



**COMPETENCY STANDARD
FOR
Welding**

(Light Engineering Sector)

Level: 01

Competency Standard Code: LECSWEL0006L1V1

**National Skills Development Authority
Prime Minister's Office, Bangladesh**

Table of Contents

Introduction	5
Overview	6
List of Abbreviations	8
Approval of Competency Standard.....	9
Course Structure.....	10
Units & Elements at a Glance:.....	11
Generic Competencies (40 Hours)	11
Perform Computations Using Basic Mathematical Concept.....	11
Occupation Specific Competencies (270 Hours)	11
Generic Competencies	13
Unit Code and Title	14
GC002L2V1: Apply OSH Procedure in the Workplace	14
Unit Code and Title	18
GU001L2V1: Perform Computations Using Basic Mathematical Concepts.....	18
Unit Code and Title	21
GU013L2V1: Practice House Keeping Procedure	21
Sector Specific Competencies.....	24
SUCS001L2V1: Work in the Light Engineering Sector	25
SUCS002L2V1: Interpret Technical Drawing	29
Occupation Specific Competencies.....	31
OUWEL001L1V1: Use Hand Tools and Power Tools	32
OUWEL002L1V1: Use Measuring Instruments	36
OUWEL003L1V1: Perform Oxy-Acetylene Cutting	38
OUWEL004L1V1: Perform Gas Welding and Brazing	41
OUWEL005L1V1: Perform Weld Beads and Padding Using SMAW.....	45
OUWEL006L1V1: Perform SMAW in 1F and 2F Positions	48
OUWEL007L1V1: Perform SMAW in 1G And 2G Position	52
Development of Competency Standard.....	56
Validation of Competency Standard by Standard and Curriculum Validation Committee (SCVC).....	57
Copyright	58

Introduction

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

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 skills, knowledge 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 guide

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 – 1 in
Welding**

Level descriptors of NTVQF/ NSQF (BNQF 1-6)


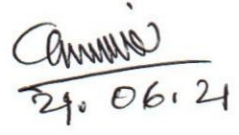

Level & Job classification	Knowledge Domain	Skills Domain	Responsibility Domain
6-Mid-Level Manager/ Sub Assistant Engineer	Comprehensive actual and theoretical knowledge within a specific work or study area with an awareness of the validity and limits of that knowledge, able to analyze, compare, relate 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

CS	- Competency Standard
ISC	- Industry Skills Council
FPS	- Foot, Pound, Second
LEISC	- Light Engineering Industry Skills Councils
NSDA	- National Skills Development Authority
MKS	- Meter, Kilogram, Second
NSQF	- National Qualifications Framework
OSH	- Occupational Safety and Health
PPE	- Personal Protective Equipment
SMAW	- Shielded Metal Arc Welding
GMAW	- Gas Metal Arc Welding
SS	- Stainless Steel
SCVC	- Standards and Curriculum Validation Committee
STP	- Skills Training Provider
SOP	- Standard Operating Procedure
UoC	- Unit of Competency

Approval of Competency Standard

Members of the Approval Committee:

Member	Signature
Dulal Krishna Saha Executive Chairman (Secretary) National Skills Development Authority	 21.06.21
Md. Nurul Amin Member (Admin & Finance) & Member (Registration & Certification) Joint Secretary National Skills Development Authority	 21.06.21
Alif Rudaba Member (Planning & Skills Standard) Joint Secretary National Skills Development Authority	


21.06.21

Dulal Krishna Saha

Executive Chairman (Secretary)

National Skills Development Authority

Date:

National Competency Standards for National Skill Certificate, Level –1 in Welding

Course Structure

SL	Unit Code and Title		UoC Level	Nominal Hours
Generic Competencies				40
1.	GU002L2V1	Apply OSH Practices at Workplace	1	15
2.	GU001L2V1	Perform computations using basic mathematical concepts	1	15
3.	GU013L2V1	Practice Housekeeping Procedure	1	10
Sector Specific Competencies				50
4.	SUCS001L2V1	Work in the Light Engineering Sector	1	20
5.	SUCS002L2V1	Interpret Technical Drawing	1	30
Occupation Specific Competencies				270
6.	OUWEL001L1V1	Use Hand and Power Tools	1	15
7.	OUWEL002L1V1	Use Measuring Instruments	1	15
8.	OUWEL003L1V1	Perform Oxy-acetylene Cutting	1	20
9.	OUWEL004L1V1	Perform Gas Welding and Brazing	1	30
10.	OUWEL005L1V1	Perform Weld Beads and Padding using SMAW	1	50
11.	OUWEL006L1V1	Perform SMAW– 1F and 2F Positions	1	40
12.	OUWEL007L1V1	Perform SMAW– 1G and 2G Positions	1	100
Total Nominal Learning Hours				360

Units & Elements at a Glance:
Generic Competencies (40 Hours)

Code	Unit of Competency	Elements of Competency	Duration (Hours)
GU002L2V1	Apply OSH Procedure in the Workplace	<ol style="list-style-type: none"> 1. Identify OSH policies and procedures. 2. Follow OSH procedure 3. Report hazards and risks 4. Respond to emergencies 5. Maintain personal well-being 	15
GU001L2V1	Perform Computations Using Basic Mathematical Concept	<ol style="list-style-type: none"> 1. Identify calculation requirements in the workplace 2. Select appropriate mathematical methods for the calculation 3. Use tool/instrument to perform calculations 	15
GU013L2V1	Practice House Keeping Procedure	<ol style="list-style-type: none"> 1. Sort and remove unnecessary items 2. Arrange items 3. Maintain work area, tools and equipment 4. Follow standardized work process and procedures 5. Perform work spontaneously 	10
Total Hour			40

Sector Specific Competencies (50 Hours)

Code	Unit of Competency	Elements of Competency	Duration (Hours)
SUCS001L2V1	Work in the Light Engineering Sector	<ol style="list-style-type: none"> 1. Identify job roles and responsibilities 2. Identify and observe OSH 3. Plan work activities 4. Work with others 	30
SUCS002L2V1	Interpret Technical Drawings	<ol style="list-style-type: none"> 1. Follow OSH practices 2. Select technical drawing 3. Interpret technical drawing 	20
Total Hours			50

Occupation Specific Competencies (270 Hours)

Code	Unit of Competency	Elements of Competency	Hours
OUWEL001L1V1	Use hand tools and power tools	<ol style="list-style-type: none"> 1. Select tools 2. Use hand tools 3. Use power tools 4. Perform basic preventive maintenance 5. Maintain workplace cleanliness and store tools 	15
OUWEL002L1V1	Use measuring instruments	<ol style="list-style-type: none"> 1. Follow OSH practices 2. Identify measuring methods 3. Measure and record measurements 4. Clean and store measuring instruments 	15
OUWEL003L1V1	Perform oxy-acetylene cutting	<ol style="list-style-type: none"> 1. Follow OSH practices 2. Prepare materials for cutting 3. Set up equipment 4. Perform cutting 5. Clean and store tools 	20
OUWEL004L1V1	Perform gas welding and brazing	<ol style="list-style-type: none"> 1. Follow OSH practices 2. Prepare materials for gas welding and brazing 3. Set up equipment 4. Perform gas welding 5. Perform brazing 6. Clean and store tools 	30
OUWEL005L1V1	Perform weld beads and padding using SMAW	<ol style="list-style-type: none"> 1. Follow OSH practices 2. Select and prepare materials 3. Set up welding machine 4. Perform beads and padding 5. Clean and store tools 	50
OUWEL006L1V1	Perform shielded metal arc welding (SMAW)	<ol style="list-style-type: none"> 1. Follow OSH practices 2. Select tools, equipment and prepare materials 3. Set up welding machine 4. Perform welding 1F and 2F 5. Clean and store tools 	40
OUWEL007L1V1	Perform shielded metal arc welding (SMAW)	<ol style="list-style-type: none"> 1. Follow OSH practices 2. Select tools, equipment and prepare materials 3. Set up welding machine 4. Perform welding 1G and 2G 5. Clean and store tools 	100
Total Hours			270

