



**COMPETENCY STANDARD**  
**FOR**  
**Welding**

**Level: 2**

**(Light Engineering Sector)**

**Competency Standard Code: CS-LE-WEL-L2-EN-V1**



**National Skills Development Authority**  
**Prime Minister's Office**  
**Government of the People's Republic of Bangladesh**



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## Copyright

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This document has been developed by NSDA in association with Light Engineering Sector, industry representatives, academia, related specialist, trainer and related employee.

Public and private institutions may use the information contained in this standard for activities benefitting Bangladesh.

## Introduction

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The NSDA aims to enhance an individual's employability by certifying completeness with skills. NSDA works to expand the skilling capacity of identified public and private training providers qualitatively and quantitatively. It also aims to establish and operationalize a responsive skill ecosystem and delivery mechanism through a combination of Well-defined set of mechanisms and necessary technical supports.

Key priority economic growth sectors identified by the government have been targeted by NSDA to improve current job skills along with existing workforce to ensure required skills to industry standards. Training providers are encouraged and supported to work with industry to address identified skills and knowledge to enable industry growth and increased employment through the provision of market responsive inclusive skills training program. "**Welding**" is selected as one of the priority occupations of **Light Engineering** Sector. This standard is developed to adopt a demand driven approach to training with effective inputs from Industry Skills Councils , employer associations and employers.

Generally, a competency standard informs curriculum, learning materials, assessment and certification of trainees enrolled in Skills training. Trainees who successfully pass the assessment will receive a qualification in the National Skills Qualification Framework (NSQF) and will be listed on the NSDA's online portal.

This competency standard is developed to improve skills and knowledge in accordance with the job roles, duties and tasks of the occupation and ensure that the required skills and knowledge are aligned to industry requirements. A series of stakeholder consultations, workshops were held to develop this document.

The document also details the format, sequencing, wording and layout of the Competency Standard for an occupation which is comprised of Units of Competence and its corresponding Elements.

## Overview

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A **competency standard** is a written specification of the knowledge, skills and attitudes required for the performance of an occupation, trade or job corresponding to the industry standard of performance required in the workplace.

The purpose of a competency standards is to:

- provide a consistent and reliable set of components for training, recognising and assessing people's skills, and may also have optional support materials
- enable industry recognised qualifications to be awarded through direct assessment of workplace competencies
- encourage the development and delivery of flexible training which suits individual and industry requirements
- encourage learning and assessment in a work-related environment which leads to verifiable workplace outcomes

Competency standards are developed by a working group comprised of representative from NSDA, Key Institutions, ISC, and industry experts to identify the competencies required of an occupation in **light Engineering sector**.

Competency standards describe the knowledge, skills and attitude needed to perform effectively in the workplace. CS acknowledge that people can achieve technical and vocational competency in many ways by emphasizing what the learner can do, not how or where they learned to do it.

With competency standards, training and assessment may be conducted at the workplace or at training institute or any combination of these.

Competency standards consist of a number of units of competency. A unit of competency describes a distinct work activity that would normally be undertaken by one person in accordance with industry standards.

Units of competency are documented in a standard format that comprises of:

- unit title
- nominal duration
- unit code
- unit descriptor
- elements and performance criteria
- variables and range statement
- curricular content guide
- assessment evidence guides

Together, all the parts of a unit of competency:

- describe a work activity
- guide the assessor to determine whether the candidate is competent or not yet competent

The ensuing sections of this document comprise of a description of the relevant occupation, trade or job with all the key components of a unit of competency, including:

- a chart with an overview of all Units of Competency for the relevant occupation, trade or job including the Unit Codes and the Unit of Competency titles and corresponding Elements
- the Competency Standard that includes the Unit of Competency, Unit Descriptor, Elements and Performance Criteria, Range of Variables, Curricular Content Guide and Assessment Evidence Guide.

**Competency Standards for National Skill Certificate – 2 in  
Welding in Light Engineering Sector  
Level Descriptors of Skills Sector, BNQF Level 1-6**

<b>Level &amp; Job classification</b>	<b>Knowledge Domain</b>	<b>Skills Domain</b>	<b>Responsibility Domain</b>
6-Mid-Level Manager/ Sub Assistant Engineer	Comprehensive actual and theoretical knowledge within a specific work or study area with an awareness of the validity and limits of that knowledge, able to analyse, compare, relate and evaluate.	Specialised and wider range of cognitive and practical skills required to provide leadership in the development of creative solutions to defined problems. Communicate professional issues and solutions to the team and to external partners/users.	Work under broad guidance and self-motivation to execute strategic and operational plan/s. Lead lower-level management. Diagnose and resolve problems within and among work groups.
5-Supervisor	Broad knowledge of the underlying, concepts, principles, and processes in a specific work or study area, able to scrutinize and break information into parts by identifying motives or causes.	Broad range of cognitive and practical skills required to generate solutions to specific problems in one or more work or study areas. Communicate practice-related problems and possible solutions to external partners.	Work under guidance of management and self-direction to resolve specific issues. Lead and take responsibility for the work and actions of group/team members. Bridge between management.
4-Highly Skilled Worker	Broader knowledge of the underlying, concepts, principles, and processes in a specific work or study area, able to solve problems to new situations by comparing and applying acquired knowledge.	A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying the full range of methods, tools, materials and information. Communicate using technical terminology and IT technology with partners and users as per workplace requirements.	Work under minimal supervision in specific contexts in response to workplace requirements. Resolve technical issues in response to workplace requirements and lead/guide a team/ group.
3-Skilled Worker	Moderately broad knowledge in a specific work or study area, able to perceive ideas and abstract from drawing and design according to workplace requirements.	Basic cognitive and practical skills required to use relevant information in order to carry out tasks and to solve routine problems using simple rules and tools. Communicate with his team and limited external partners upholding the values, nature and culture of the workplace	Work or study under supervision with considerable autonomy. Participate in teams and responsible for group coordination.
2-Semi Skilled Worker	Basic understanding of underpinning knowledge in a specific work or study area, able to interpret and apply common occupational terms and instructions.	Skills required to carry out simple tasks, communicate with his team in the workplace presenting and discussing results of his work with required clarity.	Work or study under supervision in a structured context with limited scope of manipulation
1 –Basic Skilled Worker	Elementary understanding of ability to interpret the underpinning knowledge in a specific study area, able to interpret common occupational terms and instructions.	Specific Basic skills required to carry out simple tasks. Interpret occupational terms and present the results of own work within guided work environment/ under supervision.	Work under direct supervision in a structured context with limited range of responsibilities.



## List of Abbreviations

<b>CS</b>	- Competency Standard
<b>ISC</b>	- Industry Skills Council
<b>FPS</b>	- Foot, Pound, Second
<b>LEISC</b>	- Light Engineering Industry Skills Councils
<b>NSDA</b>	- National Skills Development Authority
<b>MKS</b>	- Meter, Kilogram, Second
<b>NSQF</b>	- National Qualifications Framework
<b>OSH</b>	- Occupational Safety and Health
<b>PPE</b>	- Personal Protective Equipment
<b>SCVC</b>	- Standards and Curriculum Validation Committee
<b>STP</b>	- Skills Training Provider
<b>SOP</b>	- Standard Operating Procedure
<b>UoC</b>	- Unit of Competency

Approved by

---th Executive Committee (EC) Meeting of NSDA

Held on -----

Deputy Director (Admin)  
and  
Officer of Secretarial Duties for EC meeting  
National Skills Development Authority



