives:

At the end of this unit, the learner should be able to:

1. Understand health and safety rules in work environment
2. Understand Safety guidelines for welding operation
3. Know fire safety
4. Practice good housekeeping

Unit Assessment Requirements/ Evidence Requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 1: Health, Safety and Environment

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 Understand health and safety rules in work environment	1.1	Familiarize with work environment									
	1.2	Explain safe work practice when working with welding equipment.									
	1.3	List Personal Protective Equipment (PPE) in welding operations									
	1.4	Identify Personal Protective Equipment (PPE)									
	1.5	List common hazards in welding operations									
	1.6	Use Personal Protective Equipment (PPE)									
	1.7	Explain preventive measures for 1.5 above									
	1.8	Explain how to respond to accident in work environment.									
	1.9	Explain accident report procedure									
	1.10	Explain first aid procedures									
LO 2 Understand Safety guidelines for welding operations	2.1	Explain different regulations guiding welding practice (NIS ISO 15012-4)									
	2.2	Identify safety signs and codes in the welding workshop									
	2.3	Observe health and safety signs always.									
	2.4	Work safely to protect self and others									
LO 3 Know fire safety	3.1	Explain classes of fire									
	3.2	Explain causes of fire outbreak in a work environment									
	3.3	Explain emergency and fire procedure									
	3.4	List methods of extinguishing fire									
	3.5	List types of fire extinguishers									

	3.6	Demonstrate how to use appropriate fire extinguisher.									
	3.7	Follow fire and safety procedure									
LO 4 Practice good housekeeping	4.1	Explain good housekeeping procedures before welding operations: • Ensure cleanliness of work environment • Proper positioning of tools, equipment and consumables • Ensure gangways are free from obstacles • Shield your work area • Proper illumination of the work area • Proper ventilation of the work area									
	4.2	Explain good housekeeping procedures during welding operations: • Ensure work environment is constantly clean • Ensure welding positioners are securely in place • Ensure work area is free from hot electrode stubs, work piece, water, oil/grease, paint. • Proper placement of electrical cables and gas hoses									
	4.3	Explain good housekeeping procedures after welding operations: • Assemble all tools, equipment and consumables after operations • Clean all tools, equipment and work area									

		• Store tools and equipment appropriately • Switch off mains									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
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Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 2: COMMUNICATION SYSTEM IN WORK ENVIRONMENT

Unit Reference Number: ENGG/WF/002/L2

NSQ Level 2: INTERMEDIATE WELDER

Credit Value: 2

Guided Learning Hour: 20 hours

Unit Purpose: This unit is aimed at providing the trainee with knowledge and skills for effective communication in work place.

Objectives:

At the end of this unit, the learner should be able to:

1. Communicate effectively in the work environment
2. Develop the ability to identify sources of information in a work environment
3. Demonstrate the use of various communication means in a work environment

Unit Assessment Requirements/ Evidence Requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 2: Communication System in Work Environment

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 Communicate effectively in the work environment	1.1	Explain communication in work environment.									
	1.2	Explain methods of communication in work environment.									
	1.3	Explain verbal communication in work environment									
	1.4	Explain non-verbal communication in work environment									
	1.5	Use verbal and non-verbal means to convey necessary information e.g. body language, signs, etc.									
	1.6	Interpret symbols and signs Correctly									
LO 2 Develop the ability to identify sources of information in a work environment	2.1	Identify sources of information in the work environment									
	2.2	Relate well with sources of information									
	2.3	Use the different information flow systems in a work environment									
	2.4	Use information gathered to address challenges in a work environment									
	2.5	Report findings correctly as expected 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 correctly using symbols, signs and codes.									

	3.4	Obey instructions in line with ethics of the work environment.									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
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Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
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Location of the unit within the subject/sector classification system	
Name of the organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 3: **TEAMWORK**

Unit Reference Number: **ENGG/WF/003/L2**

NSQ Level 2: **INTERMEDIATE WELDER**

Credit Value: 2

Guided Learning Hour: **20 hours**

Unit Purpose: This unit is designed to impart on the learner knowledge and skills required to develop team spirit and positive working relationship with co-workers.

Objectives:

At the end of this unit, the learner should be able to

1. Exhibit good working relationship with co-workers
2. Take responsibility within the team
3. Comply with rules of organisation

Unit Assessment Requirements/ Evidence Requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 3: Teamwork

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 Exhibit good working relationship with co-workers	1.1	Work positively with co-workers									
	1.2	Assist team members when required									
	1.3	Maintain open communication with co-workers									
	1.4	Report to the supervisor when request for assistance fall outside area of responsibility.									
LO 2 Take responsibility within the team	2.1	Recognize own roles and responsibilities within a team or group.									
	2.2	Perform individual tasks in line with the team rules and regulations.									
	2.3	Participate well in group work.									
LO 3 Comply with rules of organisation	3.1	Explain organisational code of Conduct									
	3.2	Use organisational code of practice									
	3.3	Work in line with organisational standard.									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
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Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 4: FABRICATION DRAWING

Unit Reference Number: ENGG/WF/004/L2

NSQ Level 2: INTERMEDIATE WELDER

Credit Value: 3

Guided Learning Hour: 30 hours

Unit Purpose: This unit is designed to provide the trainee with the knowledge and skills in the use of fabrication drawings.

Objectives:

At the end of this unit, the learner should be able to

1. Know fabrication drawing
2. Know component drawing
3. Interpret fabrication drawing

Unit Assessment Requirements/ Evidence Requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 4: Fabrication Drawing

LO (Learning Outcome) Criteria: -			**Evidence Type**					**Evidence Ref Page Number**			
LO 1 **Know fabrication drawing**	1.1	Explain fabrication drawing									
	1.2	List the components of fabrication drawing									
	1.3	Explain how to interpret fabrication drawing									
LO 2 **Know component drawing.**	2.1	Explain component drawing									
	2.2	Identify drawing components and its dimensions from fabrication drawing									
	2.3	Produce simple component drawing									
LO 3 **Interpret fabrication drawing**	3.1	Obtain welding details from fabrication drawing									
	3.2	Obtain fitting details from fabrication drawing									
	3.3	Obtain information on materials from fabrication drawing									
	3.4	Obtain information on reference documents and applicable standards									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 5: BASIC WELDING METALLURGY

Unit Reference Number: ENGG/WF/005/L2

NSQ Level 2: INTERMEDIATE WELDER

Credit Value: 2

Guided Learning Hour: 20 hours

Unit Purpose: This unit is designed to provide the trainee with the basic knowledge of metallurgy in welding.

Objectives:

At the end of this unit, the learner should be able to:

1. Know the properties of metals
2. Understand fundamentals of material science
3. Know welding electrodes

Unit Assessment Requirements/ Evidence Requirements

1 Direct Observation (DO)
2 Personal statement/Learning Journal (PS/LJ)
3 Questions and Answers (QA)
4 Witness Testimony (WT)
5 Assignment (ASS)
6 Work Products (WP)

Unit 5: Basic Welding Metallurgy

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 Know the properties of metals	1.1	Discuss the physical properties of metals									
	1.2	Discuss the chemical properties of metals									
	1.3	Discuss the mechanical properties of metals									
	1.4	Discuss classification of metals									
LO 2 Understand fundamentals of material science	2.1	Explain expansion characteristics of metals									
	2.2	Explain how metals fuse during welding									
	2.3	Explain solidification of metals after welding									
LO 3 Know welding electrodes	3.1	Discuss characteristics of welding electrodes									
	3.2	Explain types of welding electrodes									
	3.3	Explain applications of types of electrodes in 3.2									
	3.4	Identify welding electrodes using standard									
	3.5	Select appropriate welding electrodes for use									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 6: FITTING OPERATIONs

Unit reference number: ENGG/WF/006/L2

NSQ level: 2

Credit value: 2

Guided learning hour: 20 hours

Unit Purpose: This unit is designed to provide the trainee with the knowledge and skills of fitting operations.

Objectives:

At the end of this unit, the learner should be able to:

1. Know joining processes
2. Carry out fitting operations
3. Carry out drilling operations
4. Carry out riveting operations
5. Demonstrate bolts and nuts fastening operations

Unit assessment requirements/evidence requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 6: Fitting Operations

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 **Know joining processes**	1.1	Explain joining processes									
	1.2	List types of joining process: • Welding • Riveting • Bolt and nut • Snap-fit • Bonding • Screw									
	1.3	State areas of application for 1.2 above									
LO 2 **Carry out fitting operations**	2.1	Carry out measurement and marking out for a given task									
	2.2	Carry out cutting operation using appropriate tools for a given task									
	2.3	Carry out grinding operation using appropriate tools for a given task									
LO 3 **Carry out drilling operations**	3.1	Describe drilling operations									
	3.2	List drilling tools and accessories									
	3.3	Select appropriate drill bits for a given task									
	3.4	Carry out drilling operations									

	3.5	Check for defects associated with 3.4 above									
	3.6	Carry out corrective measures on 3.5 above									
LO 4 **Carry out riveting operations**	4.1	Explain riveting as a joining process									
	4.2	List tools and accessories used in riveting operation									
	4.3	Perform riveting operation									
	4.4	Check for faults in riveting operation									
	4.5	Carry out corrective measures on 4.4 above									
LO 5 **Demonstrate bolts and nuts fastening operations**	5.1	Explain bolt and nut as a mechanical fastening process									
	5.2	List types of bolts and nuts									
	5.3	List types of tools used for bolts and nuts fastening									
	5.4	Demonstrate the uses of bolts and nuts									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
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Assessment requirements specified by a sector or regulatory body (if appropriate)	
Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 7: STRUCTURAL WELDING

Unit reference number: ENGG/WF/007/L2

NSQ level: 2

Credit value: 6

Guided learning hour: 60 Hours

Unit Purpose: This unit is designed to provide the trainee with the knowledge and skills of fillet and plate welding.

Objectives:

At the end of this unit, the learner should be able to:

1. Know Safety precautions in structural welding
2. Know materials selection
3. Know welding drawing and symbols
4. Know joints and preparation
5. Carry out fit-up operations
6. Carry out fillet welding operation
7. Carry out butt welding operation
8. Understand Tungsten Inert Gas (TIG) Welding process
9. Understand Flux-Cored Arc Welding (FCAW) process
10. Understand Metal Inert Gas/Metal Active Gas (MIG/MAG) Welding processes
11. Know costing and quotation

Unit assessment requirements/evidence requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 7: Structural Welding

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 **Know safety precautions in Structural Welding**	1.1	Explain safety precautions for the following processes: TIG, MIG/MAG and FCAW									
	1.2	List the Personal Protective Equipment (PPE) used in 1.1 above									
	1.3	Explain the safety precautions in handling equipment for the processes in 1.1 above									
	1.4	Take appropriate action to minimize exposure to welding gases, fumes, rays, heat, etc.									
LO 2 **Know materials selection**	2.1	List materials for welding: • Metals (Ferrous and Non-Ferrous) • Plastics (thermoset and thermoplastic)									
	2.2	List properties of materials used for welding									
	2.3	Explain factors that determine material selection for any specific task									
	2.4	Identify materials such as stainless steels, aluminium and carbon steel using: • Visual • Sound • Spark • Weight									

	2.5	Select appropriate materials for a given task									
LO 3 **Know welding drawing and symbols**	3.1	Differentiate between shop welding drawing and blue print									
	3.2	List types of weld and welding symbols									
	3.3	Use welding symbols for a given task									
	3.4	Identify standards applicable to welding drawings									
	3.5	Interpret various components of a welding drawing									
	3.6	List drawing terminologies									
	3.7	Use welding drawing terminologies for a given task									
LO 4 **Know joints and preparation**	4.1	Explain weld joint									
	4.2	List types of weld joints									
	4.3	Carry out the following weld joints preparation: • Tee joints • Butt joints • Corner joints • Edge joints • Lap joints									
	4.4	State the need for joint preparations									
	4.5	Differentiate between square and grove edge preparations									
LO 5 **Carry out fit-up operations**	5.1	Define fit-up terms									
	5.2	Explain dimensional checks									
	5.3	Identify tools and equipment for fit-up/dimensional checks									
	5.4	Carry out simple calculation and unit conversions									

	5.5	Carry out dimensional checks for fit-up									
	5.6	Carry out fit-up exercise on a job order									
	5.7	Carry out care and maintenance of fit-up/dimensional tools									
LO 6 **Carry out fillet welding operations**	6.1	Explain fillet welding operation									
	6.2	List fillet welding positions									
	6.3	State electrode classifications/sizes									
	6.4	Select appropriate electrode for use									
	6.5	Carry out fillet weld in the following positions: • Flat (PA/1F) • Horizontal (PB/2F) • Vertical up (PF/3F) • Vertical down (PG/3F) • Overhead (PD/4F) • Pipe-on-flange (PA, PB, PH, PD/5F)									
	6.6	Carry out visual checks for defects (during and after welding)									
	6.7	Carry out good house-keeping in the workshop/site									
LO 7 **Carry out butt welding operations**	7.1	Explain butt welding operations									
	7.2	List butt welding positions									
	7.3	State types/sizes of electrode									
	7.4	Select appropriate electrode for use									
	7.5	Carry out butt weld in the following positions:									

		• Flat (PA/1G) • Horizontal (PC/2G) • Vertical up (PF/3G) • Vertical down (PG/3G) • Overhead (PE/4G)									
	7.6	Carry out visual checks for defects (during and after welding)									
	7.7	Carry out good housekeeping in the workshop/site									
LO 8 **Understand Tungsten Inert Gas (TIG) Welding process**	8.1	Describe TIG Welding process									
	8.2	Identify the sign of TIG Welding process in a multi process welding machine									
	8.3	Identify the accessories for TIG Welding process such as Colet, ceramic cup, gas diffuser, Tail.									
	8.4	List the various consumables for TIG Welding process: • Gas: Argon and Helium • Filler rod									
	8.5	Select appropriate consumables for a given job.									
	8.6	List various techniques for TIG welding such as walking the cup and Lifting up									
	8.7	Apply techniques in 8.6 above									
	8.8	Identify types of Tungsten electrode: • 2% Thoriated (Red color)									

		• 1.5% Lanthanated (Gold) • 2% Ceraiated (Grey) former Orange • 0.8% Zirconiated (White) • Pure green									
	8.9	Carry out appropriate preparation of tungsten electrode									
	8.10	Set up a TIG machine for a given task									
	8.11	Carry out TIG welding in fillet joints and positions 1F, 2F, 3F, 4F, Pipe on flange 5F, 4F,									
	8.12	Carry out TIG welding in butt joints and positions 1G, 2G, 3G and 4G									
LO 9 **Understand Flux-Cored Arc Welding (FCAW) process**	9.1	Describe FCAW Process									
	9.2	Identify the sign of FCAW process in a multi-process welding machine									
	9.3	List the various accessories for FCAW such as: • Contact tip • Nozzles • Gas diffuser									
	9.4	List the various consumables for FCAW process: • Gases: - CO_2 - 25% CO_2 + 75% Argon (Ar) - 98% Argon (Ar) + 2% Oxygen (O_2)									

		• Filler wires: - Gas shielding - Self-shielding • Ceramic backing									
	9.5	Set up a FCAW machine for a given task									
	9.6	Select appropriate accessories for FCAW									
	9.7	Carry out FCAW in fillet joints and positions 1F, 2F, 3F, 4F, Pipe on flange 5F, 4F,									
	9.8	Carry out FCAW in butt joints and positions 1G, 2G, 3G and 4G									
LO 10 **Understand Metal Inert Gas/Metal Active Gas (MIG/MAG) Welding processes**	10.1	Describe MIG/MAG Welding processes									
	10.2	Identify the sign of MIG/MAG Welding process in a multi process welding machine									
	10.3	List the various accessories for MIG/MAG Welding Processes such as: • Contact tip • Nozzles • Gas diffuser									
	10.4	List the various consumables for MIG/MAG Welding processes: • Gases: - Carbon Dioxide - Argon - Helium - Ar + O_2 - Ar +CO_2 • Filler wire									
	10.5	Set up a MIG/MAG Welding machine for a given task									

	10.6	Select appropriate accessories for MIG/MAG Welding									
	10.7	Carry out MIG/MAG welding in fillet joints and positions: 1F, 2F, 3F, 4F, Pipe-on-flange 5F and 4F.									
	10.8	Carry out MIG/MAG welding in butt joints and positions: 1G, 2G, 3G and 4G									
LO 11 Know costing and quotation	11.1	Identify cost units for a given job									
	11.2	Compute welding estimate for a given job									
	11.3	Carry out costing for a given job									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 8: **GAS WELDING II (OPTIONAL UNIT)**

Unit reference number: ENGG/WF/008/L2

NSQ level: 2

Credit value: 4

Guided learning hour: 40 Hours

Unit Purpose: This unit is designed to provide the trainee with the knowledge and skills of gas welding process.