Generic Competencies

Unit Code and Title	GC002L2V1: Apply OSH Procedure in the Workplace
Unit Descriptor	<p>This unit covers the knowledge, skills and attitudes (KSA) required in applying OSH procedures in the workplace.</p> <p>It specifically includes identifying OHS policies and procedures, following OSH procedure, reporting to emergencies, and maintaining personal well-being.</p>
Nominal Hours	15 Hours
Elements of Competency	<p>Performance Criteria <u>Bold & Underlined</u> terms are elaborated in the Range of Variables</p>
1. Identify OSH policies and procedures.	<p>1.1. <u>OSH policies</u> and <u>safe operating procedures</u> are accessed and stated</p> <p>1.2. <u>Safety signs and symbols</u> are identified and followed</p> <p>1.3. Emergency response, evacuation procedures and other contingency measures are determined according to workplace requirements</p>
2. Follow OSH procedure	<p>2.1 <u>Personal protective equipment (PPE)</u> is selected and collected as required</p> <p>2.2 Personal protective equipment (PPE) is correctly used in accordance with organization OSH procedures and practices</p> <p>2.3 A clear and tidy workplace is maintained as per workplace standard</p> <p>2.4 PPE is maintained to keep them operational and compliant with OSH regulations</p>
3. Report hazards and risks.	<p>3.1 <u>Hazards</u> and risks are identified, assessed and controlled</p> <p>3.2 Incidents arising from hazards and risks are reported to designated authority</p>
4. Respond to emergencies	<p>4.1 Alarms and warning devices are responded</p> <p>4.2 Workplace <u>emergency procedures</u> are followed</p> <p>4.3 <u>Contingency measures</u> during workplace accidents, fire and other emergencies are recognized and followed in accordance with organization procedures</p> <p>4.4 First aid procedures is applied during emergency situations</p>
5. Maintain personal well-being	<p>5.1 OSH policies and procedures are adhered to</p>

	<p>5.2 OSH awareness programs are participated in as per workplace guidelines and procedures</p> <p>5.3 Corrective actions are implemented to correct unsafe condition in the workplace</p> <p>5.4 <u>“Fit to work” records</u> are updated and maintained according to workplace requirements</p>
Range of Variables	
Variables	Range (may include but not limited to):
1. OHS Policies	<p>1.1. Bangladesh standards for OHS</p> <p>1.2. Fire Safety Rules and Regulations</p> <p>1.3. Code of Practice</p> <p>1.4. Industry Guidelines</p>
2. Safe Operating Procedures	<p>2.1 Orientation on emergency exits, fire extinguishers, fire escape, etc.</p> <p>2.2 Emergency procedures</p> <p>2.3 First Aid procedures</p> <p>2.4 Tagging procedures</p> <p>2.5 Use of PPE</p> <p>2.6 Safety procedures for hazardous substances</p>
3. Safety Signs and symbols	<p>3.1 Direction signs (exit, emergency exit, etc.)</p> <p>3.2 First aid signs</p> <p>3.3 Danger Tags</p> <p>3.4 Hazard signs</p> <p>3.5 Safety tags</p> <p>3.6 Warning signs</p>
4. Personal Protective Equipment (PPE)	<p>4.1 Gas Mask</p> <p>4.2 Gloves</p> <p>4.3 Safety boots</p> <p>4.4 Face mask</p> <p>4.5 Overalls</p> <p>4.6 Goggles and safety glasses</p> <p>4.7 Sun block</p> <p>4.8 Chemical/Gas detectors</p>
5. Hazards	<p>5.1 Chemical hazards</p> <p>5.2 Biological hazards</p> <p>5.3 Physical Hazards</p> <p>5.4 Mechanical and Electrical Hazard</p> <p>5.5 Mental hazard</p> <p>5.6 Ergonomic hazard</p>
6. Emergency Procedures	<p>6.1 Fire fighting</p> <p>6.2 Earthquake</p> <p>6.3 Medical and first aid</p>

	6.4 evacuation
7. Contingency measures	7.1 Evacuation 7.2 Isolation 7.3 Decontamination
8. "Fit to Work" records	8.1 Medical Certificate every year 8.2 Accident reports, if any 8.3 Eye vision certificate
Evidence Guide	
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	Assessment required evidence that the candidate: 1.1 stated OHS policies and safe operating procedures 1.2 followed safety signs and symbols 1.3 used personal protective equipment (PPE) 1.4 maintained workplace clear and tidy 1.5 assessed and Controlled hazards 1.6 followed emergency procedures 1.7 followed contingency measures 1.8 implemented corrective actions
2. Underpinning knowledge	2.1 Define OHS 2.2 OHS Workplace Policies and Procedures 2.3 Work Safety Procedures 2.4 Emergency Procedures 2.5 Hazard control procedure 2.6 Different types of Hazards 2.7 PPE and there uses 2.8 Personal Hygiene Practices 2.9 OHS Awareness
3. Underpinning skills	3.1 Accessing OHS policies 3.2 Handling of PPE 3.3 Handling cleaning tools and equipment 3.4 Writing report 3.5 Responding to emergency procedures
4. Required attitude	4.1 Commitment to occupational health and safety 4.2 Sincere and honest to duties 4.3 Promptness in carrying out activities 4.4 Environmental concerns 4.5 Eagerness to learn 4.6 Tidiness and timeliness 4.7 Respect of peers and seniors in workplace 4.8 Communicate with peers and seniors in workplace

5. Resource implications	5.1 Workplace 5.2 Equipment and outfits appropriate in applying safety measures 5.3 Tools, materials and documentation required 5.4 OHS Policies and Procedures
6. Methods of assessment	Competency should be assessed by: 6.1 Written test 6.2 Demonstration 6.3 Oral Questioning 6.4 Portfolio
7. Context of assessment	7.1 Competency assessment must be done in NSDA accredited assessment centre 7.2 Assessment should be done by a NSDA certified/nominated assessor
<p>Accreditation Requirements</p> <p>Training Providers must be accredited by 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 national skills qualification. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.</p>	

Unit Code and Title	GU001L2V1: Perform Computations Using Basic Mathematical Concepts
Nominal Hours	15 Hours
Unit Descriptor	<p>This unit of competency requires the knowledge, skills and attitude to perform computations using basic mathematical concepts in the workplace.</p> <p>It specifically includes the tasks of identifying calculation requirements in the workplace, selecting appropriate mathematical method/concept for the calculation and using appropriate instruments tools to perform calculation.</p>
Elements of Competency	<p>Performance Criteria Bold & Underlined terms are elaborated in the Range of Variables Training Components</p>
1. Identify calculation requirements in the workplace	<p>1.1 Job requirements are identified</p> <p>1.2 <u>Measurements</u> are selected in accordance with job requirement</p> <p>1.3 Calculation requirements are identified from <u>workplace information</u></p>
2. Select appropriate mathematical methods for the calculation.	<p>2.1 Mathematical methods are identified</p> <p>2.2 <u>Appropriate method</u> is selected to carry out the calculation requirements</p> <p>2.3 Tolerance and clearance limits are identified and adjusted according to the job requirements</p>
3. Use tool/instrument to perform calculations	<p>3.1 Work instructions are confirmed and applied to the job in hand</p> <p>3.2 Materials to be measured are identified as per job specification</p> <p>3.3 Appropriate <u>tool/ instrument</u> is selected based on materials to be measured</p>
Range of Variables	
Variable	Range (may include but not limited to)
1. Measurements	<p>1.1 Length</p> <p>1.2 Width</p> <p>1.3 Weight</p> <p>1.4 Tolerance</p>
2. workplace information	<p>2.1 Job Order</p> <p>2.2 Design</p> <p>2.3 Working drawing</p> <p>2.4 Verbal instructions</p> <p>2.5 Written Instruction</p>

