



**REPUBLIC OF KENYA**

**COMPETENCY BASED CURRICULUM**

**FOR**

**GAS WELDING**

**LEVEL 3**



**TVET CDACC**  
**P.O. BOX 15745-00100**  
**NAIROBI**

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## **FOREWORD**

The provision of quality education and training is fundamental to the Government's overall strategy for social economic development. Quality education and training will contribute to achievement of Kenya's development blueprint and sustainable development goals.

Reforms in the education sector are necessary for the achievement of Kenya Vision 2030 and meeting the provisions of the Constitution of Kenya 2010. The education sector had to be aligned to the Constitution and this resulted to the formulation of the Policy Framework for Reforming Education and Training. A key feature of this policy is the radical change in the design and delivery of the TVET training. This policy document requires that training in TVET be competency based, curriculum development be industry led, certification be based on demonstration of competence and mode of delivery allows for multiple entry and exit in TVET programmes.

These reforms demand that Industry takes a leading role in curriculum development to ensure the curriculum addresses its competence needs. It is against this background that this curriculum has been developed.

It is my conviction that this curriculum will play a great role towards development of competent human resource for the Welding and Fabrication sector's growth.

**PRINCIPAL SECRETARY, VOCATIONAL AND TECHNICAL TRAINING  
MINISTRY OF EDUCATION**

## **PREFACE**

Kenya Vision 2030 aims to transform the country into a newly industrializing, “middle-income country providing a high-quality life to all its citizens by the year 2030”. Kenya intends to create a globally competitive and adaptive human resource base to meet the requirements of a rapidly industrializing economy through life-long education and training. TVET has a responsibility of facilitating the process of inculcating knowledge, skills and attitudes necessary for catapulting the nation to a globally competitive country, hence the paradigm shift to embrace Competency Based Education and Training (CBET).

The Technical and Vocational Education and Training Act No. 29 of 2013 on Reforming Education and Training in Kenya, emphasized the need to reform curriculum development, assessment and certification. This called for a shift to CBET to address the mismatch between skills acquired through training and skills needed by industry as well as increase the global competitiveness of Kenyan labour force.

TVET Curriculum Development, Assessment and Certification Council (TVET CDACC) in conjunction with Welding Sector Skills Advisory Committee (SSAC) have developed this curriculum.

This curriculum has been developed following the CBET framework policy; the CBETA standards and guidelines provided by the TVET Authority and the Kenya National Qualification Framework designed by the Kenya National Qualification Authority.

This curriculum is designed and organized with an outline of learning outcomes; suggested delivery methods, training/learning resources and methods of assessing the trainee’s achievement. The curriculum is competency-based and allows multiple entry and exit to the course.

I am grateful to the Council members, Council Secretariat, Welding Sector Skills Advisory Committee (SSAC), expert workers and all those who participated in the development of this curriculum.

**CHAIRPERSON, TVET CDACC**

## **ACKNOWLEDGEMENT**

This curriculum has been designed for competency-based training and has independent units of learning that allow the trainee flexibility in entry and exit. In developing the curriculum, significant involvement and support was received from various organisations.

I recognize with appreciation the role of the Welding Sector Skills Advisory Committee (SSAC) in ensuring that competencies required by the industry are addressed in the curriculum. I also thank all stakeholders in the Welding and Fabrication sector for their valuable input and all those who participated in the process of developing this curriculum.

I am convinced that this curriculum will go a long way in ensuring that workers in Welding and Fabrication sector acquire competencies that will enable them to perform their work more efficiently.

**COUNCIL SECRETARY/CEO  
TVET CDACC**

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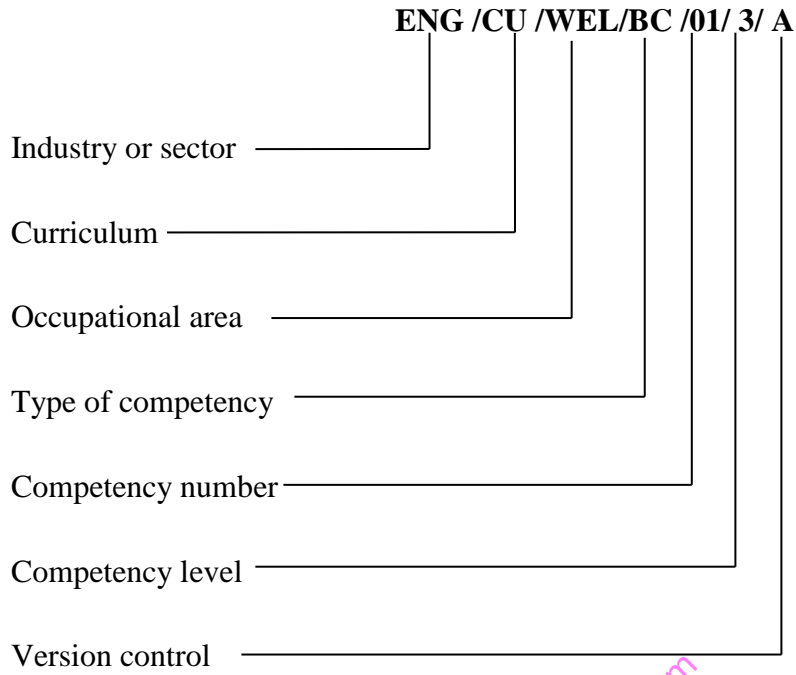
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## ABBREVIATIONS AND ACRONYMS