## National Competency Standards for National Skill Certificate, Level –2 in Welding

### Course Structure

SL	Unit Code and Title		UoC Level	Nominal Hours
<b>Generic Competencies</b>				<b>55</b>
1.	GU-04-L1-V1	Work in the team environment	2	20
2.	GU-02-L2-V1	Carry out workplace interaction	2	15
3.	GU-03-L2-V1	Communicate in the Workplace	2	20
<b>Sector Specific Competencies</b>				
<b>Occupation Specific Competencies</b>				<b>220</b>
4.	OU-LE-WEL-01-L2-V1	Perform Plasma Arc Cutting	2	30
5.	OU-LE-WEL-02-L2-V1	Perform Shielded Metal Arc Welding (SMAW) – 3F Positions	2	20
6.	OU-LE-WEL-03-L2-V1	Perform Shielded Metal Arc Welding (SMAW) – 4F Positions	2	30
7.	OU-LE-WEL-04-L2-V1	Perform Shielded Metal Arc Welding (SMAW) – 3G Positions	2	30
8.	OU-LE-WEL-05-L2-V1	Perform Shielded Metal Arc Welding (SMAW) – 4G Positions	3	50
9.	OU-LE-WEL-06-L2-V1	Perform Gas Metal Arc Welding (GMAW) – 2F, 3F and 1G, 2G and 3G Position	2	65
<b>Total Nominal Learning Hours</b>				<b>275</b>

## Units & Elements at a Glance:

### Generic Competencies (55 Hours)

Code	Unit of Competency	Elements of Competency	Duration (Hours)
GU-02-L2-V1	Carryout Workplace Interaction	<ol style="list-style-type: none"> <li>1. Interpret workplace communication and etiquette</li> <li>2. Read and understand workplace documents</li> <li>3. Participate in workplace meetings and discussions</li> <li>4. Practice professional ethics at workplace</li> </ol>	15
GU-04-L1-V1	Work in the team environment	<ol style="list-style-type: none"> <li>1. Define team role and scope</li> <li>2. Identify individual role and responsibility</li> <li>3. Participate in team discussions</li> <li>4. Work as a team member</li> </ol>	20
GU-03-L2-V1	Communicate in the Workplace	<ol style="list-style-type: none"> <li>1. Receive verbal instructions</li> <li>2. Interpret verbal and written information/instruction</li> <li>3. Convey instructions using verbal and written forms of communication</li> <li>4. Complete written documentation</li> <li>5. Participate in workplace meetings and discussions</li> </ol>	20
<b>Total Hour</b>			<b>55</b>

### Occupation Specific Competencies (220Hours)

Code	Unit of Competency	Elements of Competency	Hours
OU-LE-WEL-01-L2-V1	Perform Plasma Arc Cutting	<ol style="list-style-type: none"> <li>1. Follow OSH practices</li> <li>2. Prepare materials for plasma cutting</li> <li>3. Set up plasma cutting machine</li> <li>4. Perform plasma cutting</li> <li>5. Clean and store tools</li> </ol>	30
OU-LE-WEL-02-L2-V1	Perform SMAW– 3F Positions	<ol style="list-style-type: none"> <li>1. Follow OSH practices</li> <li>2. Select tools, equipment and prepare materials</li> <li>3. Set up welding machine</li> <li>4. Perform welding 3F position</li> <li>5. Clean and store tools</li> </ol>	20
OU-LE-WEL-03-L2-V1	Perform SMAW– 4F Positions	<ol style="list-style-type: none"> <li>1. Follow OSH practices</li> <li>2. Select tool, equipment and prepare materials</li> <li>3. Set up in welding machine</li> <li>4. Perform welding 4F position</li> <li>5. Clean and store tools</li> </ol>	30
OU-LE-WEL-04-L2-V1	Perform SMAW– 3G Positions	<ol style="list-style-type: none"> <li>1. Follow OSH practices</li> <li>2. Select tool, equipment and prepare materials</li> <li>3. Set up in welding machine</li> <li>4. Perform welding 3G position</li> <li>5. Clean and store tools</li> </ol>	30
OU-LE-WEL-05-L2-V1	Perform Shielded Metal Arc Welding using (SMAW) – 4G Positions	<ol style="list-style-type: none"> <li>1. Follow OSH practices</li> <li>2. Select tools, equipment and prepare materials</li> <li>3. Set up welding machine</li> <li>4. Perform welding 4G position</li> <li>5. Clean and store tools</li> </ol>	50
OU-LE-WEL-06-L2-V1	Perform Welding on Plate Using GMAW – 2F, 3F and 1G, 2G and 3G Position	<ol style="list-style-type: none"> <li>1. Follow OSH practices</li> <li>2. Select tool, equipment and prepare materials</li> <li>3. Set up in welding machine</li> <li>4. Perform welding</li> <li>5. Clean and store tools</li> </ol>	60
<b>Total Hours</b>			<b>220</b>

## **Generic Competencies**

<b>Unit Code and Title</b>	<b>GU-04-L1-V1: Work in a Team Environment</b>
<b>Unit Descriptor</b>	This unit covers the knowledge, skills and attitudes (KSA) required in working in a team environment. It includes defining team role and scope, identifying individual role and responsibility. Participating in team discussions and working as a team member.
<b>Nominal Hours</b>	<b>20 Hours</b>
<b>Elements of Competency</b>	<b>Performance Criteria</b> <b><u>Bold &amp; Underlined</u></b> terms are elaborated in the Range of Variables
1. Define team role and scope	1.1. Role and objectives of the team are defined 1.2. Team structure, responsibilities and reporting relations are identified from team discussions and other external <b><u>sources</u></b>
2. Identify individual role and responsibility	2.1 Individual roles and responsibilities of <b><u>team members</u></b> are identified 2.2 Reporting relationships among team members are defined and clarified 2.3 Reporting relationships external to the team are defined and clarified
3. Participate in team discussions	3.1 Ideas related to team plans are contributed 3.2 Recommendations for improving team work are put forward
4. Work as a team member	4.1. Effective forms of communication are used to interact with team members 4.2. Communication channels are followed 4.3. OHS practices are followed
<b>Range of Variables</b>	
<b>Variables</b>	<b>Range</b> (may include but not limited to):
1. Sources of information	1.1 Standard Operating Procedures 1.2 Job Description 1.3 Operations Manual 1.4 Organizational Structure
2. Team Members	2.1 Coach/mentor 2.2 Supervisor/Manager 2.3 Peers/Colleagues 2.4 Employee representative
3. <del>Workplace context</del>	3.1 <del>National Laws and Statutes</del> 3.2 <del>Standard Operating Procedures</del> 3.3 <del>Workplace Rules and Regulations</del>
<b>Evidence Guide</b> The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency	



1. Critical aspects of competency	<p>Assessment required evidence that the candidate:</p> <p>1.1 demonstrated knowledge in working in a team environment.</p> <p>1.2 satisfied the requirements mentioned in the Performance Criteria and Range of Variables</p>
2. Underpinning knowledge	<p>2.1 Team Structure, Role and Responsibility</p> <p>2.2 Individual Members' Roles and Responsibilities</p> <p>2.3 Communication Flow and Reporting Structures</p> <p>2.4 Team Planning</p> <p>2.5 Interpersonal Communication Skills</p> <p>2.6 Team Meeting Procedures</p> <p>2.7 OHS Practices</p>
3. Underpinning skills	<p>3.1 Identifying the role and responsibility of the team</p> <p>3.2 Identifying roles and responsibilities of individual members</p> <p>3.3 Participating in team discussions</p> <p>3.4 Working as a team member</p>
4. Underpinning Attitudes	<p>4.1 Commitment to occupational health and safety</p> <p>4.2 Environmental concerns</p> <p>4.3 Eagerness to learn</p> <p>4.4 Tidiness and timeliness</p> <p>4.5 Respect for rights of peers and seniors in workplace</p> <p>4.6 Communication with peers and seniors in Workplace</p>
5. Resource implications	<p>5.1 Pens</p> <p>5.2 Telephone</p> <p>5.3 Computer</p> <p>5.4 Writing materials</p> <p>5.5 Online communication</p>
6. Methods of assessment	<p>Methods of assessment may include but not limited to:</p> <p>6.1. Workplace observation</p> <p>6.2. Demonstration</p> <p>6.3. Oral questioning</p> <p>6.4. Written test</p> <p>6.5. Portfolio</p>
7. Context of assessment	<p>7.1 Competency assessment must be done in a training center or in an actual or simulated workplace after completion of the training module.</p> <p>7.2 Assessment should be done by NSDA certified/ nominated assessor.</p>

