



COMPETENCY STANDARD FOR PIPE FITTING

(Construction Sector)

Level: 02

Competency Standard Code: CS-CON-PF-EN-L2-V1

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

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Introduction

The National Skills Development Authority (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 skills 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. **Pipe Fitting** is selected as one of the priority occupations of **Construction Sector**. This standard is developed to adopt a demand driven approach to training with effective inputs from Industry Skills Councils (ISC's), employer associations and employers.

Generally, a competency standard informs curriculum, learning materials, assessment and certification of students enrolled in skills training. Trainees who successfully pass the assessment will receive a qualification in the National Skills Qualification Framework (NSQF) under Bangladesh National Qualification Framework (BNQF) 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 **Construction 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 in Pipe Fitting, NSQF Level-2

NSQF/BNQ Level Descriptors

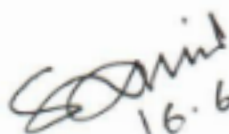
Level & Job classification	Knowledge Domain	Skills Domain	Responsibility Domain
6-Mid-Level Manager/ Sub Assistant Engineer	Comprehensive actual and theoretical knowledge within a specific work or study area with an awareness of the validity and limits of that knowledge, able to analyse, compare, relate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

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
BNQF	- Bangladesh National Qualifications Framework
OSH	– Occupational Safety and Health
PPE	– Personal Protective Equipment
SMAW	- Shielded Metal Arc Pipe Fitting
GMAW	- Gas Metal Arc Pipe Fitting
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

Approved by
9th Executive Committee (EC) Meeting of NSDA
Held on 16 June 2022


16.6.22

Md. Sanjul Ferdous
Deputy Director (Admin)
National Skills Development Authority
Prime Minister's Office

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

**National Competency Standards for National Skill Certificate in
Pipe Fitting, NSQF Level 2 in Construction Sector**

Course Structure

SL	Unit Code and Title		UoC Level	Nominal Hours
Generic Competencies				50
1.	GU02L2V1	Apply Occupational Safety and Health (OSH) Procedure in the Workplace	2	15
2.	GU05L3V1	Carryout Workplace Interaction in English	3	15
3.	GU08L2V1	Work in the Team Environment	2	20
Sector Specific Competencies				30
4.	SUCON01L2V1	Interpret Technical Drawings, Manuals and Plans	2	15
5.	SUCON02L2V1	Perform Measurement and Calculation	2	15
Occupation Specific Competencies				280
6.	OUPF01L2V1	Prepare Pipes for Fitting	2	30
7.	OUPF02L2V1	Perform Tack Welding and Gas Cutting	2	20
8.	OUPF03L2V1	Install Piping System on Ground Surface	2	65
9.	OUPF04L2V1	Install Overhead Piping System	2	80
10.	OUPF05L2V1	Install Underground Piping System	2	85
Total Nominal Learning Hours				360

**Units & Elements at a Glance:
Generic Competencies**

Code	Unit of Competency	Elements of Competency	Duration (Hours)
GU002L2V1	Apply Occupational Safety and Health (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
GU005L3V1	Carryout Workplace Interaction in English	<ol style="list-style-type: none"> 1. Interpret workplace communication and etiquette 2. Interpret Workplace Documents 3. Participate in workplace meetings and discussions 4. Practice professional ethics at workplace 	15
GU008L2V1	Work in the Team Environment	<ol style="list-style-type: none"> 1. Define team role and scope 2. Identify individual role and responsibility 3. Participate in team discussions 4. Work as a team member 	20
			50

Sector Specific Competencies

Code	Unit of Competency	Elements of Competency	Duration (Hours)
SUCONPF01L2V1:	Interpret Technical Drawings, Manuals and Plans	<ol style="list-style-type: none"> 1. Analyze signs, symbols and data 2. Interpret technical drawings and plans 3. Create freehand sketching 4. Identify and access manuals / specification 5. Interpret and apply information in manuals /specification 	15
SUCONPF02L2V1:	Perform Measurement and Calculation	<ol style="list-style-type: none"> 1. Select measuring instruments 2. Carry out measurements and calculations 	15
			30