A	Version Control
BC	Basic competency
CBET	Competency Based Education and Training
CC	Common competency
CR	Core competency
CU	Curriculum
ENG	Engineering
KCSE	Kenya Certificate of Secondary Education
KNQA	Kenya National Qualifications Authority
KS	Kenyan Standard
OSH	Occupational Safety and Health
PPE	Personal Protective Equipment
TVET	Technical and Vocational Education and Training
WE	Welding

## KEY TO UNIT CODE



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## COURSE OVERVIEW

Gas Welding Level 3 qualification consists of competencies that a person must achieve to enable him/her to carry out gas welding, in flat and horizontal positions.

This course consists of the following basic, common and core units of learning:

### Basic Units of Learning

Unit Code	Unit Title	Duration in Hours	Credit factor
ENG/CU/WEL/BC/01/3/A	Communication skills	15	1.5
ENG/CU/WEL/BC/02/3/A	Numeracy skills	15	1.5
ENG/CU/WEL/BC/03/3/A	Digital literacy	20	2.0
ENG/CU/WEL/BC/04/3/A	Entrepreneurial skills	40	4.0
ENG/CU/WEL/BC/05/3/A	Employability skills	20	2.0
ENG/CU/WEL/BC/06/3/A	Environmental literacy	15	1.5
ENG/CU/WEL/BC/07/3/A	Occupational safety and health practices	15	1.5
<b>Total</b>		<b>140</b>	<b>14.0</b>

### Common Units of Learning

Unit of Learning Code	Unit of Learning Title	Duration in Hours	Credit Factors
ENG/CU/WEL/CC/01/3/A	Basic Workshop Concepts	30	3.0
<b>Total</b>		<b>30</b>	<b>3.0</b>

### Core Units of Learning

Unit of Learning Code	Unit of Learning Title	Duration in Hours	Credit Factors
ENG/CU/WEL/CR/01/3/A	Oxy-Acetylene welding	80	8.0
	Industrial Attachment	300	30.0
<b>Total</b>		<b>380</b>	<b>8.0</b>
<b>Grand Total</b>		<b>550</b>	<b>55.0</b>

### **Entry Requirements**

A trainee entering this course should have any of the following minimum requirements:

a) Kenya Certificate of Primary Education (KCPE)

**Or**

b) Junior Secondary Education

**Or**

c) Equivalent qualification as determined by Kenya National Qualifications Authority (KNQA).

### **Trainer qualification**

A trainer for this course should have a higher qualification than the level of this course

### **Industrial Attachment**

An individual enrolled in this course will undergo three hundred (300) hours industrial attachment in a welding industry.

An individual enrolled in this core unit of learning will undergo a two hundred and twenty (220) hours institutional training.

### **Assessment**

The course will be assessed at two levels: internal and external.

- a) **Internal assessment:** conducted continuously by the trainer (internal assessor) who is monitored by an accredited internal verifier.
- b) **External assessment:** conducted by an external assessor who is monitored by an accredited external verifier.

The assessors and verifiers are registered by TVET CDACC which also coordinates external assessment.

### **Certification**

An individual will be awarded a Certificate of Competency on demonstration of competence in a unit of competency. To be awarded a National Certificate in Welding Level 3, an individual must demonstrate competence in all the units of competency as given in this qualification pack.

These certificates will be awarded by TVET CDACC in conjunction with the training provider.

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## **BASIC UNITS OF COMPETENCY**

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## COMMUNICATION SKILLS

**UNIT CODE: ENG/CU/WEL/BC/01/3/A**

### **Relationship to Occupational Standards**

This unit addresses the unit of competency: Demonstrate communication skills

**Duration of Unit:** 15 hours

### **Unit Description**

This unit specifies the competencies required to demonstrate communication skills. It involves, obtaining and conveying workplace information, speaking English at a basic operational level, participating in workplace meetings and discussions and completing relevant work-related documents.