3. Appropriate method	<ul style="list-style-type: none"> 3.1 Addition 3.2 Subtraction 3.3 Division 3.4 Multiplication 3.5 Conversion 3.6 Percentage and ratio calculation
4. Tool/ Instrument	<ul style="list-style-type: none"> 4.1 Calculator 4.2 Scale 4.3 Measuring tape 4.4 Marker
<p>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.</p>	
1. Critical Aspects of Competency	<p>Assessment required evidence that the candidate:</p> <ul style="list-style-type: none"> 1.1 identified calculation requirements from workplace information 1.2 selected appropriate method to carry out the calculation requirements 1.3 selected measurements 1.4 selected appropriate methods 1.5 used tool/instrument 1.6 added numbers 1.7 subtracted numbers 1.8 multiplied numbers. 1.9 divided numbers. 1.10 completed calculations using appropriate tools/instruments
2. Underpinning Knowledge	<ul style="list-style-type: none"> 2.1. Numerical concept 2.2. Basic mathematical methods such as addition, subtraction, multiplication and division and percentage. 2.3. Mathematical language, symbols and terminology. 2.4. Measuring units
3. Underpinning Skills	<ul style="list-style-type: none"> 3.1 Interpret numerical concept 3.2 Interpret mathematical methods such as addition, subtraction, multiplication and division and percentage. 3.3 Interpret mathematical language, symbols and terminology. 3.4 Interpret measuring units
4. Underpinning Attitudes	<ul style="list-style-type: none"> 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	5.1. Work place Procedure 5.2. Materials relevant to the proposed activity 5.3. All tools, equipment, material and documentation required. 5.4. Relevant specifications or work instructions
6. Methods of Assessment	6.1. Written Test 6.2. Demonstration 6.3. Oral Questioning 6.4. Portfolio
7. Context of Assessment	7.1. Competency assessment must be done in a NSDA accredited assessment center 7.2. Assessment should be done by an NSDA certified/nominated assessor
<p>Accreditation Requirements</p> <p>Training Providers must be accredited by 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 national skills qualification. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.</p>	

Unit Code and Title	GU013L2V1: Practice House Keeping Procedure
<p>Unit Descriptor</p>	<p>This unit covers the knowledge, skills and attitude required to Practice housekeeping procedure.</p> <p>It specifically includes sorting and removing unnecessary items, arranging items, maintaining work area, tools and equipment, following standardized work process and procedure and performing work spontaneously.</p>
<p>Nominal Hours</p>	<p>10 Hours</p>
<p>Elements of Competency</p>	<p>Performance Criteria <u>Bold underlined</u> terms are elaborated in the Range of Variables</p>
<p>1. Sort and remove unnecessary items</p>	<p>1.1 Reusable, recyclable materials are sorted in accordance with company/office procedures 1.2 <u>Unnecessary items</u> are removed and disposed of in accordance with company or office procedures</p>
<p>2. Arrange items</p>	<p>2.1 Items are arranged in accordance with company/office housekeeping procedures 2.2 Work area is arranged according to job requirements 2.3 Activities are prioritized based on instructions. 2.4 Items are provided with clear and visible <u>identification marks</u> based on procedure 2.5 Safety equipment and evacuation passages are kept clear and accessible based on instructions</p>
<p>3. Maintain work area, tools and equipment</p>	<p>3.1 Cleanliness and orderliness of work area is maintained in accordance with company/office procedures 3.2 Tools and equipment are cleaned in accordance with manufacturer's instructions/manual 3.3 <u>Minor repairs</u> are performed on tools and equipment in accordance with manufacturer's instruction/manual 3.4 Defective tools and equipment are reported to immediate supervisor</p>
<p>4. Follow standardized work process and procedure</p>	<p>4.1 Materials for common use are maintained in designated area based on procedures 4.2 Work is performed according to standard work procedures. Abnormal incidents are reported to immediate supervisor</p>
<p>5. Perform work spontaneously</p>	<p>5.1 Work is performed as per instruction 5.2 Company and office <u>decorum</u> are followed and</p>

	<p>complied with</p> <p>5.3 Work is performed in accordance with OSH requirements</p>
Range of Variables	
Variable	Range (may include but not limited to):
1. Unnecessary items	<p>1.1 Non-recyclable materials</p> <p>1.2 Pictures, posters and other materials not related to work activity</p> <p>1.3 Unserviceable tools and equipment</p> <p>1.4 Waste materials</p>
2. Identification marks	<p>2.1 Color coding</p> <p>2.2 Labels</p> <p>2.3 Tags</p>
3. Minor repairs	<p>3.1 Application of lubricants</p> <p>3.2 Replacement of parts</p> <p>3.3 Sharpening of tools</p> <p>3.4 Tightening of nuts, bolts and screws</p>
4. Decorum	<p>4.1 Behavior</p> <p>4.2 Company/office rules and regulations</p> <p>4.3 Company/office uniform</p>
Evidence Guide	
<p>The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency.</p>	
1. Critical aspects of competency	<p>1.1 Sorted and removes unnecessary items</p> <p>1.2 Arranged items</p> <p>1.3 Maintained work area, tools and equipment</p> <p>1.4 Followed standardized work process and procedures</p> <p>1.5 Performed work spontaneously</p>
2. Underpinning knowledge	<p>2.1 Environmental requirements relative to work safety</p> <p>2.2 Principles of 5S</p> <p>2.3 Reading skills required to interpret instructions</p> <p>2.4 Work process and procedures</p> <p>2.5 Work-related documentation requirements</p>
3. Underpinning skills	<p>3.1 Arranging items</p> <p>3.2 Maintaining work area, tools and equipment</p> <p>3.3 Following standardizing work process</p>

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	The following resources must be provided: 5.1 Work place Procedure 5.2 Materials relevant to the proposed activity 5.3 All tools, equipment, material and documentation required. 5.4 Relevant specifications or work instructions
6. Methods of assessment	Methods of assessment may include but not limited to: 6.1 Written test 6.2 Demonstration 6.3 Oral questioning 6.4 Portfolio
7. Context of assessment	7.1 Competency assessment must be done in a training center or in an actual or simulated work place after Completion of the training module 7.2 Assessment should be done by NSDA certified assessor
<p>Accreditation Requirements</p> <p>Training Providers must be accredited by 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 national skills qualification. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.</p>	