Occupation Specific Competencies

Code	Unit of Competency	Elements of Competency	Hours
OUPF01L3V1	Prepare Pipes for Fitting	<ol style="list-style-type: none"> 1. Plan and prepare for work 2. Prepare and lay-out pipes 3. Cut and joint pipes and fittings 4. Perform housekeeping 	30
OUPF02L3V1	Perform Tack Welding and Gas Cutting	<ol style="list-style-type: none"> 1. Prepare welding and cutting materials, tools and equipment 2. Set-up welding machine 3. Perform tack welding 4. Perform gas cutting 5. Perform housekeeping 	20
OUPF03L3V1	Install Piping System on Ground Surface	<ol style="list-style-type: none"> 1. Plan and prepare for work 2. Lay pipes 3. Install and fit-up piping system 4. Perform housekeeping 	65
OUPF04L3V1	Install Overhead Piping System	<ol style="list-style-type: none"> 1. Plan and prepare for work 2. Lay pipes 3. Install and fit-up piping system 4. Perform housekeeping 	80
OUPF05L3V1	Install Underground Piping System	<ol style="list-style-type: none"> 1. Plan and prepare for work 2. Lay pipes 3. Attach pipe connectors 4. Install and fit-up underground piping system 5. Perform housekeeping 	85

Generic Competencies

Unit Code and Title	GU02L2V1: Apply Occupational Safety and Health (OSH) Procedure in the Workplace
Unit Descriptor	<p>This unit covers the knowledge, skills and attitudes (KSA) required in applying occupational safety and health (OSH) procedures in the workplace.</p> <p>It specifically includes identifying OHS policies and procedures, following OSH procedure, reporting hazards and risks, 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>OHS 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 OHS 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 OHS 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 OHS policies and procedures are adhered to.</p> <p>5.2 OHS 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	1.1. Bangladesh standards for OHS 1.2. Fire Safety Rules and Regulations 1.3. Code of Practice 1.4. Industry Guidelines
2. Safe Operating Procedures	2.1 Orientation on emergency exits, fire extinguishers, fire escape, etc. 2.2 Emergency procedures 2.3 First Aid procedures 2.4 Tagging procedures 2.5 Use of PPE 2.6 Safety procedures for hazardous substances
3. Safety Signs and symbols	3.1 Direction signs (exit, emergency exit, etc.) 3.2 First aid signs 3.3 Danger Tags 3.4 Hazard signs 3.5 Safety tags 3.6 Warning signs
4. Personal Protective Equipment (PPE)	4.1 Gas Mask 4.2 Gloves 4.3 Safety boots 4.4 Face mask 4.5 Overalls 4.6 Goggles and safety glasses 4.7 Sun block 4.8 Chemical/Gas detectors
5. Hazards	5.1 Chemical hazards 5.2 Biological hazards 5.3 Physical Hazards 5.4 Mechanical and Electrical Hazard 5.5 Mental hazard 5.6 Ergonomic hazard
6. Emergency Procedures	6.1 Fire fighting 6.2 Earthquake 6.3 Medical and first aid 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
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 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 NSQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.

Unit Code and Title	GU005L3V1: Carryout Workplace Interaction in English
Nominal Hours	15 Hours
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to carryout workplace interaction in English. It specifically includes – interpreting workplace communication and etiquette; interpreting workplace documents; participating in workplace meetings and discussions; and practicing professional ethics at workplace.
Elements of Competency	Performance Criteria <u>Bold & Underlined</u> terms are elaborated in the Range of Variables Training Components
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 <u>courteous manner</u> to gather and convey information 1.4 Questions about routine <u>workplace procedures and matters</u> are asked and responded as required
2. Interpret 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 <u>appropriate sources</u> 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 followed meeting procedures and etiquette 3.2 Own opinions are expressed and listened to those of others without interruption 3.3 Inputs are provided consistent with the meeting purpose and interpreted and implemented meeting outcomes
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
Range of Variables	
Variable	Range (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 such as progress and incident reports 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
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 followed workplace code of conducts is as per organizational guidelines 1.2 maintained workplace documents as per standard 1.3 followed workplace instructions and symbols 1.4 followed and implemented meeting outcomes
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 Interpreting performance of workplace communication and etiquette 3.2 Interpreting workplace instructions and symbol 3.3 Interpreting workplace code of conducts is as per organizational guidelines 3.4 Interpreting workplace documents as per standard 3.5 Interpreting and implementing meeting outcomes
4. Underpinning Attitudes	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:

	<p>5.1 Relevant tools, Equipment, software and facilities needed to perform the activities.</p> <p>5.2 Required learning materials.</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>
7. Context of Assessment	<p>7.1 Competency assessment must be done in a NSDA accredited assessment centre</p> <p>7.2 Assessment should be done by an NSDA certified/ nominated assessor</p>
<p>Accreditation Requirements</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 NSQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.</p>	