Objectives:

At the end of this unit, the learner should be able to:

1. Know safety precautions in gas welding
2. Carry out gas cutting operations
3. Carry out gas welding operations
4. Know costing and quotation

Unit assessment requirements/evidence requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 8: Gas Welding II

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 Know safety precautions in gas welding	1.1	Discuss safety precautions applicable to gas welding									
	1.2	Identify the Personal Protective Equipment (PPE) used in gas welding process									
	1.3	State the importance of gangways in a gas welding workshop									
	1.4	Describe the work area in a workshop									
	1.5	Identify the operational features of gas welding equipment: • Cylinder threading • Hose colour code • Regulator colour code • Regulator threading • Blow pipe threading • Flash back arrestor									
	1.6	Describe methods of storing gas cylinders									
LO 2 Carry out gas cutting operations	2.1	Interpret drawings									
	2.2	List materials that can be cut using oxy/acetylene gases: • Carbon steel • Mild steel • Galvanized Steel									
	2.3	Carry out assembling and disassembling of an oxy-acetylene set for use									
	2.4	Describe the techniques for setting different flames									
	2.5	Describe how to generate acetylene gas from carbide.									
	2.6	Generate acetylene gas from carbide.									
	2.7	Cut plates to specification using oxy-acetylene gas.									
LO 3	3.1	Describe the following operations: • Gas Welding									

Carry out gas welding operations		• Brazing • Soldering									
	3.2	State the advantages and disadvantages of the operations in 3.1 above									
	3.3	Identify materials used in welding operations listed in 3.1 above									
	3.4	Carry out brazing operation on a specified material									
	3.5	Check for weld defects in brazing operation									
	3.6	Repair defects identified in 3.5 above									
	3.7	Carry out soldering operation on a specified material									
	3.8	Check for weld defects in soldering operation									
	3.9	Repair defects identified in 3.8 above									
	3.10	Carry out gas welding operations									
	3.11	Check for weld defects									
	3.12	Carry out repair on 3.11 above									
LO 4 Know costing and quotation	4.1	Identify cost units for a given job									
	4.2	Compute welding estimate for a given job									
	4.3	Carry out costing for a given job									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
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Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 9: PLASTIC WELDING II (OPTIONAL UNIT)

Unit reference number: ENGG/WF/009/L2

NSQ level: 2

Credit value: 4

Guided learning hour: 40 Hours

Unit Purpose: This unit is designed to provide the trainee with the knowledge and skills of plastic welding process.

Objectives:

At the end of this unit, the learner should be able to:

1. Know the importance of plastics as engineering material
2. Know the categories of plastics
3. Know plastics joining methods
4. Carry out plastic welding operations
5. Carry out plastic weld tests
6. Know costing and quotation

Unit assessment requirements/evidence requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 9: Plastic Welding II

LO (Learning Outcome) Criteria: -			**Evidence Type**					**Evidence Ref Page Number**			
LO 1 **Know the importance of plastics as engineering material**	1.1	Explain classes of engineering materials									
	1.2	Explain emergence of plastics as a welding material									
	1.3	Explain the properties of plastics									
	1.4	Distinguish between plastics and metals									
LO 2 **Know the categories of plastics**	2.1	Describe the classes of plastics									
	2.2	Explain the properties of plastics									
	2.3	Identify areas of application for different classes of plastics									
LO 3 **Know plastics joining methods**	3.1	Explain major mechanical joining methods: • Riveting • Screwing • Snap-fit • Clipping • Fastening									
	3.2	Explain Adhesive Bonding of plastics									
	3.3	Explain welding of thermoplastics									
LO4 **Carry out plastic welding operations**	4.1	Describe the following plastic welding processes: • Hot air/gas • Hot tool • Electro-fusion • Ultrasonic • Friction									
	4.2	Carry out hot air/gas plastic welding operation									
	4.3	Carry out hot tool (Plate) plastic welding operation									

	4.4	Explain the parameters affecting plastic weld quality									
LO5 **Carry out plastic weld tests**	5.1	List common plastic weld defects									
	5.2	Identify the causes of plastic weld defects									
	5.3	Explain measures of preventing plastic weld defects									
	5.4	Carry out repairs of plastic weld defects									
	5.5	Explain chemical and mechanical tests for plastic welds									
LO 6 **Know costing and quotation**	6.1	Identify cost units for a given job									
	6.2	Compute welding estimate for a given job									
	6.3	Carry out costing for a given job									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

FITTER
NSQ LEVEL 2

QUALIFICATION PURPOSE

This qualification is for those interested in developing a career in fitting work, it is aimed to acquaint the learner with sufficient knowledge and skills in the work environment to produce sound fitted structure.

NSQ LEVEL: 2

Objectives

At the end of the Units within this level, the Learner should be able to:

11. Understand safe work practices and instructions
12. Communicate effectively in work environment.
13. Work effectively in a team.
14. Interpret fabrication drawings.
15. Understand basic welding
16. Understand Basic tools
17. Carry out measurement and marking out operations
18. Carry out cutting and grinding operations
19. Carry out fitting operations.

NSQ LEVEL 2 – FITTER

Unit No	Reference Number	NOS Title	Credit Value	Guided Learning Hours	Remark
MANDATORY UNITS					
01	ENGG/WF/001/L2	Health, Safety and Environment	2	20	Mandatory Unit
02	ENGG/WF/002/L2	Communication system in the work environment	2	20	Mandatory Unit
03	ENGG/WF/003/L2	Team Work	2	20	Mandatory Unit
04	ENGG/WF/010/L2	Fabrication Drawing	3	30	Mandatory Unit
05	ENGG/WF/011/L2	Basic arc welding	3	30	Mandatory Unit
06	ENGG/WF/012/L2	Basic tools	2	20	Mandatory Unit
07	ENGG/WF/013/L2	Measurement and marking out operations	2	20	Mandatory Unit
08	ENGG/WF/014/L2	Cutting operations	4	40	Mandatory Unit
09	ENGG/WF/015/L2	Fitting Operation	4	40	Mandatory Unit
Total			24	240	

NOTE: This is a 24 credit unit qualification. To achieve this qualification; Learners are required to achieve 20 Credits from the mandatory and at least 4 credits from the optional units. Each Credit is equivalent to 10 Guided Learning Hours (GLH). The Total Learning Hours will therefore, consist of the GLH *plus* the independent learning hours of the candidate, which is generally 50% – 150% of the GLH. ***The actual Total Learning Hours for each Credit will then be a minimum of 15 hours***.

GENERAL GUIDE

Unit title	Provides a clear explanation of the content of the unit.
Unit number	The unique number assigned to the unit
Unit reference	The unique reference number given to each unit at qualification approval by NBTE
Unit level	Denotes the level of the unit within the National Skills Qualifications Framework NSQF.
Unit credit value	The value that has been given to the unit based on the expected learning time for an average learner. 1 credit = 10 learning hours
Unit aim	Provides a brief outline of the unit content.
Learning Outcome	A statement of what a learner will know, understand or be able to do, as a result of learning process.
Assessment criteria	A description of the requirements a learner must achieve to demonstrate that a learning outcome has been met.
Unit assessment guidance	Any additional guidance provided to support the assessment of the unit.
Unit guided learning hours	The average number of hours of supervised or directed study time or assessment required to achieve a qualification or unit of a qualification.

UNIT 1: **HEALTH, SAFETY AND ENVIRONMENT**

Unit Reference Number: **ENGG/WF/001/L2**

NSQ Level 2: **Fitter**

Credit Value: 2

Guided Learning Hour: **20 hours**

Unit Purpose: This unit is designed to provide the trainee with the knowledge and skills of health and safety in work environment.

Objectives:

At the end of this unit, the learner should be able to:

1. Understand health and safety rules in work environment
2. Understand Safety guidelines for welding operation
3. Know fire safety
4. Practice good housekeeping

Unit Assessment Requirements/ Evidence Requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 1: Health, Safety and Environment

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 Understand health and safety rules in work environment	1.1	Familiarize with work environment									
	1.2	Explain safe work practice when working with welding equipment.									
	1.3	List Personal Protective Equipment (PPE) in welding operations									
	1.4	Identify Personal Protective Equipment (PPE)									
	1.5	List common hazards in welding operations									
	1.6	Use Personal Protective Equipment (PPE)									
	1.7	Explain preventive measures for 1.5 above									
	1.8	Explain how to respond to accident in work environment.									
	1.9	Explain accident report procedure									
	1.10	Explain first aid procedures									
LO 2 Understand Safety guidelines for welding operations	2.1	Explain different regulations guiding welding practice (NIS ISO 15012-4)									
	2.2	Identify safety signs and codes in the welding workshop									
	2.3	Observe health and safety signs always.									
	2.4	Work safely to protect self and others									
LO 3 Know fire safety	3.1	Explain classes of fire									
	3.2	Explain causes of fire outbreak in a work environment									
	3.3	Explain emergency and fire procedure									
	3.4	List methods of extinguishing fire									
	3.5	List types of fire extinguishers									
	3.6	Demonstrate how to use appropriate fire extinguisher.									

	3.7	Follow fire and safety procedure									
LO 4 Practice good housekeeping	4.1	Explain good housekeeping procedures before fitting operations: • Ensure cleanliness of work environment • Proper positioning of tools, equipment and consumables • Ensure gangways are free from obstacles • Shield your work area • Proper illumination of the work area • Proper ventilation of the work area									
	4.2	Explain good housekeeping procedures during fitting operations: • Ensure work environment is constantly clean • Ensure welding Positioners are securely in place • Ensure work area is free from hot electrode stubs, work piece, water, oil/grease, paint. • Proper placement of electrical cables and gas hoses									
	4.3	Explain good housekeeping procedures after welding operations: • Assemble all tools, equipment and consumables after operations • Clean all tools, equipment and work area • Store tools and equipment appropriately									

		• Switch off mains									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
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Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 2: COMMUNICATION SYSTEM IN WORK ENVIRONMENT

Unit Reference Number: ENGG/WF/002/L2

NSQ Level 2: FITTER

Credit Value: 2

Guided Learning Hour: 20 hours

Unit Purpose: This unit is aimed at providing the trainee with knowledge and skills for effective communication in work place.

Objectives:

At the end of this unit, the learner should be able to:

1. Communicate effectively in the work environment
2. Develop the ability to identify sources of information in a work environment
3. Demonstrate the use of various communication means in a work environment

Unit Assessment Requirements/ Evidence Requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 2: Communication System in Work Environment

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 Communicate effectively in the work environment	1.1	Explain communication in work environment.									
	1.2	Explain methods of communication in work environment.									
	1.3	Explain verbal communication in work environment									
	1.4	Explain non-verbal communication in work environment									
	1.5	Use verbal and non-verbal means to convey necessary information e.g. body language, signs, etc.									
	1.6	Interpret symbols and signs Correctly									
LO 2 Develop the ability to identify sources of information in a work environment	2.1	Identify sources of information in the work environment									
	2.2	Relate well with sources of information									
	2.3	Use the different information flow systems in a work environment									
	2.4	Use information gathered to address challenges in a work environment									
	2.5	Report findings correctly as expected 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 correctly using symbols, signs and codes.									
	3.4	Obey instructions in line with ethics of the work environment.									

Learner's Signature:	Date:
Assessor's Signature:	Date:
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EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
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Unit expiry date	
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Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
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Location of the unit within the subject/sector classification system	
Name of the organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 3: TEAMWORK

Unit Reference Number: ENGG/WF/003/L2

NSQ Level 2: FITTER

Credit Value: 2

Guided Learning Hour: 20 hours

Unit Purpose: This unit is designed to impart on the learner knowledge and skills required to develop team spirit and positive working relationship with co-workers.

Objectives:

At the end of this unit, the learner should be able to

1. Exhibit good working relationship with co-workers
2. Take responsibility within the team
3. Comply with rules of the organization

Unit Assessment Requirements/ Evidence Requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 3: Teamwork

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 Exhibit good working relationship with co-workers	1.1	Work positively with co-workers									
	1.2	Assist team members when required									
	1.3	Maintain open communication with co-workers									
	1.4	Report to the supervisor when request for assistance fall outside area of responsibility.									
LO 2 Take responsibility within the team	2.1	Recognize own roles and responsibilities within a team or group.									
	2.2	Perform individual tasks in line with the team rules and regulations.									
	2.3	Participate well in group work.									
LO 3 Comply with rules of organisation	3.1	Explain organisational code of Conduct									
	3.2	Use organisational code of practice									
	3.3	Work in line with organisational standard.									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
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Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 10: FABRICATION DRAWING

Unit Reference Number: ENGG/WF/010/L2

NSQ Level 2: FITTER

Credit Value: 3

Guided Learning Hour: 30 hours

Unit Purpose: This unit is designed to provide the trainee with the knowledge and skills in the use of fabrication drawings.

Objectives:

At the end of this unit, the learner should be able to

1. Know fabrication drawing
2. Know component drawing
3. Interpret fabrication drawing

Unit Assessment Requirements/ Evidence Requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

1. **Unit 10: Fabrication Drawing**

LO (Learning Outcome) Criteria: -			**Evidence Type**					**Evidence Ref Page Number**			
LO 1 **Know fabrication drawing**	1.1	Explain fabrication drawing									
	1.2	List the components of fabrication drawing									
	1.3	Explain how to interpret fabrication drawing									
LO 2 **Know component drawing.**	2.1	Explain component drawing									
	2.2	Identify drawing components and its dimensions from fabrication drawing • Size dimension • Location dimension • etc									
	2.3	Produce simple component drawing									
LO 3 **Know fabrication drawing**	3.1	Obtain welding details from fabrication drawing									
	3.2	Obtain fitting details from fabrication drawing									
	3.3	Obtain information on materials from fabrication drawing									
	3.4	Obtain information on reference documents and applicable standards									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 11: BASIC ARC WELDING

Unit Reference Number: ENGG/WF/011/L2

NSQ Level 2: FITTER

Credit Value: 3

Guided Learning Hour: 30 hours

Unit Purpose: This unit is designed to provide the trainee with the basic knowledge and skills of manual metal arc (MMA) welding process.