Sector Specific Competencies

Unit Code and Title	SUCS001L2V1: Work in the Light Engineering Sector
Nominal Hours	20 Hours
Unit Descriptor	<p>This unit covers the skills, knowledge and attitude required in working in the Light Engineering sector.</p> <p>It includes describe the organizational structure within the Light Engineering sector, identify processes and procedures, identify tools, equipment and materials, identify workplace practices, and organize own workload, and practice OHS.</p>
Elements of Competency	<p>Performance Criteria <u>Bold and Underlined</u> terms are elaborated in the Range of Variables.</p>
1. Describe the organizational structure within the sector	<p>1.1 Scope, nature and major fields of the Light Engineering sector are determined</p> <p>1.2 The profile of the Light Engineering sector in relation to Bangladesh <u>employment conditions</u> is determined</p> <p>1.3 Trends and technologies relevant to the sector are explained</p> <p>1.4 Relevant policies and guidelines are identified and interpreted</p> <p>1.5 <u>Instructions</u> as to procedures in achieving quality are obtained, understood and clarified</p>
2. Identify processes and procedures	<p>2.1 Light Engineering processes are identified, described and explained</p> <p>2.2 Work activities are correctly identified</p> <p>2.3 Adjustments are interpreted</p>
3. Identify tools, equipment and materials	<p>3.1 Appropriate manuals are accessed to ensure up-to-date specifications of tools, materials and equipment</p> <p>3.2 Light Engineering <u>tools, materials and equipment</u> are identified</p> <p>3.3 Substitutes are identified in case of non-availability</p>
4. Identify workplace requirements	<p>4.1 <u>Workplace requirements</u> are identified and clarified.</p> <p>4.2 Roles and responsibilities of all personnel are described</p> <p>4.3 Workplace's practices are identified</p> <p>4.4 <u>Problem-solving strategies</u> are used to address bottlenecks, inconsistencies and other concerns</p>
5. Organize own workload	<p>5.1 Own work activities are planned and progress of work is communicated to relevant staff</p> <p>5.2 Work activities are completed</p>

	<p>5.3 Difficulties and bottlenecks are identified, and solutions are put forwarded</p> <p>5.4 Own work is monitored against workplace standards and areas for improvement identified and acted upon</p>
6. Practice OHS	<p>6.1. Relevant OHS practices are identified</p> <p>6.2. Relevant OHS practices are interpreted and implemented</p>
Range of Variables	
Variables	Range (may include but not limited to):
1. Employment conditions	<p>1.1 Code of Practice</p> <p>1.2 Salary/Wage System</p> <p>1.3 Labor Practices</p> <p>1.4 Anti-Discrimination Policy</p> <p>1.5 Gender Issues</p> <p>1.6 Collective Bargaining and Other Practices</p> <p>1.7 Awards</p> <p>1.8 Procedures for Handling Disputes</p> <p>1.9 Innovations in the Sector</p>
2. Instructions	<p>2.1 Specifications and requirements</p> <p>2.2 Standard operating procedures</p> <p>2.3 Manuals of Instruction</p> <p>2.4 Operations Manual</p> <p>2.5 Environmental Guidelines</p> <p>2.6 Gender and Develop Guidelines</p>
3. Manuals	<p>3.1 Manual of Instructions</p> <p>3.2 Manual of Specifications</p> <p>3.3 Repair Manual</p> <p>3.4 Quality Manual</p> <p>3.5 Maintenance Procedure and Troubleshooting</p>
4. Workplace requirements	<p>4.1 Goals and objectives</p> <p>4.2 Strategic and Operational Plans</p> <p>4.3 Systems and Processes</p> <p>4.4 Monitoring and Evaluation</p> <p>4.5 Reports and Documentation</p>
5. Tools, equipment and materials	Refers to all tools, equipment and materials appropriate for any of the Light Engineering fields
6. Problem-solving strategies	<p>6.1. Asking questions</p> <p>6.2. Feedback and Feed forward system</p> <p>6.3. Reference to Standard Operating Procedures</p> <p>6.4. Accessing Information</p> <p>6.5. Reviews</p>

	6.6. Brainstorming
7. OHS	7.1 Reporting hazards, risks and emergencies 7.2 Arrangement of workplaces 7.3 Standard Operating Procedure 7.4 Workplace environment and safety 7.5 Safe storage of tools and equipment 7.6 Use of PPE
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 of competency	Assessment required evidence that the candidate: 1.1 demonstrated knowledge in working in the Light Engineering sector 1.2 satisfying all the requirements mentioned in the Performance Criteria and Range of Variables
2. Underpinning knowledge	2.1 Scope and Major Divisions of the Light Engineering Sector 2.2 Relevant Policies and Guidelines in the Light Engineering Sector 2.3 Manuals used in the Light Engineering Sector 2.4 Relevant Terminologies and Acronyms 2.5 Types and Uses of Light Engineering Tools and Materials. 2.6 Workplace Practices 2.7 Occupational Health and Safety Practices 2.8 Recording and Reporting practices
3. Underpinning skills	3.1 Describing the organization structure 3.2 Identifying Light Engineering processes and procedures 3.3 Identifying tools, equipment and materials 3.4 Identifying workplace practices 3.5 Organizing own workload 3.6 Practicing OHS
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	5.1 Pens 5.2 Telephone 5.3 Computer 5.4 Writing materials 5.5 Online communication
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 NSDA accredited assessment centre 7.2 Assessment should be done by a NSDA certified/nominated assessor

Accreditation Requirements

Training Providers must be accredited by 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 national skills qualification. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.

Unit Code and Title	SUCS002L2V1: Interpret Technical Drawing
Nominal Hours	30 Hours
Unit Descriptor	<p>This unit covers the knowledge, skill and attitude required in interpreting technical drawings.</p> <p>It includes identify information, identify drawings and specifications, interpret drawings and specifications, and apply occupational health and safety procedures.</p>
Elements of Competency	<p>Performance Criteria <u>Bold and Underlined</u> terms are elaborated in the Range of Variables.</p>
1. Follow OSH practices	1.1 Safe work practices observed and PPE worn as required for the work performed
2. Select technical drawing	2.1 <u>Drawing</u> is selected and checked to ensure that it conforms to the job requirements 2.2 Drawing is validated
3. Interpret technical drawing	3.1 Drawing components, assemblies are identified 3.2 Dimensions are identified according to job requirement 3.3 Clearances/tolerances are checked for compliance with work place standards 3.4 <u>Instructions</u> are identified and followed accurately 3.5 Material specifications are identified 3.6 Symbols in drawing/s are interpreted
Range of Variables	
Variables	Range (may include but not limited to):
1. Drawing	1.1 Technical drawing, sketch
2. Instructions	2.1 Note 2.2 Instruction 2.3 Special Instruction 2.4 Precaution
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 of competency	Assessment required evidence that the candidate: 1.1 selected and Interpreted technical drawing 1.2 used and followed instruction according to job requirement.

2. Underpinning knowledge	<ul style="list-style-type: none"> 2.1 OSH 2.2 Workplace standard 2.3 Sequence of drawing 2.4 Methods of checking
3. Underpinning skills	<ul style="list-style-type: none"> 3.1 Practice workplace safety 3.2 Reading / interpreting information on the drawing, following data 3.3 Sheet, instruction and manuals, technical drawing 3.4 Perform measurements, calculations 3.5 Perform the task 3.6 Perform checking 3.7 Keeping records
4. Underpinning attitudes	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 5.1 Tools, equipment and physical facilities 5.2 Materials, consumable needed to perform activities
6. Methods of assessment	<ul style="list-style-type: none"> 6.1 Workplace observation 6.2 Demonstration 6.3 Oral questioning 6.4 Written test 6.5 Portfolio
7. Context of assessment	<ul style="list-style-type: none"> 7.1 Competency assessment must be done in NSDA accredited assessment centre 7.2 Assessment should be done by a NSDA certified/nominated assessor

Accreditation Requirements

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Occupation Specific Competencies