### **Accreditation Requirements**

Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit

towards the award of qualification under BNQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA

<b>Unit Code and Title</b>	<b>GU-02-L2-V1: Carryout Workplace Interaction</b>
<b>Unit Descriptor</b>	This unit covers the knowledge, skills and attitude required to carry out workplace interaction. It specifically includes interpreting workplace communication and etiquette, reading and understanding workplace documents, participating in workplace meetings and discussions and practicing professional ethics at workplace.
<b>Nominal Hours</b>	<b>15 Hours</b>
<b>Elements of Competency</b>	<b>Performance Criteria</b> <b><u>Bold underlined</u></b> terms are elaborated in the Range of Variables
1. Interpret workplace communication and etiquette	1.1 Workplace code of conducts are interpreted as per organizational guidelines 1.2 Appropriate lines of communication are maintained with supervisors and colleagues 1.3 Workplace interactions are conducted in a <b><u>courteous manner</u></b> to gather and convey information 1.4 Questions about routine <b><u>workplace procedures and matters</u></b> are asked and responded as required
2. Read and understand workplace documents	2.1 Workplace documents are interpreted as per standard 2.2 Assistance is taken to aid comprehension when required from peers / supervisors 2.3 Visual information / symbols / signage's are understood and followed 2.4 Specific and relevant information are accessed from <b><u>appropriate sources</u></b> 2.5 Appropriate medium is used to transfer information and ideas
3. Participate in workplace meetings and discussions	3.1 Team meetings are attended on time and meeting procedures and etiquette are followed 3.2 Own opinions are expressed and others opinions are listened without interruption 3.3 Inputs are provided consistent with meeting purpose and meeting outcomes are implemented
4. Practice professional ethics at workplace	4.1 Responsibilities as a team member are demonstrated and kept promises and commitments made to others 4.2 Tasks are performed in accordance with workplace procedures 4.3 Confidentiality is respected and maintained 4.4 Situations and actions considered inappropriate or which present a conflict of interest are avoided

<b>Range of Variables</b>	
<b>Variable</b>	<b>Range</b> (may include but not limited to):
1. Courteous manner	1.1 Effective questioning 1.2 Active listening 1.3 Speaking skills
2. Workplace procedures and matters	2.1 Notes 2.2 Agenda 2.3 Simple reports 2.3.1 Progress report 2.3.2 Incident report 2.4 Job sheets 2.5 Operational manuals 2.6 Brochures and promotional material 2.7 Visual and graphic materials 2.8 Standards 2.9 OSH information 2.10 Signs
3. Appropriate sources	3.1 HR Department 3.2 Managers 3.3 Supervisors
<b>Evidence Guide</b>	
The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency.	
1. Critical aspects of competency	1.1 Maintained workplace communication and etiquette 1.2 Followed workplace instructions and symbols 1.3 Followed team meeting and etiquette
2. Underpinning knowledge	2.1 Workplace communication and etiquette 2.2 Workplace documents, signs and symbols 2.3 Meeting procedure and etiquette
3. Underpinning skills	3.1 Maintaining workplace communication and etiquette 3.2 Following workplace instructions and symbols 3.3 Following team meeting and etiquette
4. Underpinning attitude	4.1 Commitment to occupational health and safety 4.2 Promptness in carrying out activities 4.3 Sincere and honest to duties 4.4 Environmental concerns 4.5 Eagerness to learn 4.6 Tidiness and timeliness 4.7 Respect for rights of peers and seniors in workplace 4.8 Communication with peers and seniors in workplace

5. Resource implications	<p>The following resources must be provided:</p> <p>5.1 Work place Procedure</p> <p>5.2 Materials relevant to the proposed activity</p> <p>5.3 All tools, equipment, material and documentation required.</p> <p>5.4 Relevant specifications or work instructions</p>
6. Methods of assessment	<p>Methods of assessment may include but not limited to:</p> <p>6.1 Written test</p> <p>6.2 Demonstration</p> <p>6.3 Oral questioning</p> <p>6.4 Portfolio</p>
7. Context of assessment	<p>7.1 Competency assessment must be done in a training center or in an actual or simulated workplace after completion of the training module</p> <p>7.2 Assessment should be done by NSDA certified/nominated assessor</p>
<p><b>Accreditation Requirements</b></p> <p>Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of qualification under BNQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA</p>	

<b>Unit code and Title</b>	<b>GU-03-L2-V1: Communicate in the Workplace</b>
<b>Nominal Hours</b>	<b>30 Hours</b>
<b>Unit Descriptor</b>	This unit covers the knowledge, skills and attitudes (KSAs) required to communicate in the workplace. It includes the use of verbal and written forms of communication to receive, interpret, convey, and document information/ instruction using appropriate communication equipment.
<b>Elements of Competency</b>	<b>Performance Criteria</b> <b><u>Bold &amp; Underlined</u></b> terms are elaborated in the Range of Variables Training Components
1. Receive verbal instructions.	1.1 Instructions are accessed and interpreted 1.2 Questions are asked to clarify understanding or gain more information 1.3 Information/instruction is recorded
2. Interpret verbal and written information/ instruction	2.1 <b><u>Written instructions</u></b> are interpreted 2.2 Work <b><u>signage's</u></b> are properly responded 2.3 Routine written instructions are followed in sequence 2.4 Feedback is given to workplace supervisor
3. Convey instructions using verbal and written forms of communication	3.1 Relevant <b><u>communication</u></b> methods are used to transmit instructions 3.2 Appropriate non-verbal communication is used 3.3 Channels of communication are identified and followed 3.4 Communication <b><u>tools and equipment</u></b> are operated and faults are identified and reported 3.5 Information is conveyed using appropriate <b><u>forms</u></b>
4. Complete written documentation	4.1 All required <b><u>documentation</u></b> is completed 4.2 Workplace data are recorded 4.3 Written information/instruction is passed to personnel
5. Participate in work place meetings and discussions	5.1 Meetings are attended regularly and on time 5.2 Meeting inputs are consistent with the meeting purpose and established protocols 5.3 Opinions are expressed without interruption 5.4 Meeting outputs are processed and implemented
<b>Range of Variables</b>	
<b>Variable</b>	<b>Range</b> (may include but not limited to):
1. Written instructions	1.1 Supervisor's/Manager's Instructions 1.2 Memoranda 1.3 Rules and Regulations 1.4 Signage 1.5 Approved Work Plan

	1.6 External communications
2. Workplace guidelines	2.1 Labor Policies and Guidelines 2.2 Written Instructions 2.3 Operations Manual 2.4 Organizational Manuals 2.5 Quality Assurance Handbook
3. Signage	3.1 On-site direction signs 3.2 Common site warnings 3.3 Location signs 3.4 Traffic signs
4. Communication	4.1 Verbal instructions 4.2 Written instructions 4.3 Online communication
5. Tools and machinery	5.1 Telephone 5.2 Mobile Phone 5.3 Fax machines 5.4 Two-way radio 5.5 Computers 5.6 Forms 5.7 Memo 5.8 Two-way radio
6. Forms	6.1 Memorandum 6.2 Requisitioning Form 6.3 Personnel Form 6.4 Safety Report Form
7. Documentation	7.1 Reports (Monthly, Quarterly, Half-Yearly, Annual) 7.2 Plans (Strategic Plan, Operational Plan, Monthly Schedule) 7.3 Monitoring and Evaluation Report 7.4 Minutes of Meetings
<b>Evidence Guide</b>	
The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency	
1. Critical Aspects of Competency	Assessment required evidence that the candidate: 1.1 demonstrated knowledge of workplace procedures in receiving, interpreting and conveying verbal & written communication. 1.2 satisfied the requirements mentioned in the Performance Criteria and Range of Variables.
2. Underpinning Knowledge	2.1 Workplace Communication Policies, Standards and Procedures 2.2 Verbal and Non-verbal communication 2.3 Modes of Communication