Objectives:

At the end of this unit, the learner should be able to:

1. Know safety precautions in arc welding
2. Know the fundamentals of arc welding processes
3. Know MMA welding machines
4. Know welding consumables
5. Know the range of materials
6. Demonstrate the use of MMA welding Machine
7. Know basic costing and quotation

Unit Assessment Requirements/ Evidence Requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 11: Basic Arc Welding (MMA)

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 **Know safety precautions in arc welding**	1.1	Explain safety precautions in arc welding									
	1.2	List the Personal Protective Equipment (PPE) used in arc welding processes									
	1.3	Explain the features of arc welding equipment: • AC/DC Welding Machine • Hammer • Chipping Hammer • Welding Goggle • Face Shield • Face Mask • Welding Tong • Electrode Holder • Welding Return Lead • Workbench • Wire Brush • Jigs and Fixtures • Grinders									
	1.4	Explain the safety precautions in handling arc welding equipment: • Avoid oil/grease on work piece • Ensure proper connection of power cables • Ensure avoidance of moisture/wet surface on machines and work environment • Ensure safe handling of machines and equipment									

	1.5	Take appropriate action to minimize exposure to welding fumes, rays, etc.									
LO 2 **Know the fundamentals of arc welding Processes**	2.1	Define welding									
	2.2	List types of arc welding processes such as Manual Metal Arc (MMA), Tungsten Inert Gas (TIG), Flux Cored Arc Welding (FCAW), Metal-Inert Gas/Metal-Active Gas (MIG/MAG).									
	2.3	Explain the advantages and disadvantages of arc welding processes in 2.2 above									
LO 3 **Know MMA welding machines**	3.1	Explain types of MMA welding machines									
	3.2	Explain the operational features of types of MMA (AC and DC) welding machines									
	3.3	Explain the operational sequence of MMA welding machines									
	3.4	Identify various welding machine									
	3.5	Set appropriate current in 3.1 above									
LO 4 **Know welding consumables**	4.1	Explain welding consumables									
	4.2	List consumables for welding such as; electrodes, cutting, grinding and polishing discs									
	4.3	Select appropriate welding consumables for a given task									
LO 5 Know the range of materials	5.1	List types of materials for arc welding such as sheet metal, angle iron, flat bar, rods and pipes									

	5.2	Identify types of materials for arc welding									
	5.3	Select appropriate sizes of materials									
LO 6 Demonstrate the use of MMA welding Machine	6.1	Set up MMA welding machine									
	6.2	Set up the appropriate variables in the welding machine									
	6.3	Prepare material for welding									
	6.4	Select the appropriate electrodes for welding									
	6.5	Carry out straight run fillet weld 1F etc									
	6.6	Carry out tack welding operation									
	6.7	Carry out complete welding operation									
LO 7 **Know basic costing and quotation**	7.1	Explain costing and quotation									
	7.2	Explain how to compute welding estimate for a given job									
	7.3	Carry out costing for a given job									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

UNIT 12: BASIC TOOLS

Unit Reference Number: ENGG/WF/012/L2

NSQ Level 2: FITTER

Credit Value: 2

Guided Learning Hour: 20 hours

Unit Purpose: This unit is designed to provide the trainee with the knowledge and skills to use basic tools for welding and fabrication operations

Objectives:

At the end of this unit, the learner should be able to:

1. Know basic fitting tools
2. Know maintenance and care of tools
3. Know tools requisition method
4. Use basic tools

Unit Assessment Requirements/ Evidence Requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 12: Basic Tools

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 **Know basic fitting tools**	1.1	Explain basic fitting tools									
	1.2	List 5 basic tools for the following fitting operations: measuring, marking out, cutting, grinding and handling.									
	1.3	Identify basic fitting tools									
	1.4	Select appropriate basic tools for fitting job									
LO 2 **Know maintenance and care of tools**	2.1	Check tools for defects before use.									
	2.2	Describe pressure requirement on application of tools.									
	2.3	Explain proper care of tools.									
	2.4	Identify appropriate lubricant for tools protection									
	2.5	Lubricate tools against corrosion									
	2.6	Store properly in: toolbox, metal cabinet, holder(chisels)									
LO 3 **Know tools requisition record**	3.1	Explain how to fill tools requisition form									
	3.2	State the procedure for tools requisition									
	3.3	Request tools for cutting operation									
	3.4	Return tools after use									
	4.1	Apply appropriate tools for measuring and marking - out operations									

LO 4 **Use basic tools**	4.2	Apply appropriate tools for cutting operation									
	4.3	Apply appropriate tools for grinding operations activities									
	4.4	Apply appropriate tools for handling activities									
	4.5	Apply safe use of tools in 4.1 – 4.4 above									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 13: **MEASUREMENT AND MARKING OUT OPERATIONS**

Unit Reference Number: **ENGG/WF/013/L2**

NSQ Level 2: **FITTER**

Credit Value: 2

Guided Learning Hour: **20 Hours**

Unit Purpose: This unit is aimed at providing the basic knowledge and skills for measurement and marking – out operation.

Objectives:

At the end of this unit, the learner should be able to:

1. Carry out measurement operations
2. Carry out marking out operations
3. Demonstrate care for marking and measuring tools

Unit Assessment Requirements/ Evidence Requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 13: Measurement and Marking out Operations

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 **Carry out measurement operation**	1.1	Define measurement									
	1.2	Explain units of measurements.									
	1.3	Convert imperial to SI units for the following: length, mass, area, volume and. temperature									
	1.4	Measure length using SI units.									
	1.5	List basic measurement tools such as steel rule, measuring tape, vernier caliper and micrometer screw-gauge etc.									
	1.6	Use the tools in 1.5 above to carry out measurement of length, diameter and thickness									
	1.7	Explain the importance of accuracy in measurement									
	1.8	Explain tolerance in measurement									
LO 2 **Carry out marking out operation**	2.1	Define marking-out									
	2.2	List basic marking out tools such as chalk, pencil, divider, scriber, center punch, tri-square, steel rules and compass.									
	2.3	List various methods of marking out such as datum, straight line, circles and arcs.									
	2.4	Use tools in 2.2 above to perform marking out operation									
	2.5	Explain the use of template in marking-out operation									

LO 3 **Demonstrate care for marking and measuring tools**	3.1	Explain how to care for measuring tools									
	3.2	Carry out care of the measuring tools									
	3.3	Explain how to care for marking-out tools									
	3.4	Carry out care for marking out tools									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 14: CUTTING OPERATIONS

Unit Reference Number: ENGG/WF/014/L2

NSQ Level 2: FITTER

Credit Value: 2

Guided Learning Hour: 20 hours

Unit Purpose: This unit is designed to provide trainee with basic knowledge and skills in cutting and grinding operations.

Objectives:

At the end of this unit, the learner should be able to:

1. Demonstrate cutting operations
2. Demonstrate grinding operations
3. Demonstrate the proper handling of cutting and grinding tools

Unit Assessment Requirements/ Evidence Requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 14: Cutting Operations

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 **Demonstrate cutting operations**	1.1	Explain cutting operation									
	1.2	List various methods of cutting									
	1.3	List cutting tools such as straight snips, side cutting pliers, hacksaw, power hacksaw, chisel and guillotine etc.									
	1.4	Explain the right cutting technique and posture									
	1.5	Carry out cutting operation using tools in 1.3 above									
	1.6	Apply safe use of cutting tools									
LO 2 **Demonstrate grinding operations**	2.1	Define grinding operation									
	2.2	Explain the importance of grinding operations									
	2.3	List types of grinding operations (electrical and manual)									
	2.4	List grinding tools such as files, emery cloths, angle grinder, pedestal, table-mounted									
	2.5	Perform manual grinding operation									
	2.6	Perform electrical grinding operation.									
	2.7	Apply safe use of grinding tools									
LO 3 **Demonstrate the proper**	3.1	Explain the procedure for changing worn out cutting and grinding disc									

handling of cutting and grinding tools	3.2	Carry out replacement of worn out cutting and grinding disc									
	3.3	Explain the care for various cutting tools listed in 1.3 above									
	3.4	Explain the care for various grinding tools listed in 2.4 above									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
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Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 15: **FITTING OPERATIONS**

Unit reference number: ENGG/WF/015/L2

NSQ level: **2**

Credit value: 2

Guided learning hour: 20 hours

Unit Purpose: This unit is designed to provide the trainee with the knowledge and skills of fitting, drilling and riveting operations.

Objectives:

At the end of this unit, the learner should be able to:

1. Know joining processes
2. Carry out fitting operations
3. Carry out drilling operations
4. Carry out riveting operations
5. Demonstrate bolts and nuts fastening operations

Unit assessment requirements/evidence requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 15: Fitting Operations

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 **Know joining processes**	1.1	Explain joining processes									
	1.2	List types of joining process: • Welding • Riveting • Bolt and nut • Snap-fit • Bonding • Screw • etc									
	1.3	State areas of application for 1.2 above									
LO 2 **Carry out drilling operations**	2.1	Describe drilling operations									
	2.2	List drilling tools and accessories									
	2.3	Select appropriate drill bits for a given task									
	2.4	Carry out drilling operations									
	2.5	Check for defects associated with 3.4 above									
	2.6	Carry out corrective measures on 3.5 above									
LO 3 **Carry out riveting operations**	3.1	Explain riveting as a joining process									
	3.2	List tools and accessories used in riveting operation									

	3.3	Perform riveting operation									
	3.4	Check for faults in riveting operation									
	3.5	Carry out corrective measures on 4.4 above									
LO 4 **Demonstrate bolts and nuts fastening operations**	4.1	Explain bolt and nut as a mechanical fastening process									
	4.2	List types of bolts and nuts									
	4.3	List types of tools used for bolts and nuts fastening									
	4.4	Demonstrate the uses of bolts and nuts									
LO 5 **Carry out fitting operations**	5.1	Identify joints									
	5.2	Carry out process In 1.2 above									
	5.3	Carry out joint fitting operations									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

WELDER

NSQ LEVEL 3

QUALIFICATION PURPOSE

This qualification is for those interested in developing a career in welding industry. It is aimed to acquaint the learner with sufficient knowledge and skills in the work environment, to interpret blueprint, produce sound welds using different welding processes, carry out weld repairs and fabrication.

NSQ LEVEL: 3

At the end of the Units within this level, the Learner should be able to:

1. Understand safe work practices
2. Communicate effectively in work environment.
3. Work effectively in a team.
4. Interpret blueprint for welding operation.
5. Carry out pipe welding operations.
6. Perform Tungsten Inert Gas (TIG) welding operations.
7. Carry out Metal Inert Gas/Metal Active Gas (MIG/MAG) welding operations.
8. Perform Flux-Cored Arc welding (FCAW) operations.
9. Carry out Submerged Arc welding (SAW) operations.
10. Carry out Combination weld operations.
11. Perform Composite welding.

NSQ LEVEL 3 – WELDER

Unit No	Reference Number	NOS Title	Credit Value	Guided Learning Hours	Remark
MANDATORY UNITS					
01	ENGG/WF/001/L3	Occupational Health and Safety	2	20	Mandatory Unit
02	ENGG/WF/002/L3	Communication system in the work environment	2	20	Mandatory Unit
03	ENGG/WF/003/L3	Team Work	2	20	Mandatory Unit
04	ENGG/WF/004/L3	Interpretation of Blue Print	3	30	Mandatory unit
05	ENGG/WF/005/L3	Pipe Welding	6	60	Mandatory Unit
TOTAL			**15**	**150**	
OPTIONAL UNITS					
06	ENGG/WF/006/L3	Tungsten Inert Gas (TIG) Welding Process	6	60	Optional Unit
07	ENGG/WF/007/L3	Metal Inert/Active Gas (MIG/MAG) Welding Process	6	60	Optional Unit
08	ENGG/WF/008/L3	Flux-Cored Arc Welding (FCAW) Process	6	60	Optional Unit
09	ENGG/WF/009/L3	Submerged Arc Welding (SAW) Process	6	60	Optional Unit
10	ENGG/WF/010/L3	Combination Welding	3	30	Optional Unit
11	ENGG/WF/011/L3	Composite Welding	3	30	Optional Unit
TOTAL			**30**	**300**	

NOTE: This is a 27 credit unit qualification. To achieve this qualification; Learners are required to achieve 15 Credits from the mandatory and at least 12 credits from the optional units. Each Credit is equivalent to 10 Guided Learning Hours (GLH). The Total Learning Hours will therefore consist of the GLH *plus* the independent learning hours of the candidate, which is generally 50% – 150% of the GLH. ***The actual Total Learning Hours for each Credit will then be a minimum of 15 hours***.

GENERAL GUIDE

Unit title	Provides a clear explanation of the content of the unit.
Unit number	The unique number assigned to the unit
Unit reference	The unique reference number given to each unit at qualification approval by NBTE
Unit level	Denotes the level of the unit within the National Skills Qualifications Framework NSQF.
Unit credit value	The value that has been given to the unit based on the expected learning time for an average learner. 1 credit = 10 learning hours
Unit aim	Provides a brief outline of the unit content.
Learning Outcome	A statement of what a learner will know, understand or be able to do, as a result of learning process.
Assessment criteria	A description of the requirements a learner must achieve to demonstrate that a learning outcome has been met.
Unit assessment guidance	Any additional guidance provided to support the assessment of the unit.
Unit guided learning hours	The average number of hours of supervised or directed study time or assessment required to achieve a qualification or unit of a qualification.

UNIT 1: OCCUPATIONAL HEALTH AND SAFETY

Unit reference number: ENGG/WF/001/L3

NSQ level: 3

Credit value: 2

Guided learning hour: 20 Hours

Unit Purpose: This unit is designed to enable the learner to acquire knowledge and skill required in health, safety and environment in relation to the roles in welding operation.

Objectives:

At the end of this unit, the learner should be able to:

1. Demonstrate Personal health and hygiene
2. Maintain Hygienic, safe and hazard-free workplace.
3. Maintain clean and healthy environment.
4. Demonstrate safe and secure workplace
5. Understand how to manage fire in a company
6. Work safely in confined space.

Unit assessment requirements/evidence requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 1: Occupational Health and Safety

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 Demonstrate Personal health and hygiene	1.1	State the importance of maintaining good personal hygiene									
	1.2	Wear clean, smart and appropriate personal protective equipment									
	1.3	Work safely at all times by complying with health and safety and other relevant guidelines.									
	1.4	Describe how to deal with cuts, burns and wounds.									
	1.5	Report illness and infection promptly to the appropriate authority									
	1.6	Monitor others on the general rules on hygiene that must be followed									
LO 2 Maintain Hygienic, safe and hazard-free workplace.	2.1	State the importance of working in a healthy, safe and hygienic workplace									
	2.2	State where information about health and safety in your workplace can be obtained									
	2.3	Promote health, hygiene and safety procedures during work									
	2.4	Conduct emergency safety drills during work									
	2.5	Describe the types of hazards in the workplace that may occur and how to deal with them									
	2.6	Differentiate between hazards that can be dealt with personally and those that should be reported to appropriate authority.									