Unit Code and Title	GU008L2V1: Work in the Team Environment
Unit Descriptor	This unit covers the knowledge, skills and attitudes (KSA) required to work in the team environment. It includes defining team role and scope, identifying individual role and responsibility. Participating in team discussions and working as a team member.
Nominal Hours	20 Hours
Elements of Competency	Performance Criteria <u>Bold & Underlined</u> 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 sources.
2. Identify individual role and responsibility	2.1 Individual roles and responsibilities of <u>team members</u> 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.
Range of Variables	
Variables	Range (may include but not limited to):
1. Team Members	1.1 Coach/mentor 1.2 Supervisor/Manager 1.3 Peers/Colleagues 1.4 Employee representative
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 demonstrated knowledge in working in a team environment. 1.2 satisfied the requirements mentioned in the Performance Criteria and Range of Variables
2. Underpinning knowledge	2.1 Team Structure, Role and Responsibility 2.2 Individual Members' Roles and Responsibilities 2.3 Communication Flow and Reporting Structures 2.4 Team Planning

	2.5 Interpersonal Communication Skills 2.6 Team Meeting Procedures 2.7 OHS Practices
3. Underpinning skills	3.1 Identifying the role and responsibility of the team 3.2 Identifying roles and responsibilities of individual members 3.3 Participating in team discussions 3.4 Working as a team member
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 4.6 Communication with 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	Methods of assessment may include but not limited to: 6.1. Written test 6.2. Demonstration 6.3. Oral questioning
7. Context of assessment	7.1 Competency assessment must be done in NSDA accredited assessment center 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 qualification under NSQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.	

Sector Specific Competencies

Unit Code and Title	SUCONPF01L2V1: Interpret Technical Drawings, Manuals and Plans
Nominal Hours	15 Hours
Unit Descriptor	<p>This unit covers the knowledge, skills and attitudes required to interpret technical drawings and plans.</p> <p>It specifically includes the tasks of analyzing signs, symbols and data, interpreting technical drawings and plans, creating freehand sketching, identifying and accessing manuals / specification, interpreting and applying information in manuals /specification</p>
Elements of Competency	<p>Performance Criteria <u>Bold and Underlined</u> terms are elaborated in the range of variables</p>
1. Analyze signs, symbols and data	<p>1.1 <u>Technical plans</u> are obtained according to job requirements</p> <p>1.2 Signs, symbols and data are identified according to job specifications</p> <p>1.3 Signs symbols and data are analyzed according to <u>classification</u> and <u>drawing</u></p>
2. Interpret technical drawings and plans	<p>2.1. Necessary tools, materials and equipment are identified according to the plan</p> <p>2.2. Supplies and materials are listed according to specifications</p> <p>2.3. Components, assemblies or objects are determined as required</p> <p>2.4. Dimensions are identified as appropriate to the plan</p> <p>2.5. Specification details are matched with existing / available resources and in line with job requirements</p> <p>2.6. <u>Work plan</u> is prepared following the specifications</p>
3. Create freehand sketching	<p>3.1 Freehand sketching requirements are identified</p> <p>3.2 <u>Tools and materials</u> are selected and collected for freehand sketching</p> <p>3.3 Freehand sketching is drawn in accordance with the job requirements</p>
4. Identify and access manuals / specification	<p>4.1 <u>Manuals</u> are identified and accessed as per job requirements</p> <p>4.2 Version and date of manual are checked to ensure that correct specification and procedures are identified</p>

5. Interpret and apply information in manuals /specification	<p>5.1 Relevant sections, chapters of specifications/ manuals are determined in relation to the work to be conducted</p> <p>5.2 Information and procedure in the manual are interpreted according to job requirements</p> <p>5.3 Work steps are correctly identified in accordance with manufacturer's specification</p> <p>5.4 Manual data are applied according to the given task</p> <p>5.5 Correct sequencing and adjustments are interpreted in accordance with information contained in the manual or specifications</p> <p>5.6 Manual or specification is stored in accordance with workplace requirements</p>
Range of Variables	
Variables	Range (may include but not limited to):
1. Technical Plans	<p>1.1 Electrical plans</p> <p>1.2 Structural plans</p> <p>1.3 Architectural plans</p> <p>1.4 Plumbing plans</p> <p>1.5 Welding Procedures Specifications (WPS)</p> <p>1.6 Piping and instrument diagram</p> <p>1.7 Piping isometric</p> <p>1.8 Plot plans</p> <p>1.9 Piping class sheet</p> <p>1.10 Piping support details and hanger drawings</p>
2. Classification	<p>2.1 Electrical</p> <p>2.2 Mechanical</p> <p>2.3 Plumbing</p>
3. Drawing	<p>3.1 Drawing symbols</p> <p>3.2 Alphabet of lines</p> <p>3.3 Orthographic views</p> <p>3.4 Front view</p> <p>3.5 Right side view/left side view</p> <p>3.6 Top view</p> <p>3.7 Pictorial</p> <p>3.8 Schematic diagram</p> <p>3.9 Electrical drawings</p> <p>3.10 Structural drawings</p> <p>3.11 Plumbing drawings</p> <p>3.12 Water line</p> <p>3.13 Sewerage/Drainage</p>