	2.4 Communication Equipment: Types, Uses and Faults 2.5 Channels of Communication
3. Underpinning Skills	3.1 Receiving verbal instructions. 3.2 Interpreting verbal and written information/ instruction 3.3 Conveying instructions using verbal and written forms of communication 3.4 Completing written documentation 3.5 Participating in workplace meetings and discussions
4. Underpinning Attitude	4.1 Commitment to occupational health and safety 4.2 Environmental concerns 4.3 Eagerness to learn 4.4 Tidiness and timeliness 4.5 Respect for rights of peers and seniors in workplace 4.6 Communication with peers and seniors in workplace
5. Resource Implications	The following resources must be provided: 5.1 Pens 5.2 Telephone 5.3 Computer 5.4 Writing materials 5.5 Online communication
6. Methods of Assessment	Methods of assessment may include but not limited to: 6.1 Workplace observation 6.2 Demonstration 6.3 Oral questioning 6.4 Written test 6.5 Portfolio
7. Context of Assessment	7.1 Competency assessment must be done in a training center or in an actual or simulated workplace after completion of the training module 7.2 Assessment should be done by NSDA certified/nominated assessor
<p><b>Accreditation Requirements</b></p> <p>Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of qualification under BNQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA</p>	



## **Occupation Specific Competencies**

<b>Unit Code and Title</b>	<b>OU-LE-WEL-01-L2-V1: Perform Plasma Arc Cutting</b>
<b>Nominal Hours</b>	<b>30 Hours</b>
<b>Unit Descriptor</b>	This unit covers the knowledge, skills and attitudes required to perform plasma arc cutting It specifically includes following OSH practices, preparing materials for plasma cutting, setting up plasma cutting machine, performing plasma cutting, cleaning and storing tools.
<b>Elements of Competency</b>	<b>Performance Criteria</b> <b><u>Bold and Underlined</u></b> terms are elaborated in the Range of Variables.
1. Follow OSH practices	1.1. <b><u>PPE</u></b> is selected and collected as per requirements 1.2. PPE is worn as required 1.3. Safe work practices followed as per workplace standard
2. Prepare materials for plasma cutting	2.1. Cutting requirements are identified and noted from procedures/ drawings/ specifications 2.2. <b><u>Materials</u></b> are selected and collected as per the job requirements 2.3. Materials are cleaned and marked for cutting as per noted dimension
3. Set up plasma cutting machine	3.1. <b><u>Tools and equipment</u></b> are selected as per the job requirements 3.2. Tools and equipment's are checked for safe and proper working condition 3.3. Plasma cutting equipment is set in accordance with job requirements following standard procedures
4. Perform plasma cutting	4.1. Ampere and air pressure is adjusted as per the job requirement following standard procedures 4.2. Gap between nozzle / tip and metal to be cut is maintained the following standard procedures 4.3. Metal is cut as per requirements following standard procedures 4.4. Cut surface defects are checked and rectified as required following standard procedures 4.5. Plasma cutting machine is shutdown as per standard procedure
5. Clean and store tools	5.1 Tools and equipment are cleaned and stored as per workplace standard 5.2 Waste material are disposed as per workplace procedure 5.3 Workplace is cleaned as per workplace standard
<b>Range of Variables</b>	

<b>Variables</b>	<b>Range (may include but not limited to):</b>
1. Personal Protective Equipment	1.1 Dust mask 1.2 Dark glass/Goggles 1.3 Leather hand Gloves 1.4 Ear plugs 1.5 Air respirator 1.6 Safety shoes/boots 1.7 Aprons 1.8 Face masks 1.9 Overalls 1.10 Safety helmet 1.11 Arm guard 1.12 Leg guard
2. Materials	2.1 MS Plate (maximum Thickness 20mm) 2.2 SS Plate (maximum Thickness 10mm) 2.3 Aluminum sheet (maximum Thickness 05mm)
3. Tools and equipment	3.1 Steel tape 3.2 Try square 3.3 Scriber 3.4 Trammel 3.5 Steel wire brush 3.6 Air compressor 3.7 Manual plasma cutting machine 3.8 Air dryer 3.9 Cutting nozzles
<b>Evidence Guide</b>	
The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
1. Critical aspects of competency	1.1 Followed OSH practices 1.2 Set up of plasma cutting equipment 1.3 Performed plasma cutting operations
2. Underpinning knowledge	2.1 Plasma arc cutting process 2.2 Description of plasma arc cutting machine 2.3 Air pressure for cutting 2.4 Standards and codes related to plasma cutting work 2.5 Cutting defects 2.6 Causes of defects and remedial measures
3. Underpinning Skills	3.1 Selecting PPE 3.2 Handling tools and equipment 3.3 Selecting drawings and specification 3.4 Measuring and marking 3.5 Interpreting of work instructions and specifications

4. Underpinning attitudes	4.1 Commitment to occupational health and safety 4.2 Environmental concerns 4.3 Eagerness to learn 4.4 Tidiness and timeliness 4.5 Respect for rights of peers and seniors in workplace
5. Resource implications	The following resources must be provided: 5.1 Workplace 5.2 Tools, equipment and facilities appropriate to processes or activity 5.3 Materials relevant to the proposed activity. 5.4 Relevant drawings, manuals, codes, standards and reference material.
6. Methods of assessment	6.1 Demonstration 6.2 Oral questioning 6.3 Written test 6.4 Portfolio
7. Context of assessment	7.1 Competency assessment must be done in a training center or in an actual or simulated workplace after completion of the training module 7.2 Assessment should be done by NSDA certified/ nominated assessor
<p><b>Accreditation Requirements</b></p> <p>Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of qualification under BNQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA</p>	

<b>Unit Code and Title</b>	<b>OU-LE-WEL-02-L2-V1: Perform SMAW– 3F Position</b>
<b>Nominal Hours</b>	<b>20 Hours</b>
<b>Unit Descriptor</b>	This unit covers the knowledge, skills and attitudes required to perform SMAW– 3F position. It specifically includes the tasks of following OSH practices, selecting tools, equipment and preparing materials, setting up welding machine, performing welding in 3F position, cleaning and storing tools.
<b>Elements of Competency</b>	<b>Performance Criteria</b> <b><u>Bold and Underlined</u></b> terms are elaborated in the Range of Variables.
1. Follow OSH practices	1.1 <b><u>PPE</u></b> is selected and collected as per requirements 1.2 PPE is worn as required 1.3 Safe work practices followed as per workplace standard
2. Select tools, equipment and prepare materials	2.1. Weld requirements are identified from workplace instruction 2.2. <b><u>Tools, equipment, materials</u></b> and <b><u>electrodes</u></b> are selected and collected as per job requirements 2.3. Plate surface are cleaned as per job specification
3. Set up welding machine	3.1 Welding machine is prepared as per standard procedure 3.2 Ampere are set as per job requirements
4. Perform welding 3F position	4.1 Tack welding is performed and alignment is checked as per job requirement 4.2 Welding is performed in 3F positions as per job requirement 4.3 Welds are cleaned as per job requirements 4.4 Weld quality is checked visually and <b><u>defects</u></b> are identified and rectified as required
5. Clean and store tools	5.1 Welding Machine shutdown are conducted 5.2 Equipment and tools are cleaned and stored in accordance with workplace requirements 5.3 The wastes are disposed and the workplace is cleaned in accordance with workplace requirements
<b>Range of Variables</b>	
<b>Variables</b>	<b>Range</b> (may include but not limited to):
1. Personal Protective Equipment	1.1 Dust mask 1.2 Safety glasses/Goggles 1.3 Leather hand Gloves 1.4 Ear plugs 1.5 Air respirator 1.6 Safety shoes/boots 1.7 Aprons