### **Summary of Learning Outcomes**

1. Obtain and convey workplace information
2. Speak English at a basic operational level
3. Participate in workplace meetings and discussions
4. Complete relevant work-related documents

### **Learning Outcomes, Content and Suggested Assessment Methods**

<b>Learning Outcome</b>	<b>Content</b>	<b>Suggested Assessment Methods</b>
1. Obtain and convey workplace information	<ul style="list-style-type: none"><li>• Communication process</li><li>• Modes of communication</li><li>• Medium of communication</li><li>• Effective communication</li><li>• Barriers to communication</li><li>• Flow of communication</li><li>• Sources of information</li><li>• Types of questions</li><li>• Organizational policies</li><li>• Workplace etiquette</li><li>• Ethical work practices in handling communication</li></ul>	<ul style="list-style-type: none"><li>• Written</li><li>• Oral questioning</li><li>• Observation</li></ul>

<p>2. Speak English at a basic operational level</p>	<ul style="list-style-type: none"> <li>• English grammar <ul style="list-style-type: none"> <li>○ Nouns, verbs, adjectives, adverbs, pronouns prepositions</li> </ul> </li> <li>• English speaking <ul style="list-style-type: none"> <li>○ Pronunciation</li> <li>○ Simple conversations</li> </ul> </li> <li>• Taking verbal instructions</li> <li>• Reading and writing in English</li> <li>• Forms of expression in English</li> </ul>	<ul style="list-style-type: none"> <li>• Written</li> <li>• Oral</li> <li>• Role play</li> </ul>
<p>3. Participate in workplace meetings and discussions</p>	<ul style="list-style-type: none"> <li>• Nature of workplace meetings</li> <li>• Meeting protocols</li> <li>• Workplace interactions</li> </ul>	<ul style="list-style-type: none"> <li>• Oral questioning</li> <li>• Observation</li> <li>• Written tests</li> </ul>
<p>4. Complete relevant work-related documents</p>	<ul style="list-style-type: none"> <li>• Types and purposes of workplace documents and forms</li> <li>• Methods used in filling forms and documents</li> <li>• Recording workplace data</li> <li>• Process of distributing workplace forms and documents</li> <li>• Report writing</li> <li>• Types of workplace reports</li> </ul>	<ul style="list-style-type: none"> <li>• Written tests</li> <li>• Oral questioning</li> <li>• Observation</li> </ul>

### Suggested Delivery Methods

- Discussion
- Role play
- Brainstorming
- Viewing of related videos

### Recommended Resources

- Desktop computers/laptops
- Projectors
- Report writing templates
- Pens
- Note books

## NUMERACY SKILLS

**UNIT CODE: ENG/CU/WEL/BC/02/3/A**

### **Relationship to Occupational Standards**

This unit addresses the unit of competency: Demonstrate numeracy skills

**Duration of Unit:** 15 hours

### **Unit Description**

This unit covers the competencies required to identify and undertake simple numerical processes. The person who is competent in this unit shall be able to use / work with whole numbers and money up to one hundred thousand; Locate, compare and use highly familiar measurement; Use highly familiar maps and diagrams; Identify and use some common 2D shapes; and locate specific Information in highly familiar tables, graphs and charts for work.

### **Summary of Learning Outcomes**

1. Use whole numbers for work
2. Locate, compare and use highly familiar measurement for work
3. Use highly familiar maps and diagrams for work
4. Identify and use some common 2D shapes for work
5. Locate specific Information in highly familiar tables, graphs and charts for work

### **Learning Outcomes, Content and Suggested Assessment Methods**

Learning Outcome	Content	Suggested Assessment Methods
1. Use whole numbers for work	<ul style="list-style-type: none"><li>• Whole numbers</li><li>• Use of Zeros</li><li>• Use of halves</li><li>• Sizes</li><li>• Grouping of numbers</li><li>• Addition and subtraction of whole numbers</li><li>• Numerical information,</li><li>• symbols</li></ul>	<ul style="list-style-type: none"><li>• Oral questioning</li><li>• Written tests</li><li>• Practical test</li><li>• Observation</li></ul>
2. Locate, compare and use highly familiar measurement for work	<ul style="list-style-type: none"><li>• Measurements</li><li>• Units of measurements and their use</li><li>• Digital time am and pm</li><li>• Calendars</li></ul>	<ul style="list-style-type: none"><li>• Oral</li><li>• Written</li><li>• Practical test</li><li>• Observation</li></ul>



3. Use highly familiar maps and diagrams for work	<ul style="list-style-type: none"> <li>• Use of Maps and Diagrams, simple symbols and pictorials</li> <li>• Giving simple oral directions to locate objects</li> </ul>	<ul style="list-style-type: none"> <li>• Oral</li> <li>• Written</li> <li>• Practical test</li> <li>• Observation</li> </ul>
4. Identify and use some common 2D shapes for work	<ul style="list-style-type: none"> <li>• Two dimensional shapes</li> <li>• Describe common objects in terms of size and shape</li> <li>• Compare objects</li> <li>• Group common objects based on shape, size, color and features</li> </ul>	<ul style="list-style-type: none"> <li>• Oral</li> <li>• Written</li> <li>• Practical test</li> <li>• Observation</li> </ul>
5. Locate specific Information in highly familiar tables, graphs and charts for work	<ul style="list-style-type: none"> <li>• Simple tables</li> <li>• Features of simple graphs and charts</li> <li>• Numerical information in tables, graphs &amp; charts</li> </ul>	<ul style="list-style-type: none"> <li>• Oral</li> <li>• Written</li> <li>• Practical test</li> <li>• Observation</li> </ul>