Unit Code and Title	O UWEL001L1V1: Use Hand Tools and Power Tools
Nominal Hours	15 Hours
Unit Descriptor	<p>This unit covers the skills, knowledge and attitude required in using hand tools and power tools.</p> <p>It includes identifying tools, using hand tools, power tools, performing basic preventive maintenance and maintaining workplace cleanliness and storing tools.</p>
Elements of Competency	<p>Performance Criteria <u>Bold and Underlined</u> terms are elaborated in the Range of Variables.</p>
1. Select tools	<p>1.1 <u>PPE</u> is collected and worn as per requirement</p> <p>1.2 Appropriate <u>tools</u> are identified as per requirement</p> <p>1.3 <u>Applications</u> of tools are defined</p> <p>1.4 <u>Hand tools</u> and <u>power</u> tools are prepared for use</p> <p>1.5 Sources of power supply for power tools are identified</p>
2. Use hand tools	<p>2.1 Appropriate tool is used</p> <p>2.2 Proper hand-eye coordination is applied in the use of hand tools</p> <p>2.3 Unsafe or faulty tools are identified and marked for repair</p>
3. Use power tools	<p>3.1 Route for power supply established in accordance with worker safety requirements</p> <p>3.2 Proper sequence of operations is determined in using power tools</p> <p>3.3 Power tools are used as required</p>
4. Perform basic preventive maintenance.	<p>4.1. Tools are cleaned as per standard procedure</p> <p>4.2. Appropriate lubricants are identified</p> <p>4.3. Tools are lubricated as required</p> <p>4.4. Defective tools are inspected and corrected or replaced as per standard procedure</p> <p>4.5. Tools are inspected, repaired and replaced after use</p> <p>4.6.</p>
5. Maintain workplace cleanliness and store tools	<p>5.1 Workplace is cleaned as per standard procedure</p> <p>5.2 Hazardous materials are identified, separated and disposed as per workplace procedure</p> <p>5.3 Waste materials are disposed as per workplace procedure</p> <p>5.4 Inventory of tools are conducted, and recorded as per stock register by using forms</p> <p>5.5 Tools are cleaned and stored safely in appropriate location</p>
Range of Variables	

Variables	Range (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 1.8. Face masks 1.9. Overalls 1.10. Welding helmet/Auto dark helmet 1.11. Safety helmet 1.12. Face shield 1.13. Arm guard 1.14. Leg guard 1.15. Hand shield 1.16. Safety belt
2. Tools	2.1 Hand Tools 2.2 Power Tools
3. Applications	3.1 Adjusting 3.2 Aligning 3.3 Assembling 3.4 Clamping 3.5 Cleaning 3.6 Cutting 3.7 Dismantling 3.8 Finishing 3.9 Hand sharpening 3.10 Lubricating 3.11 Scraping 3.12 Simple Tool Repairs 3.13 Tightening
4. Hand tools	4.1 Adjustable wrench 4.2 C-clamp 4.3 Chisels 4.4 Files 4.5.1 Round file 4.5.2 Flat file 4.5.3 Triangular file 4.5.4 Half round files 4.5.5 Square file 4.5.6 Knife file

	<ul style="list-style-type: none"> 4.6 Hacksaw 4.7 Ball pein Hammers 4.8 Sledge hammers 4.9 Hand saws 4.10 Tongs 4.11 Chipping hammer 4.12 Steel wire brush 4.13 Side cutting pliers 4.14 Combination pliers 4.15 Nose pliers 4.16 Neon tester 4.17 Parallel bar 4.18 Snips 4.19 Hand shares 4.20 Anvil 4.21 Steaks 4.22 Center punches 4.23 Prick punches 4.24 Number punches 4.25 Letter punches 4.26 Scarpers 4.27 Screwdrivers 4.28 Spanners and Wrenches 4.29 Grip vice 4.30 Jigs and fixtures
5. Power Tools	<ul style="list-style-type: none"> 5.1 Electric hand drill machine 5.2 Angle Grinder/hand grinder 5.3 Circular cutting machine/disc cutter 5.4 Power saw 5.5 Pedestal drill machine 5.6 Pedestal grinding machine 5.7 Pneumatic chisel
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 of competency	<p>Assessment required evidence that the candidate:</p> <ul style="list-style-type: none"> 1.1 collected PPE and worn as per requirement 1.2 used hand tools and power tools safely 1.3 determined proper sequence of operations in using power tools. 1.4 inspected, separated and corrected of defective tools. 1.5 lubricated tools 1.6 cleaned Workplace and store tools

2. Underpinning knowledge	2.1 Functions and Procedures of using hand tools for welding works 2.2 Functions and Procedures of using power tools for welding works 2.3 Care of hand and power tools 2.4 Preventive maintenance 2.5 Corrective maintenance 2.6 Storage Procedures
3. Underpinning skills	3.1 Applying skills in practice OSH 3.2 Handling tools and equipment 3.3 Applying appropriate procedure 3.4 Communicating skills in the workplace
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	5.1 Adequate workplaces 5.2 Materials for welding work 5.3 Hand tools and power tools appropriate to welding work 5.4 Information and documentation 5.5 Product specifications 5.6 Manual, Codes, Standards and reference materials
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 NSDA accredited assessment centre 7.2 Assessment should be done by a NSDA certified/nominated assessor

Accreditation Requirements

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Unit Code and Title	Ouwel002L1V1: Use Measuring Instruments
Nominal Hours	15 Hours
Unit Descriptor	This unit covers the skills, knowledge and attitude required in use measuring instruments. It includes following OSH practices, selecting the job to be measured, measuring device, taking measurements and cleaning and storing measuring instruments.
Elements of Competency	Performance Criteria <u>Bold and Underlined</u> terms are elaborated in the Range of Variables.
1. Follow OSH practices	1.1. PPE 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. Identify measuring methods	2.1 Job to be measured is identified 2.2 Measuring requirements is identified and interpreted 2.3 Measuring methods are identified as per requirements
3. Measure and record measurements	3.1. <u>Measuring instruments</u> is selected and collected according to measurement requirements 3.2. <u>Measurements</u> are taken accurately 3.3. Measurements are checked against job requirement 3.4. Measurements are recorded as per workplace procedure
4. Clean and store measuring instruments	4.1. <u>Routine maintenance</u> is done as required 4.2. Measuring instruments are cleaned and stored 4.3. Waste material are disposed as per workplace procedure 4.4. Workplace is cleaned as per workplace standard
Range of Variables	
Variables	Range (may include but not limited to):
1. Measuring instruments	1.1 Try square 1.2 Steel tape 1.3 Divider 1.4 Steel rule 1.5 Vernier caliper 1.6 Fillet gauge 1.7 Welding gauge 1.8 Wire gauge 1.9 Vernier bevel protector 1.10 Trammel 1.11 Outside caliper 1.12 In side caliper 1.13 Spirit level 1.14 Angle plate
2. Routine maintenance	2.1. Lubricating 2.2. Tighten screws

	2.3. Using anti-rust liquid
3. Measurements	3.1 Measuring length 3.2 Angle 3.3 Diameter (internal and external) 3.4 Depth
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 of competency	Assessment required evidence that the candidate: 1.1 identified the proper graduated measuring instrument 1.2 taken Measurement accurately 1.3 record of measurement 1.4 interpreted written inspection
2. Underpinning knowledge	2.1 Functions of measuring Instruments 2.2 Measuring procedure of measuring instruments 2.3 Care and storing procedure
3. Underpinning skills	3.1 Practicing workplace safety 3.2 Handling measuring instruments 3.3 Keeping record
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	5.1 Adequate workplaces 5.2 Materials 5.3 Measuring instruments
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 NSDA accredited assessment centre 7.2 Assessment should be done by a NSDA certified/nominated assessor
Accreditation Requirements Training Providers must be accredited by 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 national skills qualification. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.	