	2.7	Report any accidents or near-miss quickly and accurately to the appropriate authority.									
LO 3 **Maintain clean and healthy environment**.	3.1	Promote sound and noise control.									
	3.2	Separate wastes into their various designated places									
	3.3	Ensure the disposal of waste and Pollution control with organic and inorganic waste disposal methods									
LO 4 **Demonstrate safe and secure workplace**	4.1	Carry out organisational procedures on how to warn other people about hazards and why this is important									
	4.2	State why accidents and near-miss should be reported appropriately									
	4.3	Describe the types of emergencies that may happen in the workplace and how to deal with them									
	4.4	Indicate where to find the first-aid equipment and locate the authorized personnel									
	4.5	Lift and handle materials in line with work environment procedure.									
LO 5 **Understand how to manage fire in a workplace**	5.1	Describe organisational fire emergency procedures.									
	5.2	Discuss possible causes of fire in the workplace									
	5.3	Describe how to avoid the possibility of fire in the workplace									
	5.4	State where to find fire alarms and how to set them off									
	5.5	State why a fire should never be approached unless it is safe to									

	5.6	State the importance of following the fire safety laws									
LO 6 **Work safely in confined space.**	6.1	Discuss the characteristics of confined space.									
	6.2	Discuss the procedure for permit to work in confined space									
	6.3	Describe the procedures for working in a confined place.									
	6.4	Discuss roles of personnel working in confined space: • Attendants/Standby-man • Entrant • Entry Supervisor • Whistle Blower									
	6.5	Describe confined space hazards									
	6.6	Control confined space hazards									
	6.7	Eliminate confined space hazards									
	6.8	Perform rescue operation in confined space									
	6.9	Outline rights of employee in confined space.									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
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Assessment requirements specified by a sector or regulatory body (if appropriate)	
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Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 2: COMMUNICATION SYSTEM IN WORKPLACE

Unit reference number: ENGG/WF/002/L3

NSQ level: 3

Credit value: 2

Guided learning hour: 20 Hours

Unit Purpose: This unit is designed to enable the learner use various information flow system to overcome challenges in a workplace

Objectives:

At the end of this unit, the learner should be able to:

1. Understand complex communication system in a workplace
2. Understand sources of information and Management in a workplace
3. Understand communication channels in a workplace
4. Understand communication equipment deployment

Unit assessment requirements/evidence requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 2: Communication System in Workplace

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 Understand complex communication system in a workplace	1.1	Importance of effective communication in a workplace									
	1.2	Describe simple non-verbal means of communication									
	1.3	Interpret concept of symbols and signs appropriately									
	1.4	Use audio and electronic means to pass on necessary information									
LO 2 Understand sources of information and Management in a workplace	2.1	Discuss sources of information in an organisation and work environment.									
	2.2	Access appropriate information in an organisation or work environment from relevant sources									
	2.3	Use the various information flow system in an organisation or work environment to overcome challenges									
	2.4	Ensure proper documentation, retrieval of information in accordance to procedure in a work environment									
LO 3 Understand communication channels in a workplace	3.1	Describe the effective use of the various communication channels in a workplace									
	3.2	Demonstrate the use of various communication means in a workplace									
	3.3	Ensure effective information flow to the right personnel									
	3.4	Ensure the effective deployment of the use of symbols, signs and codes									
	3.5	Ensure that instructions are disseminated and obeyed in									

		line with ethics of the workplace									
LO 4 Understand communication equipment deployment	4.1	Ensure that communication equipment is in good working condition									
	4.2	Promptly report the loss, faulty or damaged communication equipment.									
	4.3	Ensure safe handling of communication equipment.									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
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Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 3: **TEAM WORK**

Unit reference number: ENGG/WF/003/L3

NSQ level: **3**

Credit value: **2**

Guided learning hour: **20 Hours**

Unit Purpose: This unit is designed to acquaint the learner with knowledge and skills required to develop team spirit and positive working relationship within the workplace

Objectives:

At the end of this unit, the learner should be able to:

1. Understand various team roles in workplace
2. Coordinate team activities
3. Understand communication flow

Unit assessment requirements/evidence requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 3: Teamwork

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 Understand various team roles in workplace	1.1	List the various teams in workplace: • Welders • Fitters • Helpers • QA/QC • Inspectors • Engineering									
	1.2	Discuss the roles of the various teams									
	1.3	Discuss how your work as a welder affects others in delivering quality output as a team.									
LO 2 Coordinate team activities	2.1	Discuss the method of carrying out activities with team members.									
	2.2	Distribute work load and coordinate activities									
	2.3	Select materials and tools required for each team activity									
	2.4	Interpret directives to team members									
	2.5	Ensure that team members comply with directives									
LO 3 Understand communication flow	3.1	Communicate work related information/requirement clearly to team members									
	3.2	Inform co-workers and superiors about any kind of deviation from work plan									
	3.3	Address the problems effectively if need be to superiors appropriately									
	3.4	Gather instructions from superiors and respond effectively									

	3.5	Communicate to team members/subordinates of the right work techniques and methods									
	3.6	Obtain clarification and advice from superiors as per work information where necessary									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
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Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 4: INTERPRETATION OF BLUEPRINT

Unit Reference Number: ENGG/WF/004/L3

NSQ Level 3: WELDER

Credit Value: 3

Guided Learning Hour: 30 hours

Unit Purpose: This unit is designed to provide the trainee with the knowledge and skills in the use of blueprint in welding operation.

Objectives:

At the end of this unit, the learner should be able to:

1. Understand blueprint
2. Interpret blueprint
3. Know pipe pattern and development

Unit Assessment Requirements/ Evidence Requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 4: Interpretation of Blueprint

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 Understand blueprint	1.1	Explain the term "blueprint"									
	1.2	List types of blueprints in engineering.									
	1.3	Explain parts of mechanical blueprint									
	1.4	Discuss welding symbols in blueprint									
	1.5	Explain how to read blueprint for fabrication job.									
LO 2 Interpret blueprint	2.1	Obtain welding details from blueprint									
	2.2	Obtain fitting details from blueprint									
	2.3	Obtain information on materials from blueprint									
	2.4	Obtain information on reference and standard									
LO 3 Know pipe pattern and development	3.1	Explain the term "pattern development".									
	3.2	List the steps in pattern development									
	3.3	Carry out pattern development for pipe									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 5: **PIPE WELDING**.

Unit Reference Number: ENGG/WF/005/L3

NSQ Level: **3**

Credit Value: **6**

Guided Learning Hour: **60 Hours**

Unit Purpose: This unit specifies the competencies required to demonstrate the knowledge and skills for pipe welding.

Prerequisite: Structural Welding

Objectives:

At the end of this unit, the learner should be able to:

1. Carry out joint preparation for pipe welding
2. Carry out fit-up for pipe
3. Interpret drawings and measurement to specification
4. Carry out pipe welding operations
5. Know costing and quotation

Unit assessment requirements/ evidence requirements:

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 5: Pipe Welding

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 **Carry out joint preparation for pipe welding**	1.1	Discuss different classes of pipes in terms of physical features									
	1.2	Identify the types of joint in pipe welding.									
	1.3	Use Welding Procedures Specification (WPS) in preparing joints for pipe welding									
	1.4	Justify the application of the different methods of joint preparation according to standard									
	1.5	Inspect the prepared joint: • Before • during • after									
	1.6	Explain joint design									
LO 2 **Carry out fit-up for pipe**	2.1	Identify methods of fitting pipes together for: • The same diameter • Different diameters									
	2.2	State the importance of fitting pipes and connections: • Elbow • Spools • T-K-Y connections • Flanges									
	2.3	Justify the selection of various methods of fitting pipes according to standard.									
	2.4	Carryout fit-up of pipes and branch connections.									
LO 3	3.1	Discuss fabrication drawings and measurement to specifications									

Interpret drawings and measurement to specification	3.2	Discuss working drawings: orthographic, isometric projections and sectioning									
	3.3	Use drawings to assemble components for welding to specifications.									
	3.4	Identify welding symbols									
	3.5	Interpret welding symbols									
	3.6	Use WPS for pipe welding operations									
LO 4 **Carry out pipe welding operations**	4.1	Explain the importance of thickness and diameter in pipe welding									
	4.2	Describe the ease of welding small diameter pipes less than or equal to 100 mm (4 inches)									
	4.3	Describe the ease welding large diameter pipes greater than 100 mm (4 inches)									
	4.4	Describe the methods used in welding pipes.									
	4.5	Describe the techniques used for welding pipes									
	4.6	Carry out pipe welding operations for the following: • Small Pipes • Large pipes • Branch connection • Different diameters									
	4.7	Check for weld defects (before, during and after)									
	4.8	Carry out repair on defected areas									
	4.9	Carry out good house-keeping									
LO 5 **Know costing and quotation**	5.1	Identify cost units for a given job									
	5.2	Compute welding estimate for a given job									

	5.3	Carry out costing for a given job									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 6: TUNGSTEN INERT GAS (TIG) WELDING PROCESS (OPTIONAL UNIT).

Unit Reference Number: ENGG/WF/006/L3

NSQ Level: 3

Credit Value: 6

Guided Learning Hour: 60 Hours

Unit Purpose: This unit specifies the competencies required to demonstrate the knowledge and skills for Tungsten Inert Gas (TIG) welding process.

Objectives:

At the end of this unit, the learner should be able to:

1. Demonstrate the understanding of safety precautions in TIG welding
2. Know TIG welding process
3. Carry out TIG welding operations
4. Know costing and quotation

Unit assessment requirements/ evidence requirements:

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 6: Tungsten Inert Gas (TIG) Welding Process

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 **Demonstrate the understanding of safety precautions in TIG welding**	1.1	Explain safety precautions in TIG welding operations									
	1.2	Identify appropriate PPE in TIG welding operations									
	1.3	Select appropriate PPE for use in TIG welding operations									
LO 2 **Know TIG welding process**	2.1	Describe TIG welding process									
	2.2	Describe types of TIG welding process: • Manual • Semi-automatic • Fully automatic									
	2.3	Explain set up for the types of process listed in 2.2									
	2.4	Discuss the operational features of a TIG welding machine.									
	2.5	Describe various techniques for TIG welding: • Walking the cup/Duck walk • Lifting up									
LO 3 **Carry out TIG welding operations**	3.1	Identify tools and accessories used in TIG welding: • Accessories (Collet, Collet body, Ceramic cup, Cylinder gauge, Gas lens.) • Tools (Wire brush, Chipping Hammer, Tongs, Table grinder, Spindle key, Adjustable spanner, Plier)									
	3.2	Select appropriate consumables for TIG welding operations: • Electrodes • Gases									

		• Filler rods									
	3.3	Set up TIG welding machine for use									
	3.4	Grind tungsten electrode to standard									
	3.5	Carry out TIG welding operations using appropriate techniques									
	3.6	Check for weld defects									
	3.7	Repair weld defects									
	3.8	Carry out good housekeeping									
LO 4 **Know costing and quotation**	4.1	Identify cost units for a given job									
	4.2	Compute welding estimate for a given job									
	4.3	Carry out costing for a given job									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 7: **METAL INERT GAS/METAL ACTIVE GAS (MIG/MAG) WELDING PROCESS (OPTIONAL UNIT).**

Unit Reference Number: ENGG/WF/007/L3

NSQ Level: **3**

Credit Value: 6

Guided Learning Hour: **60 Hours**

Unit Purpose: This unit specifies the competencies required to demonstrate the knowledge and skills for Metal Inert Gas/Metal Active Gas (MIG/MAG) welding process.

Objective:

At the end of this unit, the learner should be able to:

1. Demonstrate the understanding of safety precautions in MIG/MAG welding
2. Know MIG/MAG welding process
3. Carry out MIG/MAG welding operations.
4. Know costing and quotation

Unit assessment requirements/ evidence requirements:

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 7: Metal Inert Gas/Metal Active Gas (MIG/MAG) Welding Process

LO (Learning Outcome) Criteria: -			**Evidence Type**					**Evidence Ref Page Number**			
LO 1 **Demonstrate the understanding of safety precautions in MIG/MAG welding operations**	1.1	Explain safety precautions in MIG/MAG welding operations									
	1.2	Identify appropriate PPE in MIG/MAG welding operations									
	1.3	Select appropriate PPE for use in MIG/MAG welding operations									
LO 2 **Know MIG/MAG welding process**	2.1	Describe MIG/MAG welding process									
	2.2	Describe types of MIG/MAG welding process: • Manual • Semi-automatic • Fully automatic									
	2.3	Set-up for the types of processes listed in 2.2 above									
	2.4	Discuss the operational features of a MIG/MAG welding machine.									
	2.5	Describe various techniques for MIG/MAG welding: • Weaving • Stringer									
LO 3 **Carry out MIG/MAG welding operations**.	3.1	Identify tools and accessories used in MIG/MAG welding: • Accessories (Contact tip, Nozzle, Gas diffuser, Power hose, Torch-head assembly, External wire feed unit, Welding visor) • Tools (Wire brush, Chipping Hammer, Tongs, Cutter, Spindle key, Adjustable spanner, Plier)									

	3.2	Select appropriate consumables for MIG/MAG welding operations: • Gases • Filler wires									
	3.3	Set up MIG/MAG welding machine for use									
	3.4	Carry out MIG/MAG welding operations using appropriate techniques									
	3.5	Check for weld defects									
	3.6	Repair weld defects									
	3.7	Carry out good housekeeping									
LO 4 **Know costing and quotation**	4.1	Identify cost units for a given job									
	4.2	Compute welding estimate for a given job									
	4.3	Carry out costing for a given job									

Learner's Signature:	Date:
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Additional information about the unit	
Unit aim(s)	
Unit expiry date	
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Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
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Location of the unit within the subject/sector classification system	
Name of the organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 8: FLUX-CORED ARC WELDING (FCAW) PROCESS (OPTIONAL UNIT).

Unit Reference Number: ENGG/WF/008/L3

NSQ Level: **3**

Credit Value: **6**

Guided Learning Hour: **60 Hours**

Unit Purpose: This unit specifies the competencies required to demonstrate the knowledge and skills for Flux-Cored Arc welding (FCAW) process.

Objectives:

At the end of this unit, the learner should be able to:

1. Demonstrate the understanding of safety precautions in FCAW
2. Know FCAW process
3. Carry out FCAW operations
4. Know costing and quotation

Unit assessment requirements/ evidence requirements:

1. Direct Observation (DO).
2 Personal statement (PS)
3 Questions and Answers (QA).
4 Witness Testimony (WT)
5 Assignment (ASS)
6 Work Products (WP)

Unit 8: Flux-Cored Arc Welding (FCAW) Process

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 **Demonstrate the understanding of safety precautions in FCAW operations**	1.1	Explain safety precautions in FCAW operations									
	1.2	Identify appropriate PPE in FCAW operations									
	1.3	Select appropriate PPE for use in FCAW operations									
LO 2 **Know FCAW process**	2.1	Describe FCAW process									
	2.2	Describe types of FCAW process: • Manual • Semi-automatic • Fully automatic									
	2.3	Set-up for the types of process listed in 2.2 above									
	2.4	Discuss the operational features of a FCAW machine.									
	2.5	Describe various techniques for FCAW: • Weaving • Stringer									
LO 3 **Carry out FCAW operations**.	3.1	Identify tools and accessories used in FCAW: • Accessories (Contact tip, Nozzle, Gas diffuser, Power hose, Torch-head assembly, External wire feed unit, Welding visor) • Tools (Wire brush, Chipping Hammer, Tongs, Cutter, Spindle key, Adjustable spanner, Plier)									
	3.2	Select appropriate consumables for FCAW operations: • Gases • Filler wires									
	3.3	Set up FCAW machine for use									

	3.4	Carry out FCAW operations using appropriate techniques									
	3.5	Check for weld defects									
	3.6	Repair weld defects									
	3.7	Carry out good housekeeping									
LO 4 **Know costing and quotation**	4.1	Identify cost units for a given job									
	4.2	Compute welding estimate for a given job									
	4.3	Carry out costing for a given job									

Learner's Signature:	Date:
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IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 9: SUBMERGED ARC WELDING (SAW) PROCESS (OPTIONAL UNIT).

Unit Reference Number: ENGG/WF/009/L3

NSQ Level: 3

Credit Value: 6

Guided Learning Hour: 60 Hours

Unit Purpose: This unit specifies the competencies required to demonstrate the knowledge and skills for Submerged Arc Welding (SAW) process.