	<ul style="list-style-type: none"> <li>1.8 Face masks</li> <li>1.9 Overalls</li> <li>1.10 Welding helmet/Auto dark helmet</li> <li>1.11 Safety helmet</li> <li>1.12 Face shield</li> <li>1.13 Arm guard</li> <li>1.14 Leg guard</li> <li>1.15 Hand shield</li> <li>1.16 Safety belt</li> </ul>
2. Tools	<ul style="list-style-type: none"> <li>2.1 Ball pin hammer</li> <li>2.2 Chipping hammer</li> <li>2.3 Try square</li> <li>2.4 Tongs</li> <li>2.5 Wire brush</li> <li>2.6 Chisels</li> <li>2.7 Steel tape</li> <li>2.8 C-clamp</li> <li>2.9 Table vice</li> <li>2.10 Anvil</li> <li>2.11 Steel cup brush</li> <li>2.12 Center/trick punch</li> <li>2.13 Wire spacer</li> </ul>
3. Equipment	<ul style="list-style-type: none"> <li>3.1 Electrode oven</li> <li>3.2 AC welding machine</li> <li>3.3 DC welding machine</li> <li>3.4 Circular cutting machine</li> <li>3.5 Angle grinder machine</li> </ul>
4. Materials	<ul style="list-style-type: none"> <li>4.1 MS plates 6-10 mm thickness range</li> </ul>
5. Electrodes	<ul style="list-style-type: none"> <li>5.1 2.5 and 3.2 mm/12 and 10 SWG</li> </ul>
6. Defects	<ul style="list-style-type: none"> <li>6.1. Lack of fusion</li> <li>6.2. Lack of penetration</li> <li>6.3. Porosity</li> <li>6.4. Excess fusion</li> <li>6.5. Excess penetration</li> <li>6.6. Crack</li> <li>6.7. Slag inclusions</li> <li>6.8. Spatter</li> <li>6.9. Undercut</li> <li>6.10. Irregular shape and dimension</li> <li>6.11. Arc crater</li> <li>6.12. Pin hole</li> <li>6.13. Blow hole</li> <li>6.14. Over lap</li> <li>6.15. Distortion</li> </ul>

**Evidence Guide**

The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.

1. Critical Aspects	<ul style="list-style-type: none"><li>1.1 Followed OSH</li><li>1.2 Set up equipment</li><li>1.3 Adjusted ampere</li><li>1.4 Selected appropriate electrode angle</li><li>1.5 Maintained travel speed</li><li>1.6 Performed welding 3F positions</li></ul>
2. Underpinning knowledge	<ul style="list-style-type: none"><li>2.1 Welding transformer</li><li>2.2 Rectifier</li><li>2.3 Polarity</li><li>2.4 Electrodes</li><li>2.5 Selection criteria of electrodes</li><li>2.6 Tack weld</li><li>2.7 Welding current</li><li>2.8 Electrode angle</li><li>2.9 Arc length</li><li>2.10 Travel speed</li><li>2.11 Shape of fillet weld</li><li>2.12 Causes and rectification of welding defects</li><li>2.13 Destructive test</li><li>2.14 Nondestructive test</li></ul>
3. Underpinning skills	<ul style="list-style-type: none"><li>3.1 Selecting PPE</li><li>3.2 Selecting drawings and specification</li><li>3.3 Handling hand tools and equipment</li><li>3.4 Adjusting welding machine</li><li>3.5 Performing welding procedure</li></ul>
4. Underpinning attitudes	<ul style="list-style-type: none"><li>4.1 Commitment to occupational health and safety</li><li>4.2 Environmental concerns</li><li>4.3 Eagerness to learn</li><li>4.4 Tidiness and timeliness</li><li>4.5 Respect for rights of peers and seniors in workplace</li></ul>
5. Resource implications	<p>The following resources must be provided:</p> <ul style="list-style-type: none"><li>5.1 Workplace.</li><li>5.2 Tools, equipment and facilities appropriate to processes or activity</li><li>5.3 Materials relevant to the proposed activity.</li></ul>
6. Methods of assessment	<ul style="list-style-type: none"><li>6.1 Demonstration</li><li>6.2 Oral questioning</li><li>6.3 Written test</li><li>6.4 Portfolio</li></ul>

7. Context of assessment	<p>7.1 Competency assessment must be done in a training center or in an actual or simulated workplace after completion of the training module</p> <p>7.2 Assessment should be done by NSDA certified/ nominated assessor</p>
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**Accreditation Requirements**

Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of qualification under BNQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA



<b>Unit Code and Title</b>	<b>OU-LE-WEL-03-L2-V1: Perform Shielded Metal Arc Welding (SMAW) – 4F Position</b>
<b>Nominal Hours</b>	<b>20 Hours</b>
<b>Unit Descriptor</b>	This unit covers the knowledge, skills and attitudes required of a worker to perform SMAW– 4F position. It specifically includes the tasks of following OSH practices, selecting tools, equipment and preparing materials, setting up welding machine, performing welding 4F positions and cleaning and storing tools.
<b>Elements of Competency</b>	<b>Performance Criteria</b> <b><u>Bold and Underlined</u></b> terms are elaborated in the Range of Variables.
1. Follow OSH practices	1.1 <b><u>PPE</u></b> is selected and collected as per requirements 1.2 PPE is worn as required 1.3 Safe work practices followed as per workplace standard
2. Select tools, equipment and prepare materials	2.1 Weld requirements are identified from workplace instruction 2.2 <b><u>Tools, equipment, materials</u></b> and <b><u>electrodes</u></b> are selected and collected as per job requirements 2.3 Plate surface are cleaned as per job specification
3. Set up welding machine	3.1 Welding machine is prepared as per standard procedure. 3.2 Ampere are set as per job requirements
4. Perform welding 4F position	4.1 Tack welding is performed and alignment is checked as per job requirement 4.2 Welding is performed in 4F positions as per job requirement 4.3 Welds are cleaned as per job requirements 4.4 Weld quality is checked and <b><u>defects</u></b> are identified and rectified
5. Clean and store tools	5.1 Welding Machine shutdown are conducted 5.2 Equipment and tools are cleaned and stored in accordance with workplace requirements 5.3 The wastes are disposed and the workplace is cleaned in accordance with workplace requirements
<b>Range of Variables</b>	
<b>Variables</b>	<b>Range</b> (may include but not limited to):
1. Personal Protective Equipment	1.1 Dust mask 1.2 Safety glasses/Goggles 1.3 Leather hand Gloves 1.4 Ear plugs 1.5 Air respirator 1.6 Safety shoes/boots

	<ul style="list-style-type: none"> <li>1.7 Aprons</li> <li>1.8 Face masks</li> <li>1.9 Overalls</li> <li>1.10 Welding helmet/Auto dark helmet</li> <li>1.11 Safety helmet</li> <li>1.12 Face shield</li> <li>1.13 Arm guard</li> <li>1.14 Leg guard</li> <li>1.15 Hand shield</li> <li>1.16 Safety belt</li> </ul>
2. Tools	<ul style="list-style-type: none"> <li>2.1. Ball pin hammer</li> <li>2.2. Chipping hammer</li> <li>2.3. Try square</li> <li>2.4. Tongs</li> <li>2.5. Wire brush</li> <li>2.6. Chisels</li> <li>2.7. Steel tape</li> <li>2.8. C-clamp</li> <li>2.9. Table vice</li> <li>2.10. Anvil</li> <li>2.11. Steel cup brush</li> <li>2.12. Center/trick punch</li> <li>2.13. Wire spacer</li> </ul>
3. Equipment	<ul style="list-style-type: none"> <li>3.1. Electrode oven</li> <li>3.2. AC welding machine</li> <li>3.3. DC welding machine</li> <li>3.4. Circular cutting machine</li> <li>3.5. Angle grinder machine</li> </ul>
4. Materials	<ul style="list-style-type: none"> <li>4.1. MS plates 6-10 mm thickness range</li> </ul>
5. Electrodes	<ul style="list-style-type: none"> <li>5.1 2.5 and 3.2 mm/12 and 10 SWG</li> </ul>
6. Defects	<ul style="list-style-type: none"> <li>6.1. Lack of fusion</li> <li>6.2. Lack of penetration</li> <li>6.3. Porosity</li> <li>6.4. Excess fusion</li> <li>6.5. Excess penetration</li> <li>6.6. Crack</li> <li>6.7. Slag inclusions</li> <li>6.8. Spatter</li> <li>6.9. Undercut</li> <li>6.10. Irregular shape and dimension</li> <li>6.11. Arc crater</li> <li>6.12. Pin hole</li> <li>6.13. Blow hole</li> </ul>