	3.14 Ventilation 3.15 Welding symbols
4. Work plan	4.1 Job requirements 4.2 Installation instructions 4.3 Components instruction
5. Tools and materials	5.1 Compass 5.2 Pencil 5.3 Marker 5.4 Drawing paper 5.5 Divider 5.6 Rulers 5.7 Triangles
6. Manuals	6.1 Manufacturer's Specification Manual 6.2 Repair and Maintenance Manual 6.3 Servicing Manual
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 and determined signs, symbols and data according to work plan, job requirements and classifications 1.2 identified tools and equipment in accordance with job requirements 1.3 listed supplies and materials according to blueprint specifications 1.4 drawn work plan following specifications 1.5 demonstrated ability to determine job specifications based on working / technical drawing
2. Underpinning knowledge	2.1 Linear measurement 2.2 Dimension 2.3 Unit conversion 2.4 Electrical plan 2.5 Mechanical plan 2.6 Symbols and abbreviations 2.7 Drawing standard symbols 2.8 Basic technical drawing 2.9 Types technical plans 2.10 Various types of drawings 2.11 Notes and specifications
3. Underpinning Skills	3.1 Interpreting drawing/orthographic drawing 3.2 Interpreting technical plans

	3.3 Matching specification details with existing resources 3.4 Following instructions 3.5 Handling of drawing instruments
4. Required 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 Implication	The following resources must be provided: 5.1 Relevant tools, Equipment, software and facilities needed to perform the activities. 5.2 Required learning materials.
6. Methods of Assessment	Methods of assessment may include but not limited to: 6.1 Written test 6.2 Demonstration 6.3 Oral questioning
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
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 NSQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.	

Unit Code and Title	SUCONPF02L2V1: Perform Measurement and Calculations
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to perform measurement and calculations. It specifically includes the tasks of selecting measuring instruments and carrying out measurements and calculations
Nominal Hours	15 Hours
Elements of Competency	Performance Criteria <u>Bold & Underlined</u> terms are elaborated in the Range of Variables
1. Select measuring instruments	1.1 Object or component to be measured is classified according to <u>geometric shape</u> 1.2 <u>Measuring tools and instruments</u> are selected as per object to be measurement requirements 1.3 Object or component specifications are obtained from relevant sources
2. Carry out measurements and calculations	2.1 <u>Measurements</u> are performed according to job requirements 2.2 <u>Systems of measurement</u> identified and converted according as required 2.3 <u>Calculation</u> needed to complete work tasks are performed
Range of Variables	
Variables	Range (may include but not limited to):
1. Geometric shape	1.1 Round 1.2 Square 1.3 Rectangular 1.4 Triangle 1.5 Sphere 1.6 Conical
2. Measuring tools and instruments	2.1. Vernier caliper 2.2. Inside caliper 2.3. Outside caliper 2.4. Straight edge 2.5. Thickness gauge 2.6. Thread gauge 2.7. Small hole gauge 2.8. Try-square 2.9. Bevel protractor 2.10. Steel rule 2.11. Steel tape 2.12. Spirit level
3. Measurements	3.1 Length 3.2 Thickness 3.3 Inside diameter

	3.4 Outside diameter 3.5 Circumference 3.6 Area 3.7 Volume
4. Systems of measurement	4.1 ISO Standard 4.2 Metric
5. Calculation	5.1 Length 5.2 Thickness 5.3 Inside diameter 5.4 Outside diameter 5.5 Circumference 5.6 Area 5.7 Volume 5.8 Elbow center 5.9 Taper
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 Selected and prepared appropriate measuring instruments in accordance with job requirements 1.2 Performed measurements and calculations according to job requirements
2. Underpinning knowledge	2.1 Four fundamental operation 2.2 Linear measurement 2.3 Dimensions 2.4 Unit conversion 2.5 Ratio and proportion
3. Underpinning skills	3.1 Performing calculation by addition, subtraction, Multiplication and division 3.2 Interpreting formulas for volume, areas, perimeters of plane and geometric figures 3.3 Handling of measuring instruments
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 4.6 Communication with 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	<p>Methods of assessment may include but not limited to:</p> <ul style="list-style-type: none"> 6.1. Written test 6.2. Demonstration 6.3. Oral questioning
7. Context of assessment	<ul style="list-style-type: none"> 7.1 Competency assessment must be done in NSDA accredited assessment center 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 qualification under NSQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.</p>	