Unit Code and Title	O UWEL003L1V1: Perform Oxy-Acetylene Cutting
Nominal Hours	20 Hours
Unit Descriptor	<p>This unit covers the knowledge, skills and attitudes required to perform Oxy-acetylene cutting.</p> <p>It specifically includes following OSH practices, preparing materials for cutting, setting up equipment, performing cutting and cleaning and storing tools.</p>
Elements of Competency	<p>Performance Criteria <u>Bold and Underlined</u> terms are elaborated in the Range of Variables.</p>
1. Follow OSH practices	<p>1.1 <u>PPE</u> is selected and collected as per requirements</p> <p>1.2 PPE is worn as required</p> <p>1.3 Safe work practices followed as per workplace standard</p>
2. Prepare materials for cutting	<p>2.1 Cutting requirements are identified and noted from procedures, drawings and specifications</p> <p>2.2 <u>Materials</u> are cleaned and marked for cutting as per noted dimension</p>
3. Set up equipment	<p>3.1 <u>Cutting process</u> is selected as per standard</p> <p>3.2 Cutting nozzles are selected as per plate thickness</p> <p>3.3 Equipment is <u>set up</u> as per job specification</p>
4. Perform cutting	<p>4.1 Flame is adjusted as per job requirement</p> <p>4.2 Metal is pre-heated as per standard operating procedure as required</p> <p>4.3 Metal is <u>cut</u> as per standard operating procedures</p> <p>4.4 Cut is checked for quality and any defects are identified and rectified as per standard operating procedures</p> <p>4.5 Supply of oxygen and acetylene gas is put-off following standard operating procedure</p>
5. Clean and store tools	<p>5.1 Tools and equipment are cleaned and stored as per workplace standard</p> <p>5.2 Waste material are disposed as per workplace procedure</p> <p>5.3 Workplace is cleaned as per workplace standard</p>
Range of Variables	
Variables	Range (may include but not limited to):
1. Personal Protective Equipment	<p>1.1 Dust mask</p> <p>1.2 Safety glasses/Goggles</p>

	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 2.1 Mild steel 2.2 Medium carbon steel <ul style="list-style-type: none"> 2.2.1 Plate thickness (max 08 mm)
3. Cutting process	<ul style="list-style-type: none"> 3.1 Manual 3.2 Semi-automatic
4. Set up	<ul style="list-style-type: none"> 4.1 Regulator set up 4.2 Flashback arrestor/protector 4.3 Cutting torch set up 4.4 Hose pipe and connector
5. Cut	<ul style="list-style-type: none"> 5.1 Straight cut 5.2 Bevel cut 5.3 Circular cut 5.4 Zigzag cut
<p>Evidence Guide</p> <p>The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.</p>	
1. Critical aspects of competency	<ul style="list-style-type: none"> 1.1 Set up equipment 1.2 Adjusted pressure 1.3 Adjusted flame 1.4 Selected appropriate nozzle 1.5 Performed cutting
2. Underpinning knowledge	<ul style="list-style-type: none"> 2.1 Nomenclature of oxygen and acetylene cylinder 2.2 Pressure regulator 2.3 Cutting torch 2.4 Selection of cutting nozzle 2.5 Leak testing procedure 2.6 Oxy acetylene flames 2.7 Flashback 2.8 Back fire 2.9 post-heating
3. Underpinning skills	<ul style="list-style-type: none"> 3.1 Selecting PPE 3.2 Handling tools and equipment 3.3 Selecting drawings and specification

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 Required workplace 5.2 Tools, equipment and facilities appropriate to processes or activity 5.3 Stand by firefighting equipment 5.4 Materials relevant to the proposed activity 5.5 Relevant drawings, manuals, codes 5.6 Standards and reference material
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 NSDA accredited assessment centre 7.2 Assessment should be done by a NSDA certified/nominated assessor
<p>Accreditation Requirements</p> <p>Training Providers must be accredited by 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 any NSQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.</p>	

Unit Code and Title	OUWEL004L1V1: Perform Gas Welding and Brazing
Nominal Hours	30 Hours
Unit Descriptor	<p>This unit covers the knowledge, skills and attitudes required to Perform Gas Welding and Brazing.</p> <p>It specifically includes the tasks of following OSH practices, preparing materials for gas welding and brazing, setting up equipment, performing gas welding, brazing and cleaning and storing tools.</p>
Elements of Competency	<p>Performance Criteria <u>Bold and Underlined</u> terms are elaborated in the Range of Variables.</p>
1. Follow OSH practices	<p>1.1 <u>PPE</u> is selected and collected as per requirements 1.2 PPE is worn as required 1.3 Safe work practices followed as per workplace standard</p>
2. Prepare materials for gas welding and brazing	<p>2.1 <u>Gas</u> welding and brazing requirements are identified and noted from procedures, drawings and specifications 2.2 <u>Tools</u> and equipment are selected and collected as per job requirements 2.3 <u>Materials</u> are selected and collected as per job requirements 2.4 Flux is selected and collected as per brazing requirement 2.5 Filler metal is selected and collected as per requirement 2.6 Materials are cleaned and marked for gas welding and brazing as per noted dimension</p>
3. Set up equipment	<p>3.1 Gas welding equipment is set as per Job requirement 3.2 Welding nozzles are selected as per metal thickness 3.3 Gas pressure is adjusted and set as per job requirement</p>
4. Perform gas welding	<p>4.1 Flame is adjusted and set as per job requirement 4.2 Tack welding is performed and alignment is checked as required 4.3 <u>Welding</u> is performed as per standard operating procedure</p>

	<p>4.4 Welding quality is checked and defects are identified</p> <p>4.5 Defects are rectified as per standard operating procedure</p> <p>4.6 Supply of oxygen and acetylene gas is put-off following standard operating procedure</p>
5. Perform brazing	<p>5.1 Flame is adjusted and set as per job requirement</p> <p>5.2 Tacking is performed as required</p> <p>5.3 Brazing is performed as per standard operating procedure</p> <p>5.4 Brazing quality is checked and defects are identified</p> <p>5.5 Defects are rectified as per standard operating procedure</p> <p>5.6 Supply of oxygen and acetylene gas is put-off following standard operating procedure</p>
6. Clean and store tools	<p>6.1. Tools and equipment are cleaned and stored as per workplace standard</p> <p>6.2. Waste material are disposed as per workplace procedure</p> <p>6.3. Workplace is cleaned as per workplace standard</p>
Range of Variables	
Variables	Range (may include but not limited to):
1. Personal Protective Equipment	<p>1.1 Dust mask</p> <p>1.2 Safety glasses/Goggles</p> <p>1.3 Leather hand Gloves</p> <p>1.4 Ear plugs</p> <p>1.5 Air respirator</p> <p>1.6 Safety shoes/boots</p> <p>1.7 Aprons</p> <p>1.8 Face masks</p> <p>1.9 Overalls</p> <p>1.10 Safety helmet</p> <p>1.11 Arm guard</p> <p>1.12 Leg guard</p>
2. Gas	<p>2.1 Oxy-LPG</p> <p>2.2 Oxy-acetylene</p>
3. Tools	<p>3.1. Jig and fixture</p> <p>3.2. Ball pin hammer</p> <p>3.3. Chipping hammer</p> <p>3.4. Try square</p> <p>3.5. Tongs</p>