	6.14. Over lap 6.15. Distortion
<b>Evidence Guide</b> The evidence must be authentic, valid, sufficient, reliable and consistent to meet the requirements of the current version of the unit of competency.	
1. Critical Aspects	1.1 Followed OSH 1.2 Set up equipment 1.3 Adjusted ampere 1.4 Selected appropriate electrode angle 1.5 Maintained travel speed 1.6 Performed welding 4F positions
2. Underpinning knowledge	2.1. Welding transformer 2.2. Welding positions 2.3. Selection of electrodes 2.4. Tack weld 2.5. Welding current 2.6. Polarity 2.7. Electrode angle 2.8. Arc length 2.9. Travel speed 2.10. Shape of fillet weld 2.11. Causes and rectification of welding defects
3. Underpinning skills	3.1. Selecting PPE 3.2. Selecting drawings and specification 3.3. Handling hand tools and equipment 3.4. Adjusting welding machine 3.5. Performing welding procedure
4. Underpinning attitudes	4.1. Commitment to occupational health and safety 4.2. Environmental concerns 4.3. Eagerness to learn 4.4. Tidiness and timeliness 4.5. Respect for rights of peers and seniors in workplace
5. Resource implications	The following resources must be provided: 5.1. Workplace 5.2. Tools, equipment, TIG guide line and facilities appropriate to processes or activity 5.3. Materials relevant to the proposed activity
6. Methods of assessment	6.1. Demonstration 6.2. Oral questioning 6.3. Written test 6.4. Portfolio
7. Context of assessment	7.1 Competency assessment must be done in a training center or in an actual or simulated workplace after completion of the

	<p>training module.</p> <p>7.2 Assessment should be done by NSDA certified/ nominated assessor.</p>
<p><b>Accreditation Requirements</b></p> <p>Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of qualification under BNQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.</p>	

<b>Unit Code and Title</b>	<b>OU-LE-WEL-04-L2-V1: Perform Shielded Metal Arc Welding (SMAW) – 3G Position</b>
<b>Nominal Hours</b>	<b>30 Hours</b>
<b>Unit Descriptor</b>	This unit covers the knowledge, skills and attitudes required to perform SMAW– 3G position. It specifically includes the tasks of following OSH practices, selecting tools, equipment and preparing materials, setting up welding machine, performing welding 3G position and cleaning and storing tools.
<b>Elements of Competency</b>	<b>Performance Criteria</b> <b><u>Bold and Underlined</u></b> terms are elaborated in the Range of Variables.
1. Follow OSH practices	1.1 <b><u>PPE</u></b> is selected and collected as per requirements 1.2 PPE is worn as required 1.3 Safe work practices followed as per workplace standard
2. Select tools, equipment and prepare materials	2.1 Weld requirements are identified from workplace instruction 2.2 <b><u>Tools, equipment, materials</u></b> and <b><u>electrodes</u></b> are selected and collected as per job requirements 2.3 Plate surface are cleaned as per job specification 2.4 Job is prepared as required
3. Set up welding machine	3.1 Welding machine is prepared as per standard procedure 3.2 Ampere are set as per job requirements
4. Perform welding 3G position	4.1 Tack welding is performed and alignment is checked as per job requirement 4.2 Electrode’s angle is maintained as per job requirement 4.3 Key hole techniques are maintained as required 4.4 Welding is performed 3G positions as per job specification 4.5 Welds are cleaned as per job requirements 4.6 Weld quality is checked and <b><u>defects</u></b> are identified
5. Clean and store tools	5.1 Welding Machine shutdown are conducted 5.2 Equipment and tools are cleaned and stored in accordance with workplace requirements 5.3 The wastes are disposed and the workplace is cleaned in accordance with workplace requirements
<b>Range of Variables</b>	
<b>Variable</b>	<b>Range</b> (may include but not limited to):
1. Personal Protective Equipment	1.1 Dust mask 1.2 Safety glasses/Goggles 1.3 Leather hand Gloves 1.4 Ear plugs 1.5 Air respirator 1.6 Safety shoes/boots 1.7 Aprons

	<ul style="list-style-type: none"> <li>1.8 Face masks</li> <li>1.9 Overalls</li> <li>1.10 Welding helmet/Auto dark helmet</li> <li>1.11 Safety helmet</li> <li>1.12 Face shield</li> <li>1.13 Arm guard</li> <li>1.14 Leg guard</li> <li>1.15 Hand shield</li> <li>1.16 Safety belt</li> </ul>
2. Tools	<ul style="list-style-type: none"> <li>2.1 Jig and fixture/C-clamp</li> <li>2.2 Ball pin hammer</li> <li>2.3 Chipping hammer</li> <li>2.4 Tongs</li> <li>2.5 Flat file</li> <li>2.6 Weld gauge</li> <li>2.7 Wire brush</li> <li>2.8 Wire cup brush</li> <li>2.9 Angle Grinder</li> <li>2.10 Bevel protector</li> </ul>
3. Equipment	<ul style="list-style-type: none"> <li>3.1 Electrode oven</li> <li>3.2 AC welding machine</li> <li>3.3 DC welding machine</li> <li>3.4 Circular cutting machine</li> <li>3.5 Angle grinder machine</li> </ul>
4. Materials	<ul style="list-style-type: none"> <li>4.1 MS plates 10 -12 mm thickness range</li> </ul>
5. Electrodes	<ul style="list-style-type: none"> <li>5.1 2.5 and 3.2 mm/12 and 10 SWG</li> <li>5.2 E6013/E7016-8</li> </ul>
6. Defects	<ul style="list-style-type: none"> <li>6.1 Lack of fusion</li> <li>6.2 Lack of penetration</li> <li>6.3 Porosity</li> <li>6.4 Excess fusion</li> <li>6.5 Excess penetration</li> <li>6.6 Crack</li> <li>6.7 Slag inclusions</li> <li>6.8 Spatter</li> <li>6.9 Undercut</li> <li>6.10 Irregular shape and dimension</li> <li>6.11 Arc crater</li> <li>6.12 Pin hole</li> <li>6.13 Blow hole</li> <li>6.14 Over lap</li> <li>6.15 Distortion</li> <li>6.16 Undercut</li> <li>6.17 Arc crater</li> </ul>