Occupation Specific Competencies

Unit Code and Title	OUPF01L2V1: Prepare Pipes for Fitting
Nominal Hours	30 Hours
Unit Descriptor	<p>This unit covers the knowledge, skills and attitudes required to prepare pipes for fitting.</p> <p>It specifically includes the tasks of planning and preparing for work, preparing and lay-out pipes, cutting and jointing pipes and fittings, performing housekeeping based on the required performance standards</p>
Elements of Competency	<p>Performance Criteria <u>Bold and Underlined</u> terms are elaborated in the range of variables</p>
1. Plan and prepare for work	<p>1.1 Blueprint is secured and interpreted according to <u>job specifications</u></p> <p>1.2 <u>Occupational health and safety standards</u> and other regulatory requirements are identified and complied with</p> <p>1.3 <u>Personal protective equipment</u> is selected and used following job requirements</p> <p>1.4 <u>Material take-off</u> is estimated according to job specifications</p>
2. Prepare and lay-out pipes	<p>2.1 Pipe is prepared following company standard operating procedures (SOP)</p> <p>2.2 <u>Materials, tools and equipment</u> are collected according to bill of quantities (BoQ) and construction drawings following workplace procedure</p> <p>2.3 Wrap around procedure is performed following job requirements</p> <p>2.4 Pipes are measured, laid out and marked according to construction drawing</p> <p>2.5 Marked and measured pipes are checked according to job specifications</p>
3. Cut pipes and Joint with fittings	<p>3.1 Cutting layout is performed as per job specifications</p> <p>3.2 <u>Cutting</u> procedure is performed following job specifications</p> <p>3.3 Bevel cutting is performed as per job specifications</p> <p>3.4 Thread cutting is performed as per job specifications</p> <p>3.5 <u>Preparation of joint</u> is performed following job requirements</p> <p>3.6 Dimensional checking is performed according to work specification</p> <p>3.7 Pipe orientation and alignment are performed following</p>

	<p>work specification</p> <p>3.8 Fittings are identified and collected as per requirements.</p> <p>3.9 Threaded pipe and fittings are tightened following tightening specifications</p>
4. Perform housekeeping	<p>4.1 Waste materials are disposed following occupational health and safety standards</p> <p>4.2 Unused materials are returned to storage area following company SOP</p> <p>4.3 Completion report is prepared and submitted to personnel following company SOP</p>
Range of Variables	
Variables	Range (may include but not limited to):
1. Job specifications	<p>1.1 Piping code specification</p> <p>1.2 Material specification</p> <p>1.3 Item code number specification</p> <p>1.4 Size, quantity and description</p> <p>1.5 Bill of materials</p>
2. Occupational health and safety standards	<p>2.1 Availability of fire extinguisher</p> <p>2.2 Asbestos blanket</p> <p>2.3 Availability of PPE</p> <p>2.4 Manufacturer's recommendation</p> <p>2.5 Waste disposal</p> <p>2.6 First Aid Box</p>
3. Personal protective equipment	<p>3.1 Safety gloves</p> <p>3.2 Safety goggles</p> <p>3.3 Face shield</p> <p>3.4 Safety helmet</p> <p>3.5 Safety harness</p> <p>3.6 Apron/ Boiler suit</p> <p>3.7 Safety shoes</p> <p>3.8 Dust masks</p> <p>3.9 Ear plug</p> <p>3.10 Air respirator</p>
4. Material take-off	<p>4.1 Size</p> <p>4.2 Quantity</p> <p>4.3 Description</p>