Objectives:

At the end of this unit, the learner should be able to:

1. Demonstrate the understanding of safety precautions in SAW
2. Know SAW process
3. Carry out SAW operations
4. Know costing and quotation

Unit assessment requirements/ evidence requirements:

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 9: Submerged Arc Welding (SAW) Process

LO (Learning Outcome) Criteria: -			**Evidence Type**					**Evidence Ref Page Number**			
LO 1 **Demonstrate the understanding of safety precautions in SAW operations**	1.1	Explain safety precautions in SAW operations									
	1.2	Identify appropriate PPE in SAW operations									
	1.3	Select appropriate PPE for use in SAW operations									
LO 2 **Know SAW process**	2.1	Describe SAW process									
	2.2	Describe types of SAW process: • Semi-automatic • Fully automatic									
	2.3	Set-up for the types of process listed in 2.2 above									
	2.4	Discuss the operational features of a SAW machine.									
LO 3 **Carry out SAW operations.**	3.1	Identify tools and accessories used in SAW: • Accessories (Flux hopper, Nozzle, Power hose, Torch-head assembly, External wire feed unit, Plain goggle, Allen key) • Tools (Wire brush, Chipping Hammer, Tongs, Cutter, Spindle key, Adjustable spanner, Plier)									
	3.2	Select appropriate consumables for SAW operations: • Filler wires • Granular Flux									
	3.3	Set up SAW machine for use									
	3.4	Carry out SAW operations									

	3.5	Check for weld defects									
	3.6	Repair weld defects									
	3.7	Carry out good housekeeping									
LO 4 **Know costing and quotation**	4.1	Identify cost units for a given job									
	4.2	Compute welding estimate for a given job									
	4.3	Carry out costing for a given job									

Learner's Signature:	Date:
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Additional information about the unit	
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Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 10: COMBINATION WELDING PROCESS (OPTIONAL UNIT).

Unit Reference Number: ENGG/WF/010/L3

NSQ Level: **3**

Credit Value: **3**

Guided Learning Hour: **30 Hours**

Unit Purpose: This unit specifies the competencies required to demonstrate the knowledge and skills for Combination welding processes.

Objectives:

At the end of this unit, the learner should be able to:

1. Demonstrate the understanding of safety precautions in Combination welding
2. Know combination welding processes
3. Carry out combination welding operations
4. Know costing and quotation

Unit assessment requirements/ evidence requirements:

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answer (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 10: Combination Welding Processes

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 Demonstrate the understanding of safety precautions in Combination Welding operations	1.1	Explain safety precautions in Combination Welding operations									
	1.2	Identify appropriate PPE in Combination Welding operations									
	1.3	Select appropriate PPE for use in Combination Welding operations									
LO 2 Know Combination Welding processes	2.1	Describe Combination Welding process									
	2.2	Describe types of Combination Welding processes: • TIG/MMA • TIG/FCAW • TIG/MIG/MAG • MMA/FCAW									
	2.3	Set-up a multi-process welding machine for use									
	2.4	Discuss the operational features of a multi process welding machine									
LO 3 Carry out Combination Welding operations	3.1	Select appropriate consumables for Combination Welding operations									
	3.2	Set up appropriate machine for Combination Weld									
	3.3	Carry out Combination Welding operations									
	3.4	Check for weld defects									
	3.5	Repair weld defects									
	3.6	Carry out good housekeeping									
LO 4 Know costing and quotation	4.1	Identify cost units for a given job									
	4.2	Compute welding									

		estimate for a given job									
	4.3	Carry out costing for a given job									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 11: **COMPOSITE WELDING (OPTIONAL UNIT)**.

Unit Reference Number: ENGG/WF/011/L3

NSQ Level: **3**

Credit Value: **3**

Guided Learning Hour: **30 Hours**

Unit Purpose: This unit specifies the competencies required to demonstrate the knowledge and skills for Composite Welding.

Objectives:

At the end of this unit, the learner should be able to:

1. Demonstrate the understanding of safety precautions in Composite Welding
2. Understand Composite Materials
3. Know Composite Welding process
4. Carry out Composite Welding operations
5. Know costing and quotation

Unit assessment requirements/evidence requirements:

1. Direct Observation (DO)
2. Personal Statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)

Unit 11: Composite Welding

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 Demonstrate the understanding of safety precautions in Composite Welding operations	1.1	Explain safety precautions in Composite Welding operations									
	1.2	Identify appropriate PPE in Composite Welding operations									
	1.3	Select appropriate PPE for use in Composite Welding operations									
LO 2 Understand Composite Materials	2.1	Define composite materials									
	2.2	List the different types of composite materials for welding operations									
	2.3	State the importance of composite materials for welding operations									
	2.4	Discuss properties of composite materials for welding operations									
	2.5	Select appropriate composite materials for a given task									
LO 3 Know Composite Welding process	3.1	Describe Composite Welding operations									
	3.2	Set-up a multi process welding machine									
	3.3	Discuss the operational features of a multi process welding machine.									
LO 4 Carry out Composite Welding	4.1	Describe Composite Welding									
	4.2	State the reason for Composite Welding									
	4.3	Prepare materials for Composite Welding									
	4.4	Carry out Composite Welding using different processes: • Induction • Ultrasonic									

		• TIG • Resistance • Fusion Bonding • MMA									
	4.5	Check for weld defects									
	4.6	Repair weld defects									
	4.7	Carry out good housekeeping									
LO 5 **Know costing and quotation**	5.1	Identify cost units for a given job									
	5.2	Compute welding estimate for a given job									
	5.3	Carry out costing for a given job									

Learner's Signature:	Date:
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EQAM Signature (if sampled)	**Date:**

FITTER

NSQ LEVEL 3

QUALIFICATION PURPOSE

This qualification is for those interested in developing a career in fitting work. It is aimed to acquaint the learner with sufficient knowledge and skills in the work environment, to produce sound fitted products using blueprint and different fitting processes, carry out fitting repairs and fabrication.

NSQ LEVEL: 3

Objectives:

At the end of the Units within this level, the Learner should be able to:

1. Understand safe work practices
2. Communicate effectively in work environment.
3. Work effectively in a team.
4. Interpret blueprint for fitting operation.
5. Fittings component
6. Fitting operations

NSQ LEVEL 3 – FITTER

Unit No	Reference Number	NOS Title	Credit Value	Guided Learning Hours	Remark
MANDATORY UNITS					
01	ENGG/WF/001/L3	Occupational Health and Safety	2	20	Mandatory Unit
02	ENGG/WF/002/L3	Communication system in the work environment	2	20	Mandatory Unit
03	ENGG/WF/003/L3	Team Work	2	20	Mandatory Unit
04	ENGG/WF/012/L3	Interpretation of Blue Print	6	60	Mandatory unit
05	ENGG/WF/013/L3	Fitting component	8	80	Mandatory Unit
06	ENGG/WF/014/L3	Fitting operations	8	80	Mandatory Unit
TOTAL			28	280	

NOTE: This is a 28 credit unit qualification. To achieve this qualification; Learners are required to achieve all mandatory credits units. Each Credit is equivalent to 10 Guided Learning Hours (GLH). The Total Learning Hours will therefore consist of the GLH *plus* the independent learning hours of the candidate, which is generally 50% – 150% of the GLH. ***The actual Total Learning Hours for each Credit will then be a minimum of 15 hours***.

GENERAL GUIDE

Unit title	Provides a clear explanation of the content of the unit.
Unit number	The unique number assigned to the unit
Unit reference	The unique reference number given to each unit at qualification approval by NBTE
Unit level	Denotes the level of the unit within the National Skills Qualifications Framework NSQF.
Unit credit value	The value that has been given to the unit based on the expected learning time for an average learner. 1 credit = 10 learning hours
Unit aim	Provides a brief outline of the unit content.
Learning Outcome	A statement of what a learner will know, understand or be able to do, as a result of learning process.
Assessment criteria	A description of the requirements a learner must achieve to demonstrate that a learning outcome has been met.
Unit assessment guidance	Any additional guidance provided to support the assessment of the unit.
Unit guided learning hours	The average number of hours of supervised or directed study time or assessment required to achieve a qualification or unit of a qualification.

UNIT 1: **OCCUPATIONAL HEALTH AND SAFETY**

Unit reference number: **ENGG/WF/001/L3**

NSQ level: 3

Credit value: **2**

Guided learning hour: **20 Hours**

Unit Purpose: This unit is designed to enable the learner to acquire knowledge and skill required in health, safety and environment in relation to the roles in fitting operations.

Objectives:

At the end of this unit, the learner should be able to:

1. Demonstrate personal health and hygiene
2. Maintain hygienic, safe and hazard-free workplace.
3. Maintain clean and healthy environment.
4. Demonstrate safe and secure workplace
5. Understand how to manage fire in a company
6. Work safely in a confined space.

Unit assessment requirements/evidence requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)
7. Professional discussion (PD)

Unit 1: Occupational Health and Safety

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 Demonstrate personal health and hygiene	1.1	State the importance of maintaining good personal hygiene									
	1.2	Wear clean, smart and appropriate personal protective equipment									
	1.3	Work safely at all times by complying with health, safety and other relevant guidelines.									
	1.4	Describe how to deal with cuts, burns and wounds.									
	1.5	Report illness and infection promptly to the appropriate authority									
	1.6	Monitor others on the general rules on hygiene that must be followed									
LO 2 Maintain hygienic, safe and hazard-free workplace.	2.1	State the importance of working in a healthy, safe and hygienic workplace									
	2.2	State where information about health and safety in your workplace can be obtained									
	2.3	Promote health, hygiene and safety procedures during work									
	2.4	Conduct emergency safety drills during work									
	2.5	Describe the types of hazards in the workplace that may occur and how to deal with them									
	2.6	Differentiate between hazards that can be dealt with personally and those that should be reported to appropriate authority.									

	2.7	Report any accidents or near-miss quickly and accurately to the appropriate authority.									
LO 3 **Maintain clean and healthy environment.**	3.1	Promote sound and noise control.									
	3.2	Separate wastes into their various designated places									
	3.3	Ensure the disposal of waste and pollution control with organic and inorganic waste disposal methods									
LO 4 **Demonstrate safe and secure workplace**	4.1	Carry out organisational procedures on how to warn other people about hazards and why this is important									
	4.2	State why accidents and near-miss should be reported appropriately									
	4.3	Describe the types of emergencies that may happen in the workplace and how to deal with them									
	4.4	Indicate where to find the first-aid equipment and locate the authorized personnel									
	4.5	Lift and handle materials in line with work environment procedure.									
LO 5 **Understand how to manage fire in a workplace**	5.1	Describe fire emergency procedures.									
	5.2	Discuss possible causes of fire in the workplace									
	5.3	Describe how to avoid the possibility of fire in the workplace									
	5.4	State where to find fire alarms and how to set them off									
	5.5	State why a fire should never be approached unless it is safe to									

	5.6	State the importance of following the fire safety rules									
LO 6 **Work safely in confined space.**	6.1	Discuss the characteristics of confined space.									
	6.2	Discuss the procedure for permit to work in confined space									
	6.3	Describe the procedures for working in a confined place.									
	6.4	Discuss roles of personnel working in confined space: • Attendants/Standby-man • Entrant • Entry Supervisor • Whistle Blower									
	6.5	Describe confined space hazards									
	6.6	Control confined space hazards									
	6.7	Eliminate confined space hazards									
	6.8	Perform rescue operation in confined space									
	6.9	Outline rights of employee in confined space.									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 2: COMMUNICATION SYSTEM IN WORKPLACE

Unit reference number: ENGG/WF/002/L3

NSQ level: 3

Credit value: 2

Guided learning hour: 20 Hours

Unit Purpose: This unit is designed to enable the learner use various information flow system to overcome challenges in a workplace

Objectives:

At the end of this unit, the learner should be able to:

1. Understand complex communication system in a workplace
2. Understand sources of information and Management in a workplace
3. Understand communication channels in a workplace
4. Understand communication equipment deployment

Unit assessment requirements/evidence requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)
7. Professional discussion (PD)

Unit 2: Communication System in Workplace

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 Understand advance communication system in a workplace	1.1	Discuss importance of effective communication in a workplace									
	1.2	Describe simple non-verbal means of communication									
	1.3	Interpret concept of symbols and signs appropriately									
	1.4	Use audio and electronic means to pass on necessary information									
LO 2 Understand sources of information and Management in a workplace	2.1	Discuss sources of information in an organisation and work environment.									
	2.2	Access appropriate information in an organisation or work environment from relevant sources									
	2.3	Use the various information flow system in an organisation or work environment to overcome challenges									
	2.4	Ensure proper documentation, retrieval of information in accordance to procedure in a work environment									
LO 3 Understand communication channels in a workplace	3.1	Describe the effective use of the various communication channels in a workplace									
	3.2	Demonstrate the use of various communication means in a workplace									
	3.3	Ensure effective information flow to the right personnel									
	3.4	Ensure the effective deployment of the use of symbols, signs and codes									

	3.5	Ensure that instructions are disseminated and obeyed in line with ethics of the workplace									
LO 4 Understand communication equipment deployment	4.1	Ensure that communication equipment is in good working condition									
	4.2	Promptly report the loss, faulty or damaged communication equipment.									
	4.3	Ensure safe handling of communication equipment.									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 3: **TEAM WORK**

Unit reference number: ENGG/WF/003/L3

NSQ level: **3**

Credit value: **2**

Guided learning hour: **20 Hours**

Unit Purpose: This unit is designed to acquaint the learner with knowledge and skills required to develop team spirit and positive working relationship within the workplace

Objectives:

At the end of this unit, the learner should be able to:

1. Understand various team roles in workplace
2. Coordinate team activities
3. Understand communication flow

Unit assessment requirements/evidence requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)
7. Professional discussion (PD)

Unit 3: Teamwork

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 Understand various team roles in workplace	1.1	List the various teams in workplace: • Fitter • Welders • Helpers • QA/QC • Inspectors • Engineering • etc									
	1.2	Discuss the roles of the various teams in 1.1									
	1.3	Discuss how your work as a fitter affects others in delivering quality output as a team.									
LO 2 Coordinate team activities	2.1	Discuss the method of carrying out activities with team members.									
	2.2	Distribute work load and coordinate activities									
	2.3	Select materials and tools required for each team activity									
	2.4	Interpret directives to team members									
	2.5	Ensure that team members comply with directives									
LO 3 Understand communication flow	3.1	Communicate work related information/requirement clearly to team members									
	3.2	Inform co-workers and superiors about any kind of deviation from work plan									
	3.3	Address the problems effectively if need be to superiors appropriately									

	3.4	Received instructions from superiors and respond effectively									
	3.5	Communicate to team members/subordinates of the right work techniques and methods									
	3.6	Obtain clarification and advice from superiors as per work information where necessary									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 12: INTERPRETATION OF BLUEPRINT

Unit Reference Number: ENGG/WF/012/L3

NSQ Level 3: FITTER

Credit Value: 6

Guided Learning Hour: 60 hours

Unit Purpose: This unit is designed to provide the trainee with the knowledge and skills in the use of blueprint in fitting operation.