### Suggested Delivery Methods

- Instructor led facilitation of theory.
- Practical demonstration of tasks by trainer
- Practice by trainees'/ role play
- Discussion
- Observations and comments and corrections by trainers

### Recommended Resources

- Common 2D shapes objects
- Calculator
- Basic measuring instruments
- Mathematical tables

# DIGITAL LITERACY

**UNIT CODE: ENG/CU/WEL/BC/03/3/A**

## **Relationship to Occupational Standards**

This unit addresses the unit of competency: Demonstrate digital literacy

**Duration of Unit:** 20 hours

## **Unit Description**

This unit covers the competencies required to effectively demonstrate digital literacy in a working environment. It entails identifying and using digital devices such as smartphones, tablets, laptops and desktop computers for purposes of communication and performing work related tasks at the work place.

## **Summary of Learning Outcomes**

1. Identify computer hardware and software
2. Apply security measures to data, hardware and software
3. Apply computer software in solving tasks
4. Apply internet and email in communication at workplace

## **Learning Outcomes, Content and Suggested Assessment Methods**

<b>Learning Outcome</b>	<b>Content</b>	<b>Suggested Assessment Methods</b>
1. Identify computer hardware and software	<ul style="list-style-type: none"><li>• Definition of a computer</li><li>• Functions of a computer</li><li>• Components of a computer</li><li>• Classification of computers</li><li>• Computer software</li></ul>	<ul style="list-style-type: none"><li>• Written</li><li>• Oral</li><li>• Observation</li></ul>
2. Apply security measures to data, hardware and software	<ul style="list-style-type: none"><li>• Data security and control</li><li>• Security threats and control measures</li><li>• Types of computer crimes</li><li>• Detection and protection against computer crimes</li></ul>	<ul style="list-style-type: none"><li>• Written tests</li><li>• Oral presentation</li><li>• Observation</li></ul>
3. Apply computer software in solving tasks	<ul style="list-style-type: none"><li>• Operating systems</li><li>• Word processing</li><li>• Spread sheets</li></ul>	<ul style="list-style-type: none"><li>• Oral questioning</li><li>• Observation</li><li>• Practical</li></ul>

	<ul style="list-style-type: none"> <li>• Data base</li> </ul>	
4. Apply internet and email in communication at workplace	<ul style="list-style-type: none"> <li>• Computer networks</li> <li>• Uses of internet</li> <li>• Electronic mail (e-mail) concept</li> </ul>	<ul style="list-style-type: none"> <li>• Oral questioning</li> <li>• Observation</li> <li>• Oral presentation</li> <li>• Written report</li> </ul>

### **Suggested Delivery Methods**

- Instructor led facilitation of theory
- Demonstration by trainer
- Practical work by trainee
- Viewing of related videos
- Group discussions

### **Recommended Resources**

#### **Tools and equipment**

- Desk top computers
- Laptop computers
- Other digital devices
- Printers
- Storage devices
- Internet access
- Computer software

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## ENTREPRENEURIAL SKILLS

**UNIT CODE: ENG/CU/WEL/BC/04/3/A**

### **Relationship to occupational standards**

This unit addresses the unit of competency: Demonstrate entrepreneurial skills

**Duration of unit:** 40 hours

### **Unit description**

This unit describes the competencies required to demonstrate entrepreneurial competencies. It includes, acquiring and developing entrepreneurial culture, identifying entrepreneurial opportunities, starting a small business, running and growing a small business.

### **Summary of Learning Outcomes**

1. Acquire and develop entrepreneurial culture
2. Identify entrepreneurial opportunities
3. Start a small business
4. Run a small business
5. Grow a small business

### **Learning Outcomes, Content and Suggested Assessment Methods**

<b>Learning Outcome</b>	<b>Content</b>	<b>Suggested Assessment Methods</b>
1. Acquire and develop entrepreneurial culture	<ul style="list-style-type: none"><li>• Definition of entrepreneur</li><li>• Importance of entrepreneurship</li><li>• Common terminologies in entrepreneurship</li><li>• Entrepreneurship and employment creation</li><li>• Formal and informal employment</li><li>• Habits that promote entrepreneurial development</li><li>• Cultural factors that inhibit entrepreneurship</li><li>•</li></ul>	<ul style="list-style-type: none"><li>• Observation</li><li>• Individual/group assignments</li><li>• Written</li><li>• Oral</li></ul>