	6.18 Poor bead appearance
<b>Evidence Guide</b>	
The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
1. Critical aspects of competency	<ul style="list-style-type: none"> <li>1.1. Set up equipment</li> <li>1.2. Adjusted ampere</li> <li>1.3. Selected appropriate electrode angle</li> <li>1.4. Maintained travel speed</li> <li>1.5. Maintained key hole techniques</li> <li>1.6. Performed welding 1G and 2G positions</li> </ul>
2. Underpinning knowledge	<ul style="list-style-type: none"> <li>2.1. Edge preparation <ul style="list-style-type: none"> <li><b>2.1.1.</b> Bevel angle</li> <li><b>2.1.2.</b> Root face</li> </ul> </li> <li>2.2. Root gap</li> <li>2.3. Tack weld</li> <li>2.4. Welding passes</li> <li>2.5. Gauging</li> <li>2.6. Lean pass</li> <li>2.7. Electrodes</li> <li>2.8. Welding current</li> <li>2.9. Electrode angle</li> <li>2.10. Arc length</li> <li>2.11. Travel speed</li> <li>2.12. Causes and rectification of welding defects</li> </ul>
3. Underpinning skills	<ul style="list-style-type: none"> <li>3.1. Selecting PPE</li> <li>3.2. Selecting drawings and specification</li> <li>3.3. Handling hand tools and equipment</li> <li>3.4. Adjusting welding machine</li> <li>3.5. Performing welding procedure</li> </ul>
4. Underpinning attitudes	<ul style="list-style-type: none"> <li>4.1. Commitment to occupational health and safety</li> <li>4.2. Environmental concerns</li> <li>4.3. Eagerness to learn</li> <li>4.4. Tidiness and timeliness</li> <li>4.5. Respect for rights of peers and seniors in workplace Respect for rights of peers and seniors in workplace</li> </ul>
5. Resource implications	<p>The following resources must be provided:</p> <ul style="list-style-type: none"> <li>5.1. Workplace</li> <li>5.2. Tools, equipment and facilities appropriate to processes or activity.</li> <li>5.3. Materials relevant to the proposed activity</li> <li>5.4. Equipment and outfits appropriate in applying safety measures</li> </ul>

6. Methods of assessment	6.1. Demonstration 6.2. Oral questioning 6.3. Written test 6.4. Portfolio
7. Context of assessment	7.1. Competency assessment must be done in a training center or in an actual or simulated workplace after completion of the training module 8. Assessment should be done by NSDA certified/ nominated assessor
<p><b>Accreditation Requirements</b></p> <p>Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of qualification under BNQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA</p>	



<b>Unit Code and Title</b>	<b>OU-LE-WEL-05-L2-V1: Perform Shielded Metal Arc Welding (SMAW) – 4G Position</b>
<b>Nominal Hours</b>	<b>50 Hours</b>
<b>Unit Descriptor</b>	This unit covers the knowledge, skills and attitudes required to perform SMAW–4G Position. It specifically includes the tasks of following OSH practices, selecting tools, equipment and preparing materials, setting up welding machine, performing welding 4G position, cleaning and storing tools.
<b>Elements of Competency</b>	<b>Performance Criteria</b> <b><u>Bold and Underlined</u></b> terms are elaborated in the Range of Variables.
1. Follow OSH practices	1.1 <b><u>PPE</u></b> is selected and collected as per requirements 1.2 PPE is worn as required 1.3 Safe work practices followed as per workplace standard
2. Select tools, equipment and prepare materials	2.1. Weld requirements are identified from workplace instruction 2.2. <b><u>Tools, equipment, materials</u></b> and <b><u>electrodes</u></b> are selected and collected as per job requirements 2.3. Plate surface are cleaned as per job specification 2.4. Job is prepared as required
3. Set up welding machine	3.1 Welding machine is prepared as per standard procedure 3.2 Ampere are set as per job requirements
4. Perform welding 4G position	4.1 Tack welding is performed and alignment is checked as per job requirement 4.2 Electrode’s angle is maintained as per job requirement 4.3 Key hole techniques are maintained during root pass as required 4.4 Consecutive hot pass, filling pass and cover pass/reinforcement is performed as required 4.5 Welds are cleaned as per job requirements 4.6 Weld quality is checked visually and <b><u>defects</u></b> are identified and rectified as required
5. Clean and store tools	5.1 Welding Machine shutdown are conducted 5.2 Equipment and tools are cleaned and stored in accordance with workplace requirements 5.3 The wastes are disposed and the workplace is cleaned in accordance with workplace requirements
<b>Range of Variables</b>	
<b>Variables</b>	<b>Range</b> (may include but not limited to):

1. Personal Protective Equipment	<ul style="list-style-type: none"> <li>1.1 Dust mask</li> <li>1.2 Safety glasses/Goggles</li> <li>1.3 Leather hand Gloves</li> <li>1.4 Ear plugs</li> <li>1.5 Air respirator</li> <li>1.6 Safety shoes/boots</li> <li>1.7 Aprons</li> <li>1.8 Face masks</li> <li>1.9 Overalls</li> <li>1.10 Welding helmet/Auto dark helmet</li> <li>1.11 Safety helmet</li> <li>1.12 Face shield</li> <li>1.13 Arm guard</li> <li>1.14 Leg guard</li> <li>1.15 Hand shield</li> <li>1.16 Safety belt</li> </ul>
2. Tools	<ul style="list-style-type: none"> <li>2.1 Jig and fixture/C-clamp</li> <li>2.2 Ball pin hammer</li> <li>2.3 Chipping hammer</li> <li>2.4 Tongs</li> <li>2.5 Flat file</li> <li>2.6 Weld gauge</li> <li>2.7 Wire brush</li> <li>2.8 Wire cup brush</li> <li>2.9 Angle Grinder</li> <li>2.10 Bevel protector</li> </ul>
3. Equipment	<ul style="list-style-type: none"> <li>3.1 Electrode oven</li> <li>3.2 AC welding machine</li> <li>3.3 DC welding machine</li> <li>3.4 Circular cutting machine</li> <li>3.5 Angle grinder machine</li> </ul>
4. Materials	<ul style="list-style-type: none"> <li>4.1 MS plates 10 -12 mm thickness range</li> </ul>
5. Electrodes	<ul style="list-style-type: none"> <li>5.1 2.5 and 3.2 mm/12 and 10 SWG</li> <li>5.2 E6013/E7016-8</li> </ul>
6. Defects	<ul style="list-style-type: none"> <li>6.1. Lack of fusion</li> <li>6.2. Lack of penetration</li> <li>6.3. Porosity</li> <li>6.4. Excess fusion</li> <li>6.5. Excess penetration</li> <li>6.6. Crack</li> <li>6.7. Slag inclusions</li> <li>6.8. Spatter</li> <li>6.9. Undercut</li> <li>6.10. Irregular shape and dimension</li> </ul>

	6.11. Arc crater 6.12. Pin hole 6.13. Blow hole 6.14. Over lap 6.15. Distortion 6.16. Undercut 6.17. Arc crater 6.18. Poor bead appearance
<b>Evidence Guide</b> The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
1. Critical aspects of competency	1.1 Set up equipment 1.2 Adjusted ampere 1.3 Selected appropriate electrode angle 1.4 Maintained travel speed 1.5 Maintained key hole techniques 1.6 Performed welding 4G positions
2. Underpinning knowledge	2.1 Edge preparation 2.1.1 Bevel angles 2.1.2 Root face 2.2 Root gap 2.3 Tack weld 2.4 Welding passes 2.5 Lean pass 2.6 Reinforcement 2.7 Electrodes 2.8 Welding current 2.9 Polarity 2.10 Electrode angle 2.11 Arc length 2.12 Travel speed 2.13 Destructive and non-Destructive test 2.14 Causes and rectification of welding defects
3. Underpinning skills	3.1 Following OSH 3.2 Interpreting drawings and specification 3.3 Handling hand tools and equipment 3.4 Adjusting welding machine 3.5 Communicating in the workplace 3.6 Maintaining welding process and procedures

4. Underpinning attitudes	4.1 Commitment to occupational health and safety 4.2 Environmental concerns 4.3 Eagerness to learn 4.4 Tidiness and timeliness 4.5 Respect for rights of peers and seniors in workplace
5. Resource implications	The following resources must be provided: 5.1 Workplace 5.2 Tools, equipment and facilities appropriate to processes or activity 5.3 Materials relevant to the proposed activity 5.4 Relevant drawings, manuals, codes, standards and reference material 5.5 Standby firefighting system
6. Methods of assessment	6.1 Workplace observation 6.2 Demonstration 6.3 Oral questioning 6.4 Written test 6.5 Portfolio
7. Context of assessment	7.1 Competency assessment must be done in a training center or in an actual or simulated workplace after completion of the training module. 7.2 Assessment should be done by NSDA certified/ nominated assessor.
<p><b>Accreditation Requirements</b></p> <p>Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of qualification under BNQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA</p>	