Objectives:

At the end of this unit, the learner should be able to:

1. Understand blueprint
2. Interpret blueprint
3. Know pipe pattern and development

Unit Assessment Requirements/ Evidence Requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)
7. Professional discussion (PD)

Unit 12: Interpretation of Blueprint

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 Understand blueprint	1.1	Explain the term "blueprint"									
	1.2	List types of blueprints in engineering.									
	1.3	Explain parts of mechanical blueprint									
	1.4	Discuss symbols in blueprint									
	1.5	Explain how to read blueprint for fabrication job.									
LO 2 Interpret blueprint	2.1	Select fabrication drawing from blueprint									
	2.2	Discuss fabrication drawings									
	2.3	Interpret working drawing, e.g. orthographic, isometric projections and sectioning									
	2.4	Interpret drawing according to local and International standard and code eg ASME 16.9									
	2.5	Obtain fitting details from blueprint									
	2.6	Obtain information on materials from blueprint									
	2.7	Obtain information on reference and standard									
	2.8	Compare final work with drawing									
	2.9	Correct defect if any									
LO 3 Know pipe pattern and development	3.1	Explain the term "pattern development".									
	3.2	List the steps in pattern development									
	3.3	Carry out pattern development for pipe									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 13: **FITTINGS COMPONENT**

Unit Reference Number: **ENGG/WF/013/L3**

NSQ Level 3: **FITTER**

Credit Value: **8**

Guided Learning Hour: **80 hours**

Unit Purpose: This unit is designed to provide the trainee with the knowledge and skills in understanding fitting component, application of fitting component and fit-up devices.

Objectives:

At the end of this unit, the learner should be able to:

1. Understand Fitting component
2. Application of fitting component
3. Fit-up devices

Unit Assessment Requirements/ Evidence Requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)
7. Professional discussion (PD)

Unit 13: FITTINGS COMPONET

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 Understand fittings component	1.1	Explain fittings components									
	1.2	List various types of fitting components: • Piping elbow • Tee-connection • Reducer • Piping valves • Nipples • Piping cross • Etc									
	1.3	Identify appropriate component for a given task									
	1.4	Select appropriate component for a given task									
	1.5	Use appropriate component for a given task									
LO 2 Understand application of fitting component	2.1	Explain application of fitting components									
	2.2	List areas of application: • Pipes • Structural • TYK diversion • Couplings									
	2.3	Identify appropriate component for 2.2 above									
	2.4	Apply appropriate component for a given task									
LO 3 Know Fit-up devices	3.1	Explain fit-up device									
	3.2	List various fit-up device: • Lifting crane • CNC beveling machine • Spirit level • Pipe alignment clamp • Single chain clamp • Etc									
	3.3	Identify appropriate fit-up device for a given task									
	3.4	Select appropriate fit-up device for a given task									

	3.5	Use appropriate fit-up device for a given task									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 14: FITTING OPERATIONS

Unit Reference Number: ENGG/WF/014/L3

NSQ Level 3: FITTER

Credit Value: 8

Guided Learning Hour: 80 hours

Unit Purpose: This unit is designed to provide the trainee with the knowledge and skills for fitting operation.

Objectives:

At the end of this unit, the learner should be able to:

1. Selection of appropriate Material
2. Carry out measurement and marking out operations
3. Carry out cutting operation
4. Prepare joint for fitting

Unit assessment requirements/evidence requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)
7. Professional discussion (PD)

Unit 14: FITTING OPERATIONS

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 Selection of appropriate Material	1.1	Explain material Selection									
	1.2	List various types of engineering material									
	1.3	Identify various type of material used in welding									
	1.4	Select appropriate material for a given task									
LO 2 Carry out measurement and marking out operations	2.1	Explain measurement									
	2.2	Identify various measuring tools									
	2.3	Select appropriate measurement tool for a given task									
	2.4	Check for defects associated with 2.3									
	2.5	Carry out corrective measures on 2.3 above									
	2.6	Carry out measurement operation using appropriate tools for a given task									
	2.7	List marking out tools and accessories									
	2.8	Select appropriate marking out tool for a given task									
	2.9	Carry out marking out operations									
LO 3 Carry out cutting operations	3.1	Explain cutting									
	3.2	List various cutting methods: • Oxy/Fuel • Plasma • Disc • Mechanical									
	3.3	Inspect mark out point in line with working drawing									

	3.4	Select appropriate cutting method for a given task									
	3.5	Inspect cutting device for malfunctioning before, during and after operation									
	3.6	Carry out cutting operation using appropriate method for a given task									
LO 4 Prepare joint for fitting	4.1	Explain joint preparation									
	4.2	List various types of joints: • Butt • Tee • Corner • Edge • Lap									
	4.3	List various methods of joint preparation: • Grinding • Milling • Machining • Filing									
	4.4	Select appropriate method of joint preparation for a specific job task									
	4.5	List various tools/equipment for preparing a joint: • Pipe clamps • Utility clamp • Vice • Jig & Fixture • Spirit level • etc									
	4.6	Select appropriate tool/equipment for a specific task									
	4.7	Prepare joint appropriately for a given task:									

		• Butt • Tee • Lap • Edge • Corner									
	4.8	Inspect the joint prepared before fitting									
	4.9	Assemble joint for fitting operation									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	Date:

GENERAL GUIDE

Unit title	Provides a clear explanation of the content of the unit.
Unit number	The unique number assigned to the unit
Unit reference	The unique reference number given to each unit at qualification approval by NBTE
Unit level	Denotes the level of the unit within the National Skills Qualifications Framework NSQF.
Unit credit value	The value that has been given to the unit based on the expected learning time for an average learner. 1 credit = 10 learning hours
Unit aim	Provides a brief outline of the unit content.
Learning Outcome	A statement of what a learner will know, understand or be able to do, as a result of learning process.
Assessment criteria	A description of the requirements a learner must achieve to demonstrate that a learning outcome has been met.
Unit assessment guidance	Any additional guidance provided to support the assessment of the unit.
Unit guided learning hours	The average number of hours of supervised or directed study time or assessment required to achieve a qualification or unit of a qualification.

NON DESTRUCTIVE TESTING

NSQ LEVEL 3

QUALIFICATION PURPOSE:

This qualification is for those interested in developing a career in radiography and ultrasonic work. It is aimed to acquaint the learner with sufficient knowledge and skills in the work environment, to produce sound radiography/Ultrasonic test using different radiography and ultrasonic methods.

NSQ LEVEL: 3

Objectives:

At the end of the Units within this level, the Learner should be able to:

1 Understand safe work practices
2 Communicate effectively in work environment.
3 Work effectively in a team.
4 Radiography test
5 Ultrasonic test

NSQ LEVEL 3 – NON DESTRUCTIVE TESTING

Unit No	Reference Number	NOS Title	Credit Value	Guided Learning Hours	Remark
UNITS					
01	ENGG/WF/001/L3	Occupational Health and Safety	2	20	Mandatory Unit
02	ENGG/WF/002/L3	Communication system in the work environment	2	20	Mandatory Unit
03	ENGG/WF/003/L3	Team Work	2	20	Mandatory Unit
04	ENGG/WF/015/L3	Radiography testing	8	80	Optional unit
05	ENGG/WF/016/L3	Ultrasonic testing	8	80	Optional Unit
TOTAL			**22**	**220**	

NOTE: This is a 22 credit unit qualification. To achieve this qualification; Learners are required to achieve all mandatory credits units and an optional unit. Each Credit is equivalent to 10 Guided Learning Hours (GLH). The Total Learning Hours will therefore consist of the GLH *plus* the independent learning hours of the candidate, which is generally 50% – 150% of the GLH. ***The actual Total Learning Hours for each Credit will then be a minimum of 15 hours***.

GENERAL GUIDE

Unit title	Provides a clear explanation of the content of the unit.
Unit number	The unique number assigned to the unit
Unit reference	The unique reference number given to each unit at qualification approval by NBTE
Unit level	Denotes the level of the unit within the National Skills Qualifications Framework NSQF.
Unit credit value	The value that has been given to the unit based on the expected learning time for an average learner. 1 credit = 10 learning hours
Unit aim	Provides a brief outline of the unit content.
Learning Outcome	A statement of what a learner will know, understand or be able to do, as a result of learning process.
Assessment criteria	A description of the requirements a learner must achieve to demonstrate that a learning outcome has been met.
Unit assessment guidance	Any additional guidance provided to support the assessment of the unit.
Unit guided learning hours	The average number of hours of supervised or directed study time or assessment required to achieve a qualification or unit of a qualification.

UNIT 1: **OCCUPATIONAL HEALTH AND SAFETY**

Unit reference number: **ENGG/WF/001/L3**

NSQ level: 3

Credit value: **2**

Guided learning hour: **20 Hours**

Unit Purpose: This unit is designed to enable the learner to acquire knowledge and skill required in health, safety and environment in relation to the roles in radiography operations.

Objectives:

At the end of this unit, the learner should be able to:

1 Demonstrate personal health and hygiene
2 Maintain hygienic, safe and hazard-free workplace.
3 Maintain clean and healthy environment.
4 Demonstrate safe and secure workplace
5 Understand how to manage fire in a company
6 Work safely in a confined space.

Unit assessment requirements/evidence requirements

1 Direct Observation (DO)
2 Personal statement/Learning Journal (PS/LJ)
3 Questions and Answers (QA)
4 Witness Testimony (WT)
5 Assignment (ASS)
6 Work Products (WP)
7 Professional discussion (PD)

Unit 1: Occupational Health and Safety

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 Demonstrate personal health and hygiene	1.1	State the importance of maintaining good personal hygiene									
	1.2	Wear clean, smart and appropriate personal protective equipment									
	1.3	Work safely at all times by complying with health, safety and other relevant guidelines.									
	1.4	Describe how to deal with cuts, burns and wounds.									
	1.5	Report illness and infection promptly to the appropriate authority									
	1.6	Monitor others on the general rules on hygiene that must be followed									
LO 2 Maintain hygienic, safe and hazard-free workplace.	2.1	State the importance of working in a healthy, safe and hygienic workplace									
	2.2	State where information about health and safety in your workplace can be obtained									
	2.3	Promote health, hygiene and safety procedures during work									
	2.4	Conduct emergency safety drills during work									
	2.5	Describe the types of hazards in the workplace that may occur and how to deal with them									
	2.6	Differentiate between hazards that can be dealt with personally and those that should be reported to appropriate authority.									

	2.7	Report any accidents or near-miss quickly and accurately to the appropriate authority.									
LO 3 **Maintain clean and healthy environment.**	3.1	Promote sound and noise control.									
	3.2	Separate wastes into their various designated places									
	3.3	Ensure the disposal of waste and pollution control with organic and inorganic waste disposal methods									
LO 4 **Demonstrate safe and secure workplace**	4.1	Carry out organisational procedures on how to warn other people about hazards and why this is important									
	4.2	State why accidents and near-miss should be reported appropriately									
	4.3	Describe the types of emergencies that may happen in the workplace and how to deal with them									
	4.4	Indicate where to find the first-aid equipment and locate the authorized personnel									
	4.5	Lift and handle materials in line with work environment procedure.									
LO 5 **Understand how to manage fire in a workplace**	5.1	Describe fire emergency procedures.									
	5.2	Discuss possible causes of fire in the workplace									
	5.3	Describe how to avoid the possibility of fire in the workplace									
	5.4	State where to find fire alarms and how to set them off									
	5.5	State why a fire should never be approached unless it is safe to									

	5.6	State the importance of following the fire safety rules									
LO 6 **Work safely in confined space.**	6.1	Discuss the characteristics of confined space.									
	6.2	Discuss the procedure for permit to work in confined space									
	6.3	Describe the procedures for working in a confined place.									
	6.4	Discuss roles of personnel working in confined space: • Attendants/Standby-man • Entrant • Entry Supervisor • Whistle Blower									
	6.5	Describe confined space hazards									
	6.6	Control confined space hazards									
	6.7	Eliminate confined space hazards									
	6.8	Perform rescue operation in confined space									
	6.9	Outline rights of employee in confined space.									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 2: COMMUNICATION SYSTEM IN WORKPLACE

Unit reference number: ENGG/WF/002/L3

NSQ level: 3

Credit value: 2

Guided learning hour: 20 Hours

Unit Purpose: This unit is designed to enable the learner use various information flow system to overcome challenges in a workplace

Objectives:

At the end of this unit, the learner should be able to:

1 Understand complex communication system in a workplace
2 Understand sources of information and Management in a workplace
3 Understand communication channels in a workplace
4 Understand communication equipment deployment

Unit assessment requirements/evidence requirements

1 Direct Observation (DO)
2 Personal statement/Learning Journal (PS/LJ)
3 Questions and Answers (QA)
4 Witness Testimony (WT)
5 Assignment (ASS)
6 Work Products (WP)
7 Professional discussion (PD)

Unit 2: Communication System in Workplace

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 Understand advance communication system in a workplace	1.1	Discuss importance of effective communication in a workplace									
	1.2	Describe simple non-verbal means of communication									
	1.3	Interpret concept of symbols and signs appropriately									
	1.4	Use audio and electronic means to pass on necessary information									
LO 2 Understand sources of information and Management in a workplace	2.1	Discuss sources of information in an organisation and work environment.									
	2.2	Access appropriate information in an organisation or work environment from relevant sources									
	2.3	Use the various information flow system in an organisation or work environment to overcome challenges									
	2.4	Ensure proper documentation, retrieval of information in accordance to procedure in a work environment									
LO 3 Understand communication channels in a workplace	3.1	Describe the effective use of the various communication channels in a workplace									
	3.2	Demonstrate the use of various communication means in a workplace									
	3.3	Ensure effective information flow to the right personnel									
	3.4	Ensure the effective deployment of the use of symbols, signs and codes									

	3.5	Ensure that instructions are disseminated and obeyed in line with ethics of the workplace									
LO 4 Understand communication equipment deployment	4.1	Ensure that communication equipment is in good working condition									
	4.2	Promptly report the loss, faulty or damaged communication equipment.									
	4.3	Ensure safe handling of communication equipment.									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 3: **TEAM WORK**

Unit reference number: ENGG/WF/003/L3

NSQ level: **3**

Credit value: **2**

Guided learning hour: **20 Hours**

Unit Purpose: This unit is designed to acquaint the learner with knowledge and skills required to develop team spirit and positive working relationship within the workplace

Objectives:

At the end of this unit, the learner should be able to:

1 Understand various team roles in workplace
2 Coordinate team activities
3 Understand communication flow

Unit assessment requirements/evidence requirements

1 Direct Observation (DO)
2 Personal statement/Learning Journal (PS/LJ)
3 Questions and Answers (QA)
4 Witness Testimony (WT)
5 Assignment (ASS)
6 Work Products (WP)
7 Professional discussion (PD)

Unit 3: Teamwork

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 Understand various team roles in workplace	1.1	List the various teams in workplace: • Fitter • Welders • Helpers • QA/QC • Inspectors • Engineering • Etc									
	1.2	Discuss the roles of the various teams in 1.1									
	1.3	Discuss how your work as a fitter affects others in delivering quality output as a team.									
LO 2 Coordinate team activities	2.1	Discuss the method of carrying out activities with team members.									
	2.2	Distribute work load and coordinate activities									
	2.3	Select materials and tools required for each team activity									
	2.4	Interpret directives to team members									
	2.5	Ensure that team members comply with directives									
LO 3 Understand communication flow	3.1	Communicate work related information/requirement clearly to team members									
	3.2	Inform co-workers and superiors about any kind of deviation from work plan									
	3.3	Address the problems effectively if need be to superiors appropriately									

	3.4	Received instructions from superiors and respond effectively									
	3.5	Communicate to team members/subordinates of the right work techniques and methods									
	3.6	Obtain clarification and advice from superiors as per work information where necessary									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 15: RADIOGRAPHY TESTING LEVEL 3

Unit Reference Number: ENGG/WFR/015/L3

NSQ Level 3:

Credit Value: 8

Guided Learning Hour: 80 hours

Unit Purpose: This unit is designed to provide the trainee with the knowledge and skills on Radiography testing (RT), maintain quality product and observe radiography and general safety rules under supervision.