2. Identify entrepreneurial opportunities	<ul style="list-style-type: none"> <li>• Types, characteristics, qualities &amp; role of entrepreneurs</li> <li>• SWOT analysis</li> <li>• Generating Business ideas</li> <li>• Business opportunities</li> <li>• Evaluation of business opportunities</li> </ul>	<ul style="list-style-type: none"> <li>• Observation</li> <li>• Individual/group assignments</li> <li>• Written</li> <li>• Oral</li> </ul>
3. Prepare a business plan	<ul style="list-style-type: none"> <li>• Types of business plan</li> <li>• Components of a business plan</li> <li>• Importance of a business plan</li> <li>• Forms of business ownership</li> <li>• Importance of location of a small business</li> <li>• Resources required to start a small business</li> </ul>	<ul style="list-style-type: none"> <li>• Observation</li> <li>• Individual/group assignments</li> <li>• Written</li> <li>• Oral</li> </ul>
4. Start a small business	<ul style="list-style-type: none"> <li>• Factors to consider when starting a small business</li> <li>• Legal requirement for starting a small business</li> <li>• Procedure of starting a small business</li> <li>• The dos and don'ts of starting a small business</li> <li>• Challenges faced when starting a small business and mitigating factors</li> <li>• Launch of a small business</li> </ul>	<ul style="list-style-type: none"> <li>• Oral</li> <li>• Observation</li> <li>• Individual/group assignments</li> <li>• Written</li> </ul>
5. Run a small business	<ul style="list-style-type: none"> <li>• Organizational structure of a small business</li> <li>• Managing small business finances</li> <li>• Book keeping</li> <li>• Business support services</li> <li>• Marketing for small businesses</li> </ul>	<ul style="list-style-type: none"> <li>• Observation</li> <li>• Individual/group assignments</li> <li>• Written</li> </ul>

	<ul style="list-style-type: none"> <li>• Basic IT application in small business</li> </ul>	
6. Grow a small business	<ul style="list-style-type: none"> <li>• Methods of growing/expanding a small business</li> <li>• Resources for growing small business</li> <li>• Small business growth plan</li> <li>• ICT and business growth</li> </ul>	<ul style="list-style-type: none"> <li>• Observation</li> <li>• Individual/group assignments</li> <li>• Written</li> </ul>

### **Suggested Delivery Methods**

- Instructor led facilitation of theory
- Demonstration by trainer
- Practice by trainee
- Role play
- Case study

### **Recommended Resources**

- Case studies for small businesses
- Business plan template
- Laptop/ desktop computer
- Internet
- Telephone
- Writing materials

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## EMPLOYABILITY SKILLS

**UNIT CODE: ENG/CU/WEL/BC/05/3/A**

### Relationship to Occupational Standards

This unit addresses the Unit of Competency: Demonstrate employability skills

**Duration of Unit:** 20 hours

### Unit Description

This unit covers competencies required to demonstrate employability skills. It involves conducting self-management, demonstrating critical safe work habits, demonstrating workplace learning and workplace ethics.

### Summary of Learning Outcomes

1. Conduct self-management
2. Demonstrate critical safe work habits
3. Demonstrate workplace learning
4. Demonstrate workplace ethics

### Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Conduct self-management	<ul style="list-style-type: none"><li>• Self-awareness</li><li>• Formulating personal vision, mission and goals</li><li>• Strategies for overcoming life challenges</li><li>• Emotional intelligence</li><li>• Assertiveness</li><li>• Developing and maintaining high self-esteem</li><li>• Developing and maintaining positive self-image</li><li>• Accountability and responsibility</li><li>• Good work habits</li><li>• Self-awareness</li><li>• Financial literacy</li></ul>	<ul style="list-style-type: none"><li>• Observation</li><li>• Written</li><li>• Oral interview</li><li>• Third party report</li></ul>

	<ul style="list-style-type: none"> <li>• Healthy lifestyle practices</li> </ul>	
2. Demonstrate critical safe work habits	<ul style="list-style-type: none"> <li>• Stress and stress management</li> <li>• Punctuality and time consciousness</li> <li>• Interpersonal communication</li> <li>• Sharing information</li> <li>• Resources utilization</li> <li>• HIV and AIDS</li> <li>• Drug and substance abuse</li> <li>• Handling emerging issues</li> </ul>	<ul style="list-style-type: none"> <li>• Observation</li> <li>• Written</li> <li>• Oral interview</li> <li>• Third party report</li> </ul>
3. Demonstrate workplace learning	<ul style="list-style-type: none"> <li>• Personal training needs identification and assessment</li> <li>• Cultural aspects of work</li> <li>• Application of learning</li> <li>• Safe use of technology</li> <li>• Identifying opportunities</li> <li>• Workplace innovation</li> <li>• Handling emerging issues</li> <li>• Future trends and concerns in learning</li> </ul>	<ul style="list-style-type: none"> <li>• Observation</li> <li>• Oral interview</li> <li>• Written</li> <li>• Third party report</li> </ul>
4. Demonstrate workplace ethics	<ul style="list-style-type: none"> <li>• Meaning of ethics</li> <li>• Ethical perspectives</li> <li>• Values and beliefs</li> <li>• Organization code of ethics</li> <li>• Common ethical dilemmas</li> <li>• Organization culture</li> <li>• Corruption, bribery and conflict of interest</li> <li>• Privacy and data protection</li> <li>• Harassment and mutual respect</li> <li>• Financial responsibility/accountability</li> <li>• Etiquette</li> <li>• Emerging issues in ethics</li> </ul>	<ul style="list-style-type: none"> <li>• Observation</li> <li>• Oral interview</li> <li>• Written</li> <li>• Third party report</li> </ul>