	<ul style="list-style-type: none"> 3.6. Steel wire brush 3.7. Tip cleaner 3.8. Spark lighter
4. Materials	<ul style="list-style-type: none"> 4.1 Metal sheet <ul style="list-style-type: none"> 4.1.1 MS thickness 3 mm (max) 4.2 Filler metal <ul style="list-style-type: none"> 4.2.1 MS 4.2.2 Brass
5. Welding	<ul style="list-style-type: none"> 5.1 Butt 5.2 2F position
6. Defects	<ul style="list-style-type: none"> 6.1 Burn through 6.2 Concavity/convexity 6.3 Cracks 6.4 Crater cracks 6.5 Lack of fusion/penetration 6.6 Overlap 6.7 Pinholes/blowholes 6.8 Porosity 6.9 Under fill 6.10 Undercut 6.11 Misalignment
<p>Evidence Guide</p> <p>The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.</p>	
1. Critical aspects of competency	<ul style="list-style-type: none"> 1.1 identified gas welding and brazing requirements 1.2 selected and collected flux 1.3 set gas equipment 1.4 selected nozzles 1.5 adjusted and set gas pressure 1.6 adjusted and set flame 1.7 performed welding 1.8 identified and rectified welding defects 1.9 performed brazing 1.10 identified and rectified brazing defects
2. Underpinning knowledge	<ul style="list-style-type: none"> 2.1 Welding procedure specification 2.2 Gas welding 2.3 Brazing 2.4 Oxy-acetylene flames 2.5 Nomenclature of Oxygen cylinder 2.6 Nomenclature of Acetylene cylinder 2.7 Pressure regulators 2.8 Welding torch 2.9 Selection of nozzle

	<ul style="list-style-type: none"> 2.10 Leak testing procedure 2.11 Filler metal 2.12 Flux 2.13 Back fire 2.14 Flashback
3. Underpinning skills	<ul style="list-style-type: none"> 3.1 Selecting and using PPE 3.2 Handling tools and equipment 3.3 Interpreting drawings and specification 3.4 Communicating with others in workplace 3.5 Interpreting job requirements
4. Underpinning attitudes	<ul style="list-style-type: none"> 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	<p>The following resources must be provided:</p> <ul style="list-style-type: none"> 5.1 Workplace 5.2 Tools, equipment and facilities appropriate to processes or activity. 5.3 Stand by firefighting equipment 5.4 Materials relevant to the proposed activity. 5.5 Equipment and outfits appropriate in applying safety measures. 5.6 Relevant drawings, manuals, codes, standards and reference material.
6. Methods of assessment	<ul style="list-style-type: none"> 6.1 Workplace observation 6.2 Demonstration 6.3 Oral questioning 6.4 Written test 6.5 Portfolio
7. Context of assessment	<ul style="list-style-type: none"> 7.1 Competency assessment must be done in NSDA accredited assessment centre 7.2 Assessment should be done by a NSDA certified/nominated assessor

Accreditation Requirements

Training Providers must be accredited by 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 national skills qualification. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.

Unit Code and Title	OUWEL005L1V1: Perform Weld Beads and Padding Using SMAW
Nominal Hours	50 Hours
Unit Descriptor	<p>This unit covers the knowledge, skills and attitudes required to perform weld beads and padding using SMAW.</p> <p>It specifically includes following OSH practices, selecting and preparing materials, setting up welding machine, performing beads and padding and cleaning and storing tools.</p>
Elements of Competency	<p>Performance Criteria <u>Bold and Underlined</u> terms are elaborated in the Range of Variables.</p>
1. Follow OSH practices	1.1 <u>PPE</u> is selected and collected as per requirements 1.2 Personal protective equipment (PPE) is worn as required 1.3 Safe work practices followed as per workplace standard
2. Select and prepare materials	2.1 Weld requirements are identified from workplace instruction 2.2 <u>Plates, tools</u> and <u>electrodes</u> are selected and collected as per job requirements 2.3 Plates are marked and cut as per job specification 2.4 Plate surface are cleaned as per job specification
3. Set up welding machine	3.1 Ampere is adjusted and set as per job requirement 3.2 Earth clamp is connected to the job/work piece as required
4. Perform beads and padding	4.1. Job is set up as per workplace standard 4.2. Weld bead and padding is performed as per job requirement 4.3. Weaving is followed as per instructions during bead and padding 4.4. Travel speed is maintained as per standard operating procedure 4.5. Welds are cleaned, checked for quality and defects are identified 4.6. Corrective action is taken to meet the standards for basic purposes where load bearing is not critical 4.7. Tack the base metal properly avoid distortion prevention measures
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

Range of Variables	
Variables	Range (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 1.8 Face masks 1.9 Overalls 1.10 Welding helmet/Auto dark helmet 1.11 Safety helmet 1.12 Face shield 1.13 Arm guard 1.14 Leg guard 1.15 Hand shield 1.16 Safety belt
2. Plates	2.1 MS plates 6-10 mm thickness range
3. Tools	3.1 Ball pin hammer 3.2 Chipping hammer 3.3 Try square 3.4 Tongs 3.5 Wire brush 3.6 Cup brush 3.7 Angle Grinder
4. Electrodes	4.1 2.5 and 3.2 mm/12 and 10 SWG
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 of competency	1.1 Set up equipment 1.2 Adjusted ampere 1.3 Selected appropriate electrode angle 1.4 Maintained travel speed 1.5 Performed beads and padding
2. Underpinning knowledge	2.1 Welding symbols 2.2 Define beads and padding 2.3 Weavings 2.4 Welding Metallurgy 2.5 Define ferrous metal 2.6 Define non-ferrous metal

	<ul style="list-style-type: none"> 2.7 Different between metal plate, sheet and bar 2.8 Types of electrodes 2.9 Ampere setting procedure 2.10 Maintain proper electrode angle 2.11 Maintain proper Arc length 2.12 Maintain travel speed
3. Underpinning skills	<ul style="list-style-type: none"> 3.1 Selecting PPE 3.2 Selecting drawings and specification 3.3 Handling hand tools and equipment 3.4 Adjusting welding machine 3.5 Maintaining welding arc and arc length 3.6 Performing welding procedure
4. Underpinning attitudes	<ul style="list-style-type: none"> 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	<p>The following resources must be provided:</p> <ul style="list-style-type: none"> 5.1 Workplace 5.2 Tools, equipment and facilities appropriate to processes or activity. 5.3 Materials relevant to the proposed activity. 5.4 Equipment and outfits appropriate in applying safety measures. 5.5 Relevant drawings, manuals, codes, standards and reference material.
6. Methods of assessment	<ul style="list-style-type: none"> 6.1. Workplace observation 6.2. Demonstration 6.3. Oral questioning 6.4. Written test 6.5. Portfolio
7. Context of assessment	<ul style="list-style-type: none"> 7.1 Competency assessment must be done in NSDA accredited assessment centre 7.2 Assessment should be done by a NSDA certified/nominated assessor