Objectives:

At the end of this unit, the learner should be able to

1. understand personal safety and radiation protection,
2. demonstrate the knowledge and skills of radiography test,
3. understand the principle of RT,
4. understand equipment- radiation source,
5. photographic and photographic recoding,
6. understand work parameter and conditions,
7. film processing,
8. demonstrate the understanding and skills of techniques selection in RT

Unit Assessment Requirements/ Evidence Requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)
7. Professional Discussion (PD)

UNIT 15: RADIOGRAPHY TESTING LEVEL 3

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type					Evidence Ref. Page No.			
LO 1 Understand Personal safety and radiation protection	1.1	Explain exposure to X rays and gamma rays									
	1.2	List dangers of excessive exposure to X rays and gamma rays									
	1.3	List ways of personal monitoring: • Wearing of monitoring badges • Reading of pocket dosimeters • Recording of daily dosimeter reading • Off-scale dosimeter-action required									
	1.4	Carry out RT putting on monitoring badge									
	1.5	Carry out RT putting on pocket dosimeter									
	1.6	Document your daily dosimeter									
	1.7	Explain permissible doses									
	1.8	List method of controlling exposure dose: • Time • Distance • Shielding									
LO 2: Demonstrate the knowledge and skills of radiography test (RT)	2.1	Define radiography									
	2.2	List types of radiography: • X ray • Gamma ray									
	2.3	Explain radiography set-up									
	2.4	Identify X ray equipment									
	2.5	Identify gamma ray equipment									
	2.6	Set up X ray equipment									
	2.7	Set up gamma ray equipment									
	2.8	Identify the class RT belong to (volumetric or visual)									
	2.10	List the limitations of radiography test									
LO 3:	3.1	List the penetrating radiation:									

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type					Evidence Ref. Page No.			
Understand the physical principle of RT		• X rays • Gamma rays									
	3.2	Explain wavelength and energy									
	3.3	Explain principle of radioactive decay									
	3.4	Explain properties of propagation of penetrant radiation									
	3.5	Explain Absorption coefficient, half-thickness									
LO 4: Understand Equipment-radiation sources	4.1	Explain X ray generator and tube, target material and characteristics, configuration, focus, heat dissipation									
	4.2	List various accessories of X ray equipment • Film markers • Cassette holder • Film viewer • Film developer • Drier • Hanger • etc									
	4.3	Identify the basic component and control of X ray equipment									
	4.4	Use X ray equipment and accessories									
	4.5	Define radioisotopes									
	4.6	List types of radioisotope: • Hydrogen-3 (tritium) 12.32yrs • Carbon-14 5,700yrs • Chlorine-36 301,000yrs • Lead-210 22.2yrs									
	4.7	Identify the spectrum of the radioisotope and its activity									
	4.8	Dismantle and couple X ray tubes and accessories									
LO 5: Know Photographic and	5.1	Define film for RT									
	5.2	Identify classes of industrial radiographic films									

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type					Evidence Ref. Page No.			
photographic recording	5.3	relate the code of the film to its properties (grain size, contrast, speed);									
	5.4	Explain photographic recording									
	5.5	List types of screen: • Lead • Fluorescent									
	5.6	Distinguish between the types of screens and their applications.									
	5.7	Select appropriate film for a given task									
	5.8	Develop exposed film									
	5.9	Record data generated									
	5.10	Compare data with established standards									
LO 6 Understand work parameters and conditions	6.1	Explain parameters and work conditions									
	6.2	Explain image quality, contrast and definition									
	6.3	Define density measures									
	6.4	Explain image density									
	6.5	List factors that can affect density: • Total number of X-rays that reach the film • Penetrating power of X-rays • The developing time • The temperature of the developer									
	6.6	List causes of defective radiography: • Distorted images • Finger marks • Blurred images • Double exposure • Undeveloped/ clear area of film • Etc									
	6.7	List remedy for 6.6 above									
	6.8	Explain darkroom									
	6.9	List equipment in the darkroom: • Safe light • Developer									

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type					Evidence Ref. Page No.			
		• Focus finder • Darkroom trays • etc									
	6.10	Explain film processing									
	6.11	List processing defects: • High density • Low density • Contrast • Definition • Fog									
LO 7 **Know Processing of film**	7.1	Mix chemical for development to the right proportion									
	7.2	Extract film from jacket									
	7.3	Immerse film in developer									
	7.4	Immerse film in fixer									
	7.5	Immersed film in washer and wash									
	7.6	Dry the film in the drier									
	7.7	View film with the film viewer									
LO 8 **Demonstrate the skills of techniques selection in RT process**	8.1	Explain techniques according to the geometry of the object									
	8.2	Explain: • Single wall/single image • Double wall/double image • Double wall/Single image									
	8.3	Explain Panoramic exposure									
	8.4	Explain Thickness compensation									
	8.5	Explain Masks									
	8.6	Select appropriate film									
	8.7	Put film in the appropriate gasket									
	8.8	Mount film on object or test piece									
	8.9	Set idle time and exposure time									
	8.10	Conduct radiography test									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

GENERAL GUIDE

Unit title	Provides a clear explanation of the content of the unit.
Unit number	The unique number assigned to the unit
Unit reference	The unique reference number given to each unit at qualification approval by NBTE
Unit level	Denotes the level of the unit within the National Skills Qualifications Framework NSQF.
Unit credit value	The value that has been given to the unit based on the expected learning time for an average learner. 1 credit = 10 learning hours
Unit aim	Provides a brief outline of the unit content.
Learning Outcome	A statement of what a learner will know, understand or be able to do, as a result of learning process.
Assessment criteria	A description of the requirements a learner must achieve to demonstrate that a learning outcome has been met.
Unit assessment guidance	Any additional guidance provided to support the assessment of the unit.
Unit guided learning hours	The average number of hours of supervised or directed study time or assessment required to achieve a qualification or unit of a qualification.

UNIT 16: ULTRASONIC TESTING

Unit Reference Number: ENGG/WFU/016/L3

NSQ Level 3:

Credit Value: 8

Guided Learning Hour: 80 hours

Unit Purpose: This unit is designed to provide the trainee with the knowledge and skills on Ultrasonic testing (UT) to maintain quality product under supervision.

Objectives:

At the end of this unit, the learner should be able to

1. Understand principles and fundamentals of ultrasonic,
2. Understand testing techniques and limitations,
3. Understand equipment and accessories,
4. Calibrate testing equipment,
5. Understand codes, standards and specifications,
6. Records and evaluation of results.

Unit Assessment Requirements/ Evidence Requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)
7. Professional Discussion (PD)

Unit 16: ULTRASONIC TESTING

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 Understand Principles and Fundamentals of Ultrasonic	1.1	Define ultrasonic									
	1.2	List ultrasonic terminologies: • Frequency, • Amplitude, • Reflection, • Speed of propagation • Wavelength etc									
	1.3	Define the terminologies in 1.2 above									
	1.4	Explain the concepts relating to frequency, amplitude, wave length and speed of propagation									
	1.5	Define sensor									
	1.6	List types of sensor: • Normal • Angular • Emitter-receiver									
	1.7	Define sonic filed									
	1.8	explain the relationship between transducer size, frequency and tested material on sonic field									
LO 2 **Know Testing Techniques and Limitations**	2.1	Define techniques in UT									
	2.2	List various types of techniques in UT: • Pulse-echo • Direct contact • Transmission • Resonance etc									
	2.3	Define coupling in UT									

	2.4	Define the characteristics of a good couplant;									
	2.5	List substances which can be used as a good couplants: • Oil • Grease • Glycerine									
	2.6	Describe the nature of the transmission technique									
	2.7	list the applications and limitations of the transmission technique									
	2.8	State the basic principle of the pulse- echo technique;									
	2.9	list the applications and limitations of the technique									
LO 3 **Understand UT equipment and accessories**	3.1	Describe UT equipment									
	3.2	List types of UT equipment									
	3.3	List UT accessories: • Probe • Reference block									
	3.4	List types of probes: • Angular shear wave • Straight beam									
	3.5	Set-up UT equipment									
LO 4 **Calibrate testing equipment**	4.1	Define calibration									
	4.2	List calibration equipment: • Calibration block • Reference block									
	4.3	Explain checking the calibration of equipment: • consideration of differences in speed of propagation between									

		calibration block and test piece, • comparison with reference blocks									
	4.4	Explain calibration procedure in line with standards									
	4.5	perform the calibration correctly with an angular sensor									
	4.6	Distinguish between calibration techniques for angular sensors									
	4.7	Perform calibration to locate the beam exit point and verify the angle.									
	4.8	Explain the adjustment for calibration to compensate for the difference in speed of ultrasonic propagation between the calibration block and the test piece.									
	4.9	Perform calibration in line with 4.8 above									
LO 5 **Know codes, standards, specifications and procedures**	5.1	Define Codes, Standards, Specification and procedures in relation to UT									
	5.2	List various codes and standards which exist for the application of UT									
	5.3	Define discontinuity									
	5.4	List types of discontinuities: • Cracks • Porosity • Inclusion • Laminar tear etc									
	5.5	Prepare a procedure for a given task									
LO 6	6.1	Explain recording in UT									

Recording and evaluation of results	6.2	Define evaluation in UT									
	6.3	List format for recording result: • Template • Written • Digital									
	6.4	Explain how defects are detected: • By its position • Size of reflector									
	6.5	Carry out test using UT equipment									
	6.6	Evaluate work using UT method									
	6.7	Record findings from 6.5 above									
	6.8	Submit report to appropriate authority									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

WELDING INSPECTOR BASICS

NSQ LEVEL 3

QUALIFICATION PURPOSE

This qualification is for those interested in developing a career in welding inspection. It is aimed to acquaint the learner with sufficient knowledge and skills in welding inspection and product quality assurance.

NSQ LEVEL: 3

Objectives

At the end of the Units within this level, the Learner should be able to:

1. Understand safe work practices
2. Communicate effectively in work environment.
3. Work effectively in a team.
4. Interpret welding drawings and WPS
5. Ensuring appropriate processes, materials selection techniques and consumables
6. Understand weld defects
7. Weld test specimen joint and edge preparation
8. Heat treatment of metals

Perquisite: Intermittent welder level 2

NSQ LEVEL 3 – WELDING INSPECTOR BASICS

Unit No	Reference Number	NOS Title	Credit Value	Guided Learning Hours	Remark
01	ENGG/WF/001/L3	Health, safety and environment	2	20	Mandatory Unit
02	ENGG/WF/002/L3	Communication system in the work environment	2	20	Mandatory Unit
03	ENGG/WF/003/L3	Team work	2	20	Mandatory Unit
04	ENGG/WF/017/L3	Welding drawings and WPS	4	40	Mandatory Unit
05	ENGG/WF/018/L3	welding processes, materials selection, techniques and consumables	4	40	Mandatory Unit
06	ENGG/WF/019/L3	Weld defects, detection and repair	4	40	Mandatory Unit
07	ENGG/WF/020/L3	Weld test specimen preparation	4	40	Mandatory Unit
08	ENGG/WF/021/L3	Heat treatment of metals	4	40	Mandatory Unit
		TOTAL	26	260	

NOTE: This is a 26 credit unit qualification. To achieve this qualification; Learners are required to achieve all mandatory credits units. Each Credit is equivalent to 10 Guided Learning Hours (GLH). The Total Learning Hours will therefore consist of the GLH *plus* the independent learning hours of the candidate, which is generally 50% – 150% of the GLH. ***The actual Total Learning Hours for each Credit will then be a minimum of 15 hours***.

GENERAL GUIDE

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Unit aim	Provides a brief outline of the unit content.
Learning Outcome	A statement of what a learner will know, understand or be able to do, as a result of learning process.
Assessment criteria	A description of the requirements a learner must achieve to demonstrate that a learning outcome has been met.
Unit assessment guidance	Any additional guidance provided to support the assessment of the unit.
Unit guided learning hours	The average number of hours of supervised or directed study time or assessment required to achieve a qualification or unit of a qualification.

UNIT 1: **OCCUPATIONAL HEALTH AND SAFETY**

Unit reference number: ENGG/WF/001/L3

NSQ level: 3

Credit value: **2**

Guided learning hour: 20 Hours

Unit Purpose: This unit is designed to enable the learner to acquire knowledge and skill required in health, safety and environment in relation to the roles in fitting operations.

Objectives:

At the end of this unit, the learner should be able to:

1. Demonstrate Personal health and hygiene
2. Maintain Hygienic, safe and hazard-free workplace.
3. Maintain clean and healthy environment.
4. Demonstrate safe and secure workplace
5. Understand how to manage fire in a company
6. Work safely in confined space.

Unit assessment requirements/evidence requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)
7. Professional discussion (PD)

Unit 1: Occupational Health and Safety

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 Demonstrate Personal health and hygiene	1.1	State the importance of maintaining good personal hygiene									
	1.2	Wear clean, smart and appropriate personal protective equipment									
	1.3	Work safely at all times by complying with health and safety and other relevant guidelines.									
	1.4	Describe how to deal with cuts, burns and wounds.									
	1.5	Report illness and infection promptly to the appropriate authority									
	1.6	Monitor others on the general rules on hygiene that must be followed									
LO 2 Maintain Hygienic, safe and hazard-free workplace.	2.1	State the importance of working in a healthy, safe and hygienic workplace									
	2.2	State where information about health and safety in your workplace can be obtained									
	2.3	Promote health, hygiene and safety procedures during work									
	2.4	Conduct emergency safety drills during work									
	2.5	Describe the types of hazards in the workplace that may occur and how to deal with them									
	2.6	Differentiate between hazards that can be dealt with personally and those that should be reported to appropriate authority.									