5. Materials, tools and equipment	5.1 Materials <ul style="list-style-type: none"> 5.1.1 Metal pipes 5.1.2 Fittings 5.1.3 Gaskets, bolts and nuts 5.1.4 Valves 5.1.5 Flange 5.2 Tools and equipment <ul style="list-style-type: none"> 5.2.1 Cutting set 5.2.2 Angle Grinder 5.2.3 Steel square 5.2.4 Center punch 5.2.5 Ball peen hammer 5.2.6 Contour marker 5.2.7 Spirit level 5.2.8 Soft stone 5.2.9 Steel measuring tape 5.2.10 Files 5.2.11 Power brush 5.2.12 Steel wire brush 5.2.13 Adjustable slide wrench 5.2.14 Spanners 5.2.15 Pencil grinder machine 5.2.16 Grinder key 5.2.17 Tip cleaner 5.2.18 Spark lighter 5.2.19 Plumb bob 5.2.20 Disc Cutter machine 5.2.21 Oxy-acetylene gas cutting set 5.2.22 Die set
6. Cutting	6.1 Straight cutting <ul style="list-style-type: none"> 6.2 Bevel cutting 6.3 Cold cutting 6.4 Hot cutting 6.5 Grinding
7. Preparation of joint	7.1 Welding gap, groove as per WPS (Welding Procedure Specifications) <ul style="list-style-type: none"> 7.2 Leveling, squareness and straightness 7.3 Internal and external alignment
8. Fittings	8.1 Flanges (weld neck, socket weld, syphon, threaded) <ul style="list-style-type: none"> 8.2 Elbow 8.3 Reducer 8.4 Socket 8.5 Tee

	8.6 Cross 8.7 Y 8.8 Valve (Gate, Ball, butterfly, Check, globe, Float, Pressure relief, non-return) 8.9 Nipple 8.10 Cap 8.11 Branches 8.12 Union 8.13 Bend (Male, Female)
9. Waste materials	9.1 Metal scrap 9.2 Grinding discs 9.3 Electrode butts 9.4 Flux 9.5 Metal dusts / metal oxide / welding slags 9.6 Chips
10. Personnel	10.1 Foreman 10.2 In-charge 10.3 Supervisor
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 demonstrates ability to interpret blueprint following job specifications 1.2 demonstrates ability to comply occupational health and safety standards and other regulatory requirements in pipefitting 1.3 demonstrates ability to estimate material take-off following job specifications 1.4 demonstrates ability to lay-out pipes according to job specifications
2. Underpinning knowledge	2.1 Isometric symbols and drawings 2.2 Orthographic symbols and drawings 2.3 Cutting Layout 2.4 Sketches and material description 2.5 Description of materials 2.5.1 Brand name 2.5.2 Size 2.5.3 Classification 2.5.4 Capacity 2.5.5 Kind of application 2.6 Company standard operating procedures 2.6.1 Job order

	2.6.2 Requisition slip 2.6.3 Borrower slip 2.7 Occupational health and safety standards 2.8 Helmet color code 2.9 Requirements for cutting and beveling pipes 2.10 Piping material classification, specifications and uses 2.11 Piping cutting procedure for jointing
3. Underpinning Skills	3.1 Interpreting isometric and / or orthographic symbols, drawings, sketches and material description 3.2 Applying Mathematical calculations 3.3 Following occupational health and safety standards 3.4 Using piping materials 3.5 Performing piping cutting procedure for jointing
4. Required 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 Implication	The following resources must be provided: 5.1 Relevant tools, Equipment, software and facilities needed to perform the activities. 5.2 Required learning materials.
6. Methods of Assessment	Methods of assessment may include but not limited to: 6.1 Written test 6.2 Demonstration 6.3 Oral questioning
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
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 NSQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.	

Unit Code and Title	OUPF02L2V1: Perform Tack Welding and Gas Cutting
Nominal Hours	20 Hours
Unit Descriptor	<p>This unit covers the knowledge, skills and attitudes required to perform tack welding and gas cutting.</p> <p>It specifically includes the tasks of preparing welding and cutting materials, tools and equipment, setting-up welding machine, performing tack welding, performing gas cutting and housekeeping.</p>
Elements of Competency	<p>Performance Criteria</p> <p><u>Bold and Underlined</u> terms are elaborated in the range of variables</p>
1. Prepare welding and cutting materials, tools and equipment	<p>1.1 Job requirements is identified and interpreted according to job specifications</p> <p>1.2 Personal protective equipment (<u>PPE</u>) is collected and worn as per job requirements</p> <p>1.3 <u>Materials, tools and equipment</u> are selected and collected as per specifications</p> <p>1.4 Materials are prepared as per job requirements</p>
2. Set-up welding machine	<p>2.1 Electric connections are checked and neutral terminal is connected as required</p> <p>2.2 Welding current is selected as per job requirement</p> <p>2.3 Machine setup is performed as per manufacturers operating manual</p>
3. Perform tack welding	<p>3.1 <u>Tack welding procedure</u> is performed following job Specifications</p> <p>3.2 <u>Visual inspection</u> is performed following job specifications</p> <p>3.3 Defects are identified and rectified following standard procedure</p>
4. Perform gas cutting	<p>4.1 Cutting requirement is identified as per job specifications</p> <p>4.2 Oxy-acetylene cutting set is prepared as per cutting requirements</p> <p>4.3 Cutting torch and cutting nozzles are selected and collected as required</p> <p>4.4 Cutting frame is determined as per cutting requirements</p> <p>4.5 Cutting is performed as per drawing specification</p>
5. Perform housekeeping	<p>5.1 Workplace is cleaned as per workplace standard</p> <p>5.2 Waste materials are disposed following workplace standards</p>