### **Suggested Methods of Delivery**

- Instructor lead facilitation of theory
- Demonstrations
- Simulation/Role play
- Group Discussion
- Presentations
- Projects
- Case studies
- Assignments

### **Recommended Resources**

- Computers
- Stationery
- Charts
- Video clips
- Audio tapes
- Radio sets
- TV sets
- LCD projectors

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## ENVIRONMENTAL LITERACY

**UNIT CODE: ENG/CU/WEL/BC/06/3/A**

### **Relationship to Occupational Standards:**

This unit addresses the unit of competency: Demonstrate environmental literacy

**Duration of Unit:** 15 hours

### **Unit Description**

This unit describes the competencies required by a worker to control environmental hazard, control environmental pollution and comply with workplace sustainable resource use.

### **Summary of Learning Outcomes**

1. Control environmental hazard
2. Control environmental Pollution
3. Demonstrate sustainable resource use

### **Learning Outcomes, Content and Suggested Assessment Methods**

<b>Learning Outcome</b>	<b>Content</b>	<b>Suggested Assessment Methods</b>
1. Control environmental hazard	<ul style="list-style-type: none"><li>• Environmental Management and Coordination Act 1999</li><li>• Solid Waste Act</li><li>• Storage of environmentally hazardous materials</li><li>• Disposal of hazardous wastes</li><li>• Types and uses of PPEs in line with environmental regulations</li><li>• Occupational Safety and Health Act 2007</li></ul>	<ul style="list-style-type: none"><li>• Written questions</li><li>• Oral questions</li><li>• Observation of work procedures</li></ul>
2. Environmental Pollution Control	<ul style="list-style-type: none"><li>• Types of pollution</li><li>• Environmental pollution control and management</li><li>• Procedures for waste management</li></ul>	<ul style="list-style-type: none"><li>• Written questions</li><li>• Oral questions</li><li>• Observation of work procedures</li></ul>
3. Demonstrate sustainable resource use	<ul style="list-style-type: none"><li>• Types of resources</li><li>• Sustainable resource use and management</li></ul>	<ul style="list-style-type: none"><li>• Written questions</li><li>• Oral questions</li></ul>

	<ul style="list-style-type: none"> <li>Principles of 3Rs (Reduce, Reuse, Recycle)</li> </ul>	<ul style="list-style-type: none"> <li>Observation of work procedures</li> </ul>
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**Suggested Delivery Methods**

- Instructor led facilitation of theory
- Discussion
- Demonstration by trainer
- Practice by trainee
- Observations and comments and corrections by trainers

**Recommended Resources**

- Standard operating and/or other workplace procedures manuals
- Specific job procedures manuals
- Solid Waste Act
- Environmental Management and Coordination Act 1999
- Machine/equipment manufacturer’s specifications and instructions
- Personal Protective Equipment (PPE)

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# OCCUPATIONAL SAFETY AND HEALTH PRACTICES

**UNIT CODE: ENG/CU/WEL/BC/07/3/A**

## Relationship to Occupational Standards

This unit addresses the unit of competency: Demonstrate safety and health practices

**Duration of Unit:** 15 hours

## Unit Description

This unit describes the competencies required by a worker in an industry to practice and promote safety and health at work.

## Summary of Learning Outcomes

1. Prepare to apply workplace safety and health practices
2. Compliance with occupational safety and health Act

## Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Prepare to apply workplace safety and health practices	<ul style="list-style-type: none"><li>• Awareness of legislation that outlines the minimum standards for occupational safety and health requirements/ regulations</li><li>• Benefits of implementing an occupational safety and health program</li><li>• Safety requirements/ regulations of own work and of other workers</li><li>• Workplace standards and procedures for incidents and emergencies</li><li>• Prevention and Control Measures for accidents, injuries and sickness</li></ul>	<ul style="list-style-type: none"><li>• Oral questions</li><li>• Written questions</li><li>• Observation of work procedures</li></ul>

2. Compliance with occupational safety and health Act	<ul style="list-style-type: none"> <li>• Safety instructions and safety signs</li> <li>• Safe handling of tools, equipment and materials</li> <li>• Use of safe guards and safety devices</li> <li>• Reporting of hazards, incidents, injuries and sickness in the workplace</li> </ul>	<ul style="list-style-type: none"> <li>• Written questions</li> <li>• Oral questions</li> <li>• Observation of work procedures</li> </ul>
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### **Suggested Delivery Methods**

- Instructor led facilitation of theory
- Practical demonstration of tasks by trainer
- Practice by trainee
- Observations and comments and corrections by trainers

### **Recommended Resources**

- Occupational safety and health standards
- Standard operating and/or other workplace procedures manuals
- Specific job procedures manuals
- Client/supplier instructions
- Organizational or external personnel
- Machine/equipment manufacturer's specifications and instructions
- Quality standards

## **COMMON UNITS OF LEARNING**

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## BASIC WORKSHOP CONCEPTS

**UNIT CODE: ENG/CU/WEL/CC/01/3/A**

### Relationship to Occupational Standards

This unit addresses the unit of competency: apply basic workshop concepts

**Duration of Unit:** 30 hours

### Unit Description

This unit describes the competencies required by a gas welding worker in order to apply basic calculations, measurements, and workshops while carrying out day-to-day welding works.