	2.7	Report any accidents or near-miss quickly and accurately to the appropriate authority.									
LO 3 **Maintain clean and healthy environment.**	3.1	Promote sound and noise control.									
	3.2	Separate wastes into their various designated places									
	3.3	Ensure the disposal of waste and Pollution control with organic and inorganic waste disposal methods									
LO 4 **Demonstrate safe and secure workplace**	4.1	Carry out organisational procedures on how to warn other people about hazards and why this is important									
	4.2	State why accidents and near-miss should be reported appropriately									
	4.3	Describe the types of emergencies that may happen in the workplace and how to deal with them									
	4.4	Indicate where to find the first-aid equipment and locate the authorized personnel									
	4.5	Lift and handle materials in line with work environment procedure.									
LO 5 **Understand how to manage fire in a workplace**	5.1	Describe organisational fire emergency procedures.									
	5.2	Discuss possible causes of fire in the workplace									
	5.3	Describe how to avoid the possibility of fire in the workplace									
	5.4	State where to find fire alarms and how to set them off									
	5.5	State why a fire should never be approached unless it is safe to									

	5.6	State the importance of following the fire safety laws									
LO 6 **Work safely in confined space.**	6.1	Discuss the characteristics of confined space.									
	6.2	Discuss the procedure for permit to work in confined space									
	6.3	Describe the procedures for working in a confined place.									
	6.4	Discuss roles of personnel working in confined space: • Attendants/Standby-man • Entrant • Entry Supervisor • Whistle Blower									
	6.5	Describe confined space hazards									
	6.6	Control confined space hazards									
	6.7	Eliminate confined space hazards									
	6.8	Perform rescue operation in confined space									
	6.9	Outline rights of employee in confined space.									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 2: **COMMUNICATION SYSTEM IN WORKPLACE**

Unit reference number: **ENGG/WF/002/L3**

NSQ level: **3**

Credit value: **2**

Guided learning hour: **20 Hours**

Unit Purpose: This unit is designed to enable the learner use various information flow system to overcome challenges in a workplace

Objectives:

At the end of this unit, the learner should be able to:

1. Understand complex communication system in a workplace
2. Understand sources of information and Management in a workplace
3. Understand communication channels in a workplace
4. Understand communication equipment deployment

Unit assessment requirements/evidence requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)
7. Professional discussion (PD)

Unit 2: Communication System in Workplace

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 Understand complex communication system in a workplace	1.1	Importance of effective communication in a workplace									
	1.2	Describe simple non-verbal means of communication									
	1.3	Interpret concept of symbols and signs appropriately									
	1.4	Use audio and electronic means to pass on necessary information									
LO 2 Understand sources of information and Management in a workplace	2.1	Discuss sources of information in an organisation and work environment.									
	2.2	Access appropriate information in an organisation or work environment from relevant sources									
	2.3	Use the various information flow system in an organisation or work environment to overcome challenges									
	2.4	Ensure proper documentation, retrieval of information in accordance to procedure in a work environment									
LO 3 Understand communication channels in a workplace	3.1	Describe the effective use of the various communication channels in a workplace									
	3.2	Demonstrate the use of various communication means in a workplace									
	3.3	Ensure effective information flow to the right personnel									
	3.4	Ensure the effective deployment of the use of symbols, signs and codes									
	3.5	Ensure that instructions are disseminated and obeyed in									

		line with ethics of the workplace									
LO 4 Understand communication equipment deployment	4.1	Ensure that communication equipment is in good working condition									
	4.2	Promptly report the loss, faulty or damaged communication equipment.									
	4.3	Ensure safe handling of communication equipment.									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the Organization submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 3: TEAM WORK

Unit reference number: ENGG/WF/003/L3

NSQ level: 3

Credit value: 2

Guided learning hour: 20 Hours

Unit Purpose: This unit is designed to acquaint the learner with knowledge and skills required to develop team spirit and positive working relationship within the workplace

Objectives:

At the end of this unit, the learner should be able to:

1. Understand various team roles in workplace
2. Coordinate team activities
3. Understand communication flow

Unit assessment requirements/evidence requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)
7. Professional discussion (PD)

Unit 3: Teamwork

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1 Understand various team roles in workplace	1.1	List the various teams in workplace: • Fitter • Welders • Helpers • QA/QC • Inspectors • Engineering									
	1.2	Discuss the roles of the various teams									
	1.3	Discuss how your work as a fitter affects others in delivering quality output as a team.									
LO 2 Coordinate team activities	2.1	Discuss the method of carrying out activities with team members.									
	2.2	Distribute work load and coordinate activities									
	2.3	Select materials and tools required for each team activity									
	2.4	Interpret directives to team members									
	2.5	Ensure that team members comply with directives									
LO 3 Understand communication flow	3.1	Communicate work related information/requirement clearly to team members									
	3.2	Inform co-workers and superiors about any kind of deviation from work plan									
	3.3	Address the problems effectively if need be to superiors appropriately									
	3.4	Gather instructions from superiors and respond effectively									
	3.5	Communicate to team members/subordinates of the right work techniques									

		and methods									
	3.6	Obtain clarification and advice from superiors as per work information where necessary									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 17: **WELDING DRAWINGS AND WELDING PROCEDURE SPECIFICATION (WPS)**

Unit Reference Number: ENGG/WFI/017/L3

NSQ Level 3: Welding inspector Basics

Credit Value: 4

Guided Learning Hour: 40 hours

Unit Purpose: This unit is designed to provide the trainee with the knowledge and skills in the understanding use of welding drawings and procedure specification

Objectives:

At the end of this unit, the learner should be able to:

1. Understand welding drawings
2. Understand welding procedure specification (WPS)
3. Understand inspection testing plan

Unit Assessment Requirements/ Evidence Requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)
7. Professional discussion (PD)

UNIT 17: **WELDING DRAWINGS AND WELDING PROCEDURE SPECIFICATION (WPS)**

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type					Evidence Ref. Page No.			
LO 1: Understand welding drawings	1.1	Explain welding drawing									
	1.2	Identify welding drawing from a blueprint									
	1.3	Select appropriate drawing									
	1.4	Interpret the drawing in line with a given task.									
LO 2: Know welding procedure specification (WPS)	2.1	Explain welding procedure specification									
	2.2	Select approved welding procedure									
	2.3	Read and interpret welding procedures									
	2.4	Read and interpret welder qualification specification (WQS)									
	2.5	Explain the application of all relevant procedures: • Check weld against code and standards • Check finish and contour • Check size with gauges and print • Determine if spatter is at acceptable levels • etc.									
LO 3: Understand inspection testing plan	3.1	Define inspection testing plan									
	3.2	List the component of a testing plan: • Scope of work • Data sheet • Specification • Reference publication • Approved drawings • Vendor code									
	3.3	Explain inspection testing plan in 3.2 above									
	3.4	Determine what has to be done with inspection testing plan									
	3.5	Use inspection testing plan									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 18: Welding processes, materials selection techniques and consumables

Unit Reference Number: ENGG/WF/018/L3

NSQ Level 3: Welding inspector Basics

Credit Value: 4

Guided Learning Hour: 40 hours

Unit Purpose: This unit is designed to provide the trainee with the knowledge and skills in applying appropriate welding processes, material selection techniques and consumables.

Objectives:

At the end of this unit, the learner should be able to:

1. Apply appropriate standards and codes
2. Understand Material selection
3. Understand appropriate processes
4. Know welding consumables

Unit Assessment Requirements/ Evidence Requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)
7. Professional discussion (PD)

Unit 18: WELDING PROCESSES, MATERIALS SELECTION, TECHNIQUES AND CONSUMABLES

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type					Evidence Ref. Page No.			
LO 1: **Apply appropriate standards and codes**	1.1	Explain Standard and code									
	1.2	List various standard and code applicable to welding operation									
	1.3	Identify appropriate standards and codes for a given welding operation									
	1.4	Communicate the appropriate standard and codes to the welder and welding operator									
	1.5	Use appropriate standard and codes for a given operation									
LO 2: **Understand Material selection**	2.1	Discuss appropriate material selection									
	2.2	Explain material selection techniques									
	2.3	Select materials and consumables as recommended in standard and codes									
	2.4	Distinguish between materials, using material certificate									
	2.5	Recognize materials by verifying data and adequacy of material certificates (base material and filler materials)									
	2.6	Select appropriate material for a given task									
	2.7	Audit material and tools									
LO 3: **Know appropriate welding processes**	3.1	Explain welding processes									
	3.2	List various welding processes: • MMA • TIG • MIG/MAG • FCAW • SAW • etc.									
	3.3	Select the appropriate process for a given task									
	3.4	Recommend appropriate processes for a given task									
LO 4	4.1	Define welding consumables									
	4.2	List various welding consumables:									

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type					Evidence Ref. Page No.			
Know welding consumables		• Gasses (C02 • Flux • Electrodes • Filler wire • Filler rods									
	4.3	Identify appropriate welding consumables for a given task									
	4.4	Recommend the appropriate consumable for a given task									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Additional information about the unit	
Unit aim(s)	
Unit expiry date	
Details of the relationship between the unit and relevant National Occupational Standards (if appropriate)	
Details of the relationship between the unit and other standards or curricula (if appropriate)	
Assessment requirements specified by a sector or regulatory body (if appropriate)	
Endorsement of the unit by a sector or other appropriate body (if required)	
Location of the unit within the subject/sector classification system	
Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 19: **WELD DEFECTS DETECTION AND REPAIRS**

Unit Reference Number: **ENGG/WF/019/L3**

NSQ Level 3: **WELDING INSPECTOR BASICS**

Credit Value: **4**

Guided Learning Hour: **40 hours**

Unit Purpose: This unit is designed to provide the trainee with the knowledge and skills to understand weld defects.

Objectives:

At the end of this unit, the learner should be able to:

1. Understand Weld defects
2. Understand cracks
3. Understand porosity
4. Understand undercut

Unit assessment requirements/evidence requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)
7. Professional discussion (PD)

Unit 19: WELD DEFECTS DETECTION AND REPAIRS

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type					Evidence Ref. Page No.			
LO 1: Understand Weld defects	1.1	Define weld defects									
	1.2	List various weld defects: • Cracks • Porosity • Undercut • Lack of side wall fusion • Etc									
	1.3	Carry out visual inspection on a welded structure									
	1.4	Identify various weld defects in a given task									
	1.5	Justify defect using appropriate standard and code									
	1.6	Justify defect using appropriate inspection kits									
LO 2: Understand cracks	2.1	Explain crack in a weldment									
	2.2	List various types of cracks: • Cold crack • Hot crack • Hydrogen crack etc.									
	2.3	Identify crack location in a weldment: • Crater • HAZ (Heat Affected Zone) • Underbead Etc									
	2.4	List nature of cracks: • Star crack • Longitudinal crack • Transvers crack etc.									
	2.5	List various causes of cracks in a weldment: • Using low hydrogen electrode while welding ferrous metals. • Applying low current with high welding speed. • Poor design concept									

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type					Evidence Ref. Page No.			
		• No preheating before welding • Contamination of base metal. • Residual stress solidification due to shrinkage etc.									
	2.6	List remedy for 2.5 above • Using suitable filler metals • Utilizing the appropriate welding speed and current. • Using proper design concept. • Preheating the metal before welding. • Cleaning the metal surface before welding. • Giving proper cooling of the weld area. etc.									
	2.7	Justify crack using the appropriate standards and codes									
	2.8	Justify crack using the appropriate inspection kits									
LO 3: Understand porosity	3.1	Explain porosity in a weldment									
	3.2	List various types of porosity: • Pin hole • Wormhole • Crater pipes Etc									
	3.3	List causes of porosity: • Using a larger arc. • Unsuitable gas shield. • Existence of moisture in the process. • Excessive gas flow rate. • Dirty job surface									
	3.4	List remedy for 3.3 above • Choosing suitable electrode and filler materials. • Checking the gas flow meter and ensure that it is adapted as needed with appropriate pressure and flow settings									

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type					Evidence Ref. Page No.			
		• Maintain correct arc length • Cleaning the metal before welding • Use appropriate welding speed. etc.									
		Justify porosity using appropriate code and standard									
	3.5	Justify porosity using appropriate inspection kits									
LO 4: Understand undercut	4.1	Define undercut in a weldment									
	4.2	List causes of undercut: • Incorrect angle of electrode. • Speed of travel too fast. • Poor welding techniques • Use of incorrect gas shielding and filler metal. • Use of excessive welding current. • Using larger diameter electrodes. etc.									
	4.3	List remedy for 4.2 above • Using correct electrode angle. • Reduce travel speed. • Select appropriate shielding gas and filler metal. • Reduce arc length. etc.									
	4.4	Justify undercut using appropriate inspection kits									
	4.5	Justify undercut using appropriate code and standard									

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Name of the Organisation submitting the unit	Nigerian Institute of Welding (NIW)
Guided Learning Hours	

UNIT 20: WELD TEST SPECIMEN PREPARATION

Unit Reference Number: ENGG/WF/020/L3

NSQ Level 3: WELDING INSPECTOR BASICS

Credit Value: 4

Guided Learning Hour: 40 hours

Unit Purpose: This unit is designed to provide the trainee with the knowledge and skills to understand basic principle of edge preparation, fundamental aspects of testing materials with particular reference to weldment test pieces.

Objectives:

At the end of this unit, the learner should be able to:

1. Understand basic principle of edge preparation
2. Understand Joints in welding
3. Understand the fundamental aspects of testing materials with particular reference to weldment tests pieces

Unit assessment requirements/evidence requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)
7. Professional discussion (PD)

Unit 20: WELD TEST SPECIMEN PREPARATION

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type					Evidence Ref. Page No.			
LO 1: **Understand the basic principles of edge preparation process**	1.1	Define edge preparation									
	1.2	List methods of edge preparation: • Grinding • Cutting • Machining • Milling									
	1.3	List the equipment for edge preparation • Plasma • laser • water jet cutting • gauging etc.									
	1.4	Identify appropriate edge preparation method for a given task									
	1.5	Check standards for edge preparation procedures									
	1.6	Select recommended methods for edge preparation									
	1.7	Select recommended methods for edge preparation repair									
LO 2: **Understand Joints in welding**	2.1	Define joint in welding									
	2.2	List various types of joints: • Butt • Tee • Lap • Edge • Corner									
	2.3	Identify area of application for 2.2 above									
	2.4	Supervise the application of 2.2 above									
LO3 **Know the fundamental aspects of testing**	3.1	Explain testing of weldment									
	3.2	List methods of testing: • Non Destructive Test (NDT) • Destructive Test (DT)									

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type					Evidence Ref. Page No.			
materials with particular reference to weldment tests pieces	3.3	List NDT methods for testing: • Visual • PT • UT • RT • MPT etc.									
	3.4	List DT methods for testing: • Bend test • Impact testing • V notch • Tensile etc.									
	3.5	Identify appropriate testing method for a given task									
	3.6	Classify competence in carrying out testing to a given schedule									
	3.7	Use appropriate method of testing with reference to standard and code									
	3.8	Prepare reports									
	3.9	Compare report with existing data									
	3.10	Submit report to appropriate authority									

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Guided Learning Hours	

UNIT 21: Heat treatment of metals

Unit Reference Number: ENGG/WF/021/L3

NSQ Level 3: WELDING INSPECTOR BASICS

Credit Value: 4

Guided Learning Hour: 40 hours

Unit Purpose: This unit is designed to provide the trainee with the knowledge and skills of heat treatment.

Objectives:

At the end of this unit, the learner should be able to:

1. Know heat treatment procedures
2. Understand regulations (codes and technical reports
3. Know temperature measurements and recording
4. Stress relieving pre/post weld heat treatment (PWHT)

Unit assessment requirements/evidence requirements

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Products (WP)
7. Professional discussion (PD)

Unit 21: HEAT TREATMENT OF METALS

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type					Evidence Ref. Page No.			
LO 1: **Know heat treatment procedures**	1.1	Define heat treatment									
	1.2	Describe heat treatment equipment: • Furnace • Oxy fuel									
	1.3	List various heat treatment methods: • Tempering • Annealing • Normalizing etc.									
	1.4	Explain purpose of 1.2 above									
	1.5	Explain the procedure for heat treatment in 1.2 above									
	1.6	Supervise heat treatment procedure									
LO 2: **Understand regulations (codes and technical reports)**	2.1	Explain technical report									
	2.2	List various format for report writing: • Written • Template									
	2.3	List the codes and standards applicable for welding operations: • API 1104 • ISO 9606-1 • AWS D1.1 etc.									
	2.4	Apply appropriate codes and standard for a given task									
LO 3: **Understand Stress relieving**	3.1	Explain stress relieving									
	3.2	List methods of stress relieving: • Pre-weld heat treatment • Post-weld heat treatment • Pinning									
	3.3	Define pre weld heat treatment method (PWHT)									
	3.4	Discuss the reasons for heat treatment before welding									
	3.5	Define post weld heat treatment method (PWHT)									
	3.6	Discuss the reasons for heat treatment after welding.									
	3.7	Define pinning									
	3.8	Discuss the reasons for pining									

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type					Evidence Ref. Page No.			
	3.8	List the temperature range/time for pre-weld heat treatment and post-weld heat treatment									
	3.9	Use the applicable codes and standards									
LO 4 **Know temperature measurements and recording**	4.1	Explain temperature measurement									
	4.2	List device used in measuring temperature: • Temperature cone • Crayon • Thermocouple etc.									
	4.3	Explain the use of the devices in 4.2 above									
	4.4	Use appropriate device for a given task									
	4.5	Record heat treatment result									
	4.6	Apply annealing and homogenization when required in accordance with codes									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**