<b>Unit Code and Title</b>	<b>OU-LE-WEL-06-L2-V1: Perform Gas Metal Arc Welding (GMAW) -2F,3F,1G,2G and 3G Position.</b>
<b>Nominal Hours</b>	<b>60 Hours</b>
<b>Unit Descriptor</b>	This unit covers the knowledge, skills and attitudes required to weld steel plate using GMAW. It specifically includes the tasks of following OSH practices, selecting tools, equipment and preparing materials, setting up welding machine, performing welding, cleaning and storing tools.
<b>Elements of Competency</b>	<b>Performance Criteria</b> <b><u>Bold and Underlined</u></b> terms are elaborated in the Range of Variables.
1. Follow OSH practices	1.1 <b><u>PPE</u></b> is selected and collected as per requirements 1.2 PPE is worn as required 1.3 Safe work practices followed as per workplace standard
2. Select tools, equipment and prepare materials	2.1 Welding Requirements are identified from workplace instruction 2.2 <b><u>Tools, equipment and accessories</u></b> are selected and collected as per job requirements 2.3 <b><u>Materials and Consumables</u></b> are selected as required 2.4 <b><u>Wire</u></b> for GMAW is selected and collected as per job requirements 2.5 Contact tip is selected as per wire diameter 2.6 Job is prepared as per job requirement
3. Set up welding machine	3.1 Welding machine is prepared as per standard procedure 3.2 Wire feed unit is setup as per job requirement 3.3 Gas flow meter is adjusted as required 3.4 Ampere is set as per job requirements 3.5 Wire feeding speed is adjusted as per job requirement
4. Perform welding	4.1 Job is positioned and clamped according to <b><u>welding position</u></b> 4.2 Tack weld is performed and alignment is checked as per job requirement 4.3 Welding is performed as per job specification 4.4 Welds are cleaned as per job requirements 4.5 Weld quality is checked and <b><u>defects</u></b> are identified 4.6 Defects are rectified following SOP
5. Clean and store tools	5.1 Welding Machine shutdown are conducted following SOP 5.2 Equipment and tools are cleaned and stored in accordance with workplace requirements 5.3 The wastes are disposed and the workplace is cleaned in accordance with workplace requirements.
<b>Range of Variables</b>	
<b>Variable</b>	<b>Range</b> (may include but not limited to):
1. PPE	1.1 Protective musk

	<ul style="list-style-type: none"> <li>1.2 Dark eye lenses</li> <li>1.3 Safety Goggles (white)</li> <li>1.4 Safety shoes</li> <li>1.5 Overalls</li> <li>1.6 Leather Apron</li> <li>1.7 Leather cap</li> <li>1.8 Auto Helmet</li> <li>1.9 Leather hand gloves</li> <li>1.10 Full sleeve leather jacket</li> <li>1.11 Leather arm-guard</li> <li>1.12 Safety belt</li> </ul>
2. Tools	<ul style="list-style-type: none"> <li>2.1 Nose pliers</li> <li>2.2 Ball pin hammer</li> <li>2.3 Chipping hammer</li> <li>2.4 Try square</li> <li>2.5 Tongs</li> <li>2.6 Wire brush</li> <li>2.7 Chisels Steel tape</li> <li>2.8 C-clamp</li> <li>2.9 Table vice</li> <li>2.10 Anvil</li> <li>2.11 Steel cup brush</li> <li>2.12 Center/trick punch</li> <li>2.13 Wire spacer</li> </ul>
3. Equipment and accessories	<ul style="list-style-type: none"> <li>3.1 GMAW machine</li> <li>3.2 CO<sub>2</sub> Gas cylinder</li> <li>3.3 CO<sub>2</sub> regulator with heater</li> <li>3.4 Circular cutting machine</li> <li>3.5 Angle grinder machine</li> <li>3.6 Contact tip</li> <li>3.7 Nozzles</li> <li>3.8 Nozzle body</li> <li>3.9 CO<sub>2</sub> Liner</li> <li>3.10 Ceramic filter</li> </ul>
4. Materials and consumables	<ul style="list-style-type: none"> <li>4.1 MS plate thickness 12 mm (max)</li> <li>4.2 CO<sub>2</sub> gas</li> <li>4.3 Wire</li> <li>4.4 Colling gel/grease</li> </ul>
5. Wire	<ul style="list-style-type: none"> <li>5.1 Solid wire 1.2mm (max)</li> <li>5.2 Fluxed core wire 1.2mm (max)</li> </ul>

6. Welding position	6.1 2F 6.2 3F 6.3 1G 6.4 2G 6.5 3G
7. Defects	7.1 Lack of penetration 7.2 Lack of fusion 7.3 Excess penetration 7.4 Crack 7.5 Slag inclusions 7.6 Spatter 7.7 Excessive Reinforcement 7.8 Poor Reinforcement 7.9 Overlap 7.10 Blow hole 7.11 Porosity 7.12 Undercut 7.13 Arc crater 7.14 Poor bead appearance
<b>Evidence Guide</b> The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.	
1. Critical aspects of competency	1.1. Followed OSH 1.2. Set up equipment 1.3. Adjusted ampere 1.4. Selected appropriate gun angle 1.5. Maintained travel speed 1.6. Adjusted wire feeding speed 1.7. Performed welding 1.8. Checked and rectified welding defects
2. Underpinning knowledge	2.1. Define GMAW 2.2. Describe GMAW machine 2.3. Welding gun 2.4. Wire feeder unit 2.5. GMAW wire 2.6. Welding current 2.7. Arc length 2.8. Functions of regulator 2.9. Shielding gas 2.10. Travel speed 2.11. Causes and rectification of welding defects 2.12. Destructive Test 2.13. Non-Destructive Test

3. Underpinning skills	<ul style="list-style-type: none"> <li>3.1. Selecting PPE</li> <li>3.2. Selecting drawings and specification</li> <li>3.3. Handling tools and equipment</li> <li>3.4. Adjusting welding machine</li> <li>3.5. Preparing Edges</li> </ul>
4. Underpinning attitudes	<ul style="list-style-type: none"> <li>4.1. Commitment to occupational health and safety</li> <li>4.2. Environmental concerns</li> <li>4.3. Eagerness to learn</li> <li>4.4. Tidiness and timeliness</li> <li>4.5. Respect for rights of peers and seniors in workplace Respect for rights of peers and seniors in workplace.</li> </ul>
5. Resource implications	<p>The following resources must be provided:</p> <ul style="list-style-type: none"> <li>5.1. Workplace</li> <li>5.2. Tools, equipment, GMAW guide line and facilities appropriate to processes or activity.</li> <li>5.3. Materials relevant to the proposed activity.</li> <li>5.4. Relevant drawings, manuals, training manuals, poster, codes, standards and reference material.</li> </ul>
6. Methods of assessment	<ul style="list-style-type: none"> <li>6.1. Demonstration</li> <li>6.2. Oral questioning</li> <li>6.3. Written test</li> <li>6.4. Portfolio</li> </ul>
7. Context of assessment	<ul style="list-style-type: none"> <li>7.1. Competency assessment must be done in a training center or in an actual or simulated workplace after completion of the training module.</li> <li>7.2. Assessment should be done by NSDA certified/ nominated assessor</li> </ul>
<p><b>Accreditation Requirements</b></p> <p>Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of qualification under BNQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.</p>	



## Development of Competency Standard

The Competency Standards for National Skills Certificate in **Welding, Level-2** Standard is developed by NSDA on 14-21 March, 2021.

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## Validation of Competency Standard by Standard and Curriculum Validation Committee (SCVC)

The Competency Standards for National Skills Certificate in **Welding, Level-2** Standard is validated by SCVC on 23 and 24 May 2021.

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