	5.3 Unused materials are returned to storage area as per workplace standard 5.4 Tools and equipment are cleaned and stored in designated place
Range of Variables	
Variables	Range (may include but not limited to):
1. PPE	1.1 Safety gloves 1.2 Face shield/ Safety helmet 1.3 Safety harness 1.4 Apron/ boiler suit 1.5 Safety shoes 1.6 Dust masks 1.7 Ear plug
2. Materials, tools and equipment	2.1 Welding materials 2.1.1 Electrodes 2.1.2 Metal pipes 2.1.3 Plates 2.2 Tools and equipment 2.2.1 Shielded metal Arc welding (SMAW) machine 2.2.2 Oxy-acetylene gas cutting set 2.2.3 Spark lighter 2.2.4 Air compressor 2.2.5 Exhaust fan 2.2.6 Welding gloves 2.2.7 Ball peen hammer 2.2.8 Chipping hammer 2.2.9 Portable grinder 2.2.10 Tongs 2.2.11 Steel wire Brush 2.2.12 Pencil grinder 2.2.13 Angle grinder
3. Tack welding procedure	3.1 Direct tacking 3.2 Bridge tacking 3.3 Fabrication of temporary support
4. Visual inspection	4.1 Dimensional check-up 4.2 Squareness and levelness
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 and worn PPE 1.2 set-up welding machine 1.3 performed tack welding procedure 1.4 Inspected welding visually 1.5 Identified and rectified defects
2. Underpinning knowledge	<ul style="list-style-type: none"> 2.1 Shielded metal Arc Welding procedure 2.2 Electric Arc 2.3 Welding current and voltage 2.4 Polarity 2.5 Electrode 2.6 Types of metals 2.7 Oxy-acetylene flames 2.8 Precautions during cutting operation 2.9 Tack welding procedures 2.10 Tack weld defects, their causes and rectification in tack welding
3. Underpinning Skills	<ul style="list-style-type: none"> 3.1 Handling tools and equipment 3.2 Following manufacturer's recommendations 3.3 Identifying types of metal 3.4 Complying occupational health and safety standards in welding
4. Required attitude	<ul style="list-style-type: none"> 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 Implication	<p>The following resources must be provided:</p> <ul style="list-style-type: none"> 5.1 Relevant tools, Equipment, software and facilities needed to perform the activities. 5.2 Required learning materials.
6. Methods of Assessment	<p>Methods of assessment may include but not limited to:</p> <ul style="list-style-type: none"> 6.1 Written test 6.2 Demonstration 6.3 Oral questioning
7. Context of Assessment	<ul style="list-style-type: none"> 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>Accreditation Requirements</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 NSQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.</p>	

Unit Code and Title	OUPF03L2V1: Install Piping System on Ground Surface
Nominal Hours	65 Hours
Unit Descriptor	<p>This unit covers the knowledge, skills and attitudes required to install piping system on ground surface.</p> <p>It specifically includes the tasks of planning and preparing for work, laying pipes, installing and fit-up piping system and performing housekeeping based on the required performance standards</p>
Elements of Competency	<p>Performance Criteria</p> <p><u>Bold and Underlined</u> terms are elaborated in the range of variables</p>
1. Plan and prepare for work	<p>1.1 <u>Personal protective equipment (PPE)</u> is collected and worn as required</p> <p>1.2 Construction drawings are collected and requirements are reviewed according to <u>job specifications</u></p> <p>1.3 <u>Materials, tools and equipment</u> are selected and collected as per job requirement.</p> <p>1.4 <u>Quality/Occupational health, safety and environmental plans</u> are complied with</p> <p>1.5 Materials, tools and equipment are prepared as per job requirements</p>
2. Lay pipes	<p>2.1. Measurement and marking are performed as per drawing and specification</p> <p>2.2. Marked and measured <u>pipes</u> are checked as per drawings and specification</p> <p>2.3. Installation supports are selected and collected as per requirements</p> <p>2.4. Installed supports are checked as per drawings and specification</p> <p>2.5. Pipes are lifted and laid using appropriate lifting equipment as per drawings and specification</p> <p>2.6. Clamping devices are tightened as required</p>
3. Install and fit-up piping system	<p>3.1 Pipes <u>installation and fit-up</u> are performed as per drawings and specification</p> <p>3.2 Pipe alignment and fit-up are performed as per drawings and specification</p> <p>3.3 Installation and fit-up are checked as per drawings and specification</p> <p>3.4 <u>Pipe connectors</u> are installed as per requirements</p>