### Summary of Learning Outcomes

1. Apply basic calculations and measurements
2. Apply workshop tools

### Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Apply basic calculations and measurements	<ul style="list-style-type: none"><li>• Basic mathematical operations<ul style="list-style-type: none"><li>• Addition</li><li>• Subtraction</li><li>• Division</li><li>• Multiplication</li></ul></li><li>• Manipulation of fraction and mixed numbers</li><li>• Percentages, averages, ratios and proportions</li></ul> Measurements <ul style="list-style-type: none"><li>• Basic units of measurements (metric and imperial)</li><li>• Conversion of units</li><li>• Drawing plane figures</li><li>• Mensuration – plane figures<ul style="list-style-type: none"><li>• Length, perimeters, areas, and volume</li></ul></li><li>• Free hand sketches of plane figures</li></ul>	<ul style="list-style-type: none"><li>• Written tests</li><li>• Oral questioning</li><li>• Assignments</li></ul>

<p>2. Apply workshop tools</p>	<ul style="list-style-type: none"> <li>• Workshop safety <ul style="list-style-type: none"> <li>• Hazards and accidents</li> <li>• Movement of materials (manual and mechanical) <ul style="list-style-type: none"> <li>– chains, crane, forklift, etc.</li> </ul> </li> </ul> </li> <li>• Behaviour in workshop</li> <li>• Machine <ul style="list-style-type: none"> <li>• Guards</li> <li>• Gangways, aisles, etc.</li> </ul> </li> <li>• Hand-operated tools e.g. hammers, hacksaws, vices, chisel, files, etc. <ul style="list-style-type: none"> <li>• Use</li> <li>• Dangers</li> <li>• Care and maintenance</li> </ul> </li> <li>• Power operated tools e.g. power hand grinder, swage, block, anvil, band saw, cut off grinder, hand power drill, etc. <ul style="list-style-type: none"> <li>• Use</li> <li>• Dangers</li> <li>• Care and maintenance</li> </ul> </li> <li>• Cutting techniques <ul style="list-style-type: none"> <li>• Grinding</li> <li>• Sawing</li> <li>• Filing</li> <li>• Chiselling</li> </ul> </li> <li>• Verification checklist for safe workshop operations <ul style="list-style-type: none"> <li>• Checklist for safe operation</li> <li>• Checklist for welding environment</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Written tests</li> <li>• Oral questioning</li> <li>• Assignments</li> <li>• Product checklist</li> <li>• Project</li> </ul>
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### **Suggested Methods of Instruction**

- Group discussions
- Demonstration by trainer
- Exercises by trainee
- Projects by trainees

### **Recommended Resources**

- Calculators
- Stationery
- Assorted workshop tools
- Videos of safe use of hand-operated tools.
- Videos of safe use of power-operated tools.
- Sample welding safety checklists

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## **CORE UNIT OF LEARNING**

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## OXY-ACETYLENE WELDING

**UNIT CODE: ENG/CU/WEL/CR/01/3/A**

### Relationship to Occupational Standards

This unit of learning addresses the unit of competency: perform oxy-acetylene welding

**Duration of Unit:** 80 hours

### Unit Description

This unit standard is intended for those who carry out oxy-acetylene gas welding & cutting, and soldering operations. It specifies competencies required to set up and carry out welding, cutting and/ or soldering tasks while observing appropriate safety.

### Summary of Learning Outcomes

1. Set up oxy-acetylene welding equipment and materials
2. Carry out oxy-acetylene welding
3. Set up oxy-acetylene cutting equipment and materials
4. Carry out oxy-acetylene cutting operation
5. Set up soldering equipment and materials
6. Carry out soldering process

### Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Set up oxy-acetylene welding equipment and materials	<ul style="list-style-type: none"><li>• Safety in welding workshop<ul style="list-style-type: none"><li>• Workplace safety</li><li>• Welding area safety – checklist</li><li>• Fire fighting</li><li>• Workplace housekeeping (before, during and after working - workstation cleaning)</li><li>• Care and storage of tools and equipment, and waste disposal</li></ul></li><li>• Materials, tools and equipment<ul style="list-style-type: none"><li>• Use of carbon steels, Stainless, and Aluminium and aluminium- alloys</li></ul></li></ul>	<ul style="list-style-type: none"><li>• Observation checklist</li><li>• Oral questioning</li><li>• Written tests</li><li>• Product checklist</li></ul>