Accreditation Requirements

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Unit Code and Title	OUWEL006L1V1: Perform SMAW in 1F and 2F Positions
Nominal Hours	40 Hours
Unit Descriptor	<p>This unit covers the knowledge, skills and attitudes required of a worker to perform SMAW - 1F and 2F positions.</p> <p>It specifically includes the tasks of following OSH practices, selecting tools, equipment and preparing materials, setting up welding machine, performing welding in 1F and 2F position and cleaning and storing tools.</p>
Elements of Competency	<p>Performance Criteria <u>Bold and Underlined</u> terms are elaborated in the Range of Variables.</p>
1. Follow OSH practices	1.1 <u>PPE</u> is selected and collected as per requirements 1.2 Personal protective equipment (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 <u>Plates, tools, equipment</u> and <u>electrodes</u> 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 1F and 2F	4.1 Tack welding is performed and alignment is checked as per job requirement 4.2 Welding is performed 1F positions as per job requirement 4.3 Welding is performed 2F positions as per job requirement 4.4 Welds are cleaned as per job requirements 4.5 Weld quality is checked and <u>defects</u> 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
Range of Variables	
Variables	Range (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 1.8 Overalls 1.9 Welding helmet/Auto dark helmet 1.10 Safety helmet 1.11 Face shield 1.12 Arm guard 1.13 Leg guard 1.14 Hand shield 1.15 Safety belt
2. Plates	2.1 MS plates 6-10 mm thickness
3. Tools	3.1 Ball pin hammer 3.2 Chipping hammer 3.3 Try square 3.4 Tongs 3.5 Wire brush 3.6 Chisels 3.7 Steel tape 3.8 C-clamp 3.9 Table vice 3.10 Anvil 3.11 Steel cup brush 3.12 Center/trick punch 3.13 Wire spacer
4. Equipment	4.1 Electrode oven 4.2 AC welding machine 4.3 DC welding machine 4.4 Circular cutting machine 4.5 Angle grinder machine
5. Electrodes	5.1 2.5 and 3.2 mm/12 and 10 SWG
6. Defects	6.12 Lack of fusion 6.13 Lack of penetration 6.14 Porosity 6.15 Excess fusion 6.16 Excess penetration 6.17 Crack 6.18 Slag inclusions 6.19 Spatter

	6.20 Undercut 6.21 Irregular shape and dimension 6.22 Arc crater 6.23 Pin hole 6.24 Blow hole 6.25 Over lap 6.26 Distortion
Evidence Guide 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 Set up equipment 1.2 Adjusted ampere 1.3 Selected appropriate electrode angle 1.4 Maintained travel speed 1.5 Performed welding 1F and 2F positions
2. Underpinning knowledge	2.1. Welding transformer 2.2. Rectifier 2.3. Polarity 2.4. Welding positions 2.5. Electrodes 2.6. Selection of electrodes 2.7. Tack weld 2.8. Welding current 2.9. Electrode angle 2.10. Arc length 2.11. Travel speed 2.12. 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. Maintaining welding arc and arc length 3.6. 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

	<ul style="list-style-type: none"> 5.3. Materials relevant to the proposed activity 5.4. Equipment and outfits appropriate in applying safety measures 5.5. Relevant drawings, manuals, training manuals, poster, codes, standards and reference material
6. Methods of assessment	<ul style="list-style-type: none"> 6.1. Workplace observation 6.2. Demonstration 6.3. Oral questioning 6.4. Written test 6.5. Portfolio
7. Context of assessment	<ul style="list-style-type: none"> 7.1. Competency assessment must be done in NSDA accredited assessment centre 7.2. Assessment should be done by a NSDA certified/nominated assessor

Accreditation Requirements

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Unit Code and Title	OUWEL007L1V1: Perform SMAW in1G And 2G Position
Nominal Hours	100 Hours
Unit Descriptor	<p>This unit covers the knowledge, skills and attitudes required to Perform SMAW –1G and 2G position.</p> <p>It specifically includes the tasks of following OSH practices, selecting tools, equipment and preparing materials, setting up welding machine, performing welding in 1G and 2G position and cleaning and storing tools.</p>
Elements of Competency	<p>Performance Criteria <u>Bold and Underlined</u> terms are elaborated in the Range of Variables.</p>
1. Follow OSH practices	<p>1.1 <u>Personal Protective Equipment (PPE)</u> is selected and collected as per requirements</p> <p>1.2 Personal protective equipment (PPE) is worn as required</p> <p>1.3 Safe work practices followed as per workplace standard</p>
2. Select tools, equipment and prepare materials	<p>2.1 Weld requirements are identified from workplace instruction</p> <p>2.2 <u>Plates, tools, equipment</u> and <u>electrodes</u> are selected and collected as per job requirements</p> <p>2.3 Plate surface are cleaned as per job specification</p> <p>2.4 Job is prepared as per job requirement</p>
3. Set up welding machine	<p>3.1 Welding machine is prepared as per standard procedure</p> <p>3.2 Ampere are set as per job requirements</p>
4. Perform welding 1G and 2G	<p>4.1 Tack welding is performed and alignment is checked as per job requirement</p> <p>4.2 Electrode's angle is maintained as per job requirement</p> <p>4.3 Key hole techniques are maintained as required</p> <p>4.4 Welding is performed 1G positions as per job specification</p> <p>4.5 Welding is performed 2G positions as per job specification</p> <p>4.6 Welds are cleaned as per job requirements</p> <p>4.7 Weld quality is checked visually and <u>defects</u> are identified and rectified as required</p>

5. Clean and store tools	5.1 Welding Machine shutdown are conducted as per standard procedure 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
Range of Variables	
Variable	Range (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 1.8 Face masks 1.9 Overalls 1.10 Welding helmet/Auto dark helmet 1.11 Safety helmet 1.12 Face shield 1.13 Arm guard 1.14 Leg guard 1.15 Hand shield 1.16 Safety belt
2. Plates	2.1 MS plates 10 -12 mm thickness range
3. Tools	3.1 Jig and fixture/C-clamp 3.2 Ball pin hammer 3.3 Chipping hammer 3.4 Tongs 3.5 Flat file 3.6 Weld gauge 3.7 Wire brush 3.8 Cup brush 3.9 Angle Grinder 3.10 Bevel protector 3.11 Table vice 3.12 Anvil 3.13 Steel tape
4. Equipment	4.1 Electrode oven 4.2 AC welding machine 4.3 DC welding machine

	4.4 Circular cutting machine
5. Electrodes	5.1 2.5 and 3.2 mm/12 and 10 SWG 5.2 E6013/E7016-8
6. Defects	6.1 Lack of penetration 6.2 Lack of fusion 6.3 Excess penetration 6.4 Crack 6.5 Slag inclusions 6.6 Spatter 6.7 Reinforcement overlap 6.8 Blow hole 6.9 Porosity 6.10 Undercut 6.11 Arc crater 6.12 Poor bead appearance
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 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 1G and 2G positions
2. Underpinning knowledge	2.1. Surface preparation 2.2. Edge preparation 2.2.1. Bevel angle 2.2.2. Root face 2.3. Root gap 2.4. Tack weld 2.5. Welding passes 2.6. Welding Defects 2.7. Gauging 2.8. Lean pass 2.9. Electrodes 2.10. Polarity 2.11. Welding current 2.12. Electrode angle 2.13. Arc length 2.14. Travel speed 2.15. Causes and rectification of welding defects
3. Underpinning skills	3.1. Selecting PPE

	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 Respect for rights of peers and seniors in workplace.
5. Resource implications	<p>The following resources must be provided:</p> <ul style="list-style-type: none"> 5.1. Workplace 5.2. Tools, equipment, 5.3. Materials relevant to the proposed activity. 5.4. Equipment and outfits appropriate in applying safety measures. 5.5. Relevant drawings, manuals, training manuals, poster, codes, standards and reference material.
6. Methods of assessment	<ul style="list-style-type: none"> 6.1. Demonstration 6.2. Oral questioning 6.3. Written test 6.4. Portfolio
7. Context of assessment	<ul style="list-style-type: none"> 7.1. Competency assessment must be done in NSDA accredited assessment centre 7.2. Assessment should be done by a NSDA certified/nominated assessor

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Development of Competency Standard

The Competency Standards for National Skills Certificate Level-01 in **Welding** 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 Level-01 in **Welding** is validated by SCVC on 23 - 24 May 2021.

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This Competency Standard for **Welding** is a document for the development of curricula, teaching and learning materials, and assessment tools. It also serves as the document for providing training consistent with the requirements of industry in order for individuals who graduated through the established standard via competency-based assessment to be suitably qualified for a relevant job.

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