	<ul style="list-style-type: none"> <li>• Oxygen and acetylene gases</li> <li>• Use of filler metals</li> <li>• Filler rods for welding carbon steels</li> <li>• Filler rods for soldering/braze welding aluminium</li> <li>• Filler metals for braze stainless steel</li> <li>• Tools and equipment</li> <li>• Tools essential in welding/ cutting/ soldering works <ul style="list-style-type: none"> <li>• Use</li> <li>• Care and maintenance</li> </ul> </li> <li>• OAW equipment and accessories</li> <li>• Soldering/ brazing equipment and accessories</li> <li>• Setting up steps; OAW equipment, Cutting equipment and soldering/brazing</li> <li>• Forms of finished material supply <ul style="list-style-type: none"> <li>• Plates</li> <li>• Tubes</li> <li>• Sheets</li> <li>• Pipes</li> <li>• Bars</li> </ul> </li> <li>• Joint geometry preparation <ul style="list-style-type: none"> <li>• Joints in gas welding</li> <li>• Joints in soldering/brazing</li> </ul> </li> </ul>	
<p>2. Carry out gas welding</p>	<ul style="list-style-type: none"> <li>• Procedure; lighting and shutting off oxy-acetylene welding flame</li> <li>• Flame adjustment <ul style="list-style-type: none"> <li>• Types of flames</li> <li>• Backfiring and flashback</li> </ul> </li> <li>• Oxy-acetylene welding equipment and accessories <ul style="list-style-type: none"> <li>• Cylinders</li> <li>• Hose and hose connections</li> <li>• Pressure regulators</li> <li>• Torches</li> <li>• Nozzles</li> <li>• Nozzle cleaners</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Observation checklist</li> <li>• Product checklist</li> <li>• Oral questioning</li> <li>• Written tests</li> <li>• Project checklist</li> </ul>

	<ul style="list-style-type: none"> <li>• Flashback arrestors</li> <li>• Spark lighter</li> <li>• Spindle key</li> <li>• Gas welding techniques and patterns</li> <li>• Gas welding defects, causes and remedies</li> <li>• Application of gas welding</li> </ul>	
3. Set up oxy-acetylene cutting equipment and materials	<ul style="list-style-type: none"> <li>• Observation of safety in oxy-acetylene cutting</li> <li>• Selection of materials, equipment and accessories</li> <li>• Setting up oxy-acetylene cutting torch</li> </ul>	<ul style="list-style-type: none"> <li>• Observation checklist</li> <li>• Oral questioning</li> <li>• Written tests</li> </ul>
4. Carry out gas cutting operation	<ul style="list-style-type: none"> <li>• Observation of safety in gas cutting</li> <li>• Gas cutting equipment and accessories</li> <li>• Gas cutting process</li> <li>• Gas cutting defects, causes and remedies</li> <li>• Features of a quality kerf</li> </ul>	<ul style="list-style-type: none"> <li>• Observation checklist</li> <li>• Product checklist</li> <li>• Oral questioning</li> <li>• Written tests</li> <li>• Project checklist</li> </ul>
5. Set up soldering equipment and materials	<ul style="list-style-type: none"> <li>• Selection of materials, equipment and accessories</li> <li>• Setting up soldering equipment</li> </ul>	<ul style="list-style-type: none"> <li>• Observation</li> <li>• Oral questioning</li> <li>• Written tests</li> </ul>
6. Carry out soldering process	<ul style="list-style-type: none"> <li>• Safety in soldering</li> <li>• Soldering processes               <ul style="list-style-type: none"> <li>• Soft soldering</li> <li>• Hard soldering (brazing)</li> </ul> </li> <li>• Use of solders and fluxes</li> <li>• Application of soldering</li> </ul>	<ul style="list-style-type: none"> <li>• Observation checklist</li> <li>• Product checklist</li> <li>• Oral questioning</li> <li>• Written tests</li> <li>• Project checklist</li> </ul>

### Suggested Methods of Instruction

- Facilitation of theory by trainer
- Demonstration of task by trainer
- Practice by trainee
- Viewing videos of soldering, brazing, oxy-acetylene welding and cutting process

- Industrial visits
- Projects by Trainees

### **Recommended Resources**

- Personal Protective Equipment (PPE)
  - Gas /soldering welding goggles
  - Special fire proof head cap
  - Safety boots
  - Gas welding gloves
  - welding Apron/ overall
- Soldering tools and equipment
- Welding bay /booth
- Gas manifold system/ trolleys
- Gas welding equipment and accessories
- Gas cutting equipment and accessories
- Gas welding consumables
  - Filler metals
  - fluxs
- Gas welding materials
  - Carbon steels
- Soldering and brazing materials
  - Carbon steels
  - Aluminium
  - Stainless steel
- Soldering consumables
  - Soldering flux
  - Brazing rods and solders
  - Brazing fluxes
- Soldering and gas welding video clips

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