	3.5 Pressure and leak test are performed
4. Perform housekeeping	4.1 Excess/un-used materials are recovered and stored according to workplace procedures 4.2 Waste materials are disposed following workplace standards 4.3 Work area is cleaned according to safety and environmental regulations 4.4 Tools and other materials are cleaned and stored after use
Range of Variables	
Variables	Range (may include but not limited to):
1. Personal protective equipment (PPE)	1.1 Safety gloves 1.2 Safety goggles 1.3 Face shield 1.4 Safety helmet 1.5 Full body harness 1.6 Apron/ boiler suit 1.7 Safety shoes 1.8 Dust masks 1.9 Ear plug
2. Job specifications	2.1 Piping and structural code specifications 2.2 Material specification 2.3 Item code number specifications 2.4 Size, quantity and description 2.5 Bill of materials
3. Materials, tools and equipment	Materials 3.1 Metal pipes 3.2 Fittings 3.3 Gaskets, bolts and nuts 3.4 Valves 3.5 Flange 3.6 Hangers 3.7 Pipe supports Tools and equipment 3.8 Angle grinder 3.9 Steel square 3.10 Level bar 3.11 Center punch 3.12 Ballpeen hammer 3.13 Chain block 3.14 Roller

	3.15 Spirit level 3.16 Soft stone 3.17 Steel measuring tape / tape line 3.18 Plumb bob 3.19 Power brush 3.20 Steel brush 3.21 Adjustable wrench 3.22 Grinder key 3.23 Welding machine 3.24 Air compressor 3.25 Electric lights / Handheld work lights 3.26 Safety / medical kit 3.27 Scaffolding 3.28 Pencil Grinder 3.29 Pipe Wrench 3.30 Drill machine
4. Quality/ Occupational health, safety and environmental plans	Quality plan: 4.1. Inspection and Test Plans 4.2. Method Statements Occupational health and safety plan: 4.3. PPE 4.4. Handling of materials 4.5. Hazard and Hazard control 4.6. Use of tools, plant and equipment 4.7. Surrounding structure and facilities 4.8. Use of firefighting equipment 4.9. Use of first aid kit 4.10. Work site visitors and public 4.11. Compressed gas safety procedures 4.12. Precautions in installation of ladders 4.13. Working at heights 4.14. Working in confined space 4.15. Portable equipment and tools procedures 4.16. Welding and gas cutting procedures Environmental plan: 4.17. Noise and vibration controls 4.18. Air pollution controls 4.19. Water pollution controls 4.20. Waste management controls 4.21. Cleanup protection

5. Pipes	5.1 Compressed air refrigerants and low temperature applications including chilled water and refrigerated gas 5.2 Condensate 5.3 Fuel oil 5.4 Water and other liquid
6. Installation and fit-up	6.1 Lifting and installation of materials and equipment 6.2 Trimming and cutting 6.3 Pipefitting alignment 6.4 Gradient 6.5 Tack welding 6.6 Fabrication of temporary supports 6.7 Use of Jigs 6.8 Use of Stoppers 6.9 Pipe clamping
7. Pipe Connectors	7.1 Bolts and nuts 7.2 Couplings
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 Interpreted instructional manuals in accordance with industry practices 1.2 Applied information in manuals according to the given task 1.3 prepared materials, tools and equipment in accordance to work requirements 1.4 complied Quality/Occupational health, safety and environmental plans 1.5 measured, laid out and marked pipes according to construction drawing 1.6 joined pipes and fittings as per standard operating procedure 1.7 checked and adjusted Alignment as required
2. Underpinning knowledge	2.1 Pipe fittings 2.2 Types of pipes 2.3 Identification of pipes 2.4 Color code used in pipe 2.5 Spool pipe 2.6 Types of manuals used in construction sector 2.7 Identification of symbols used in the manuals 2.8 Identification of units of measurements

	2.9 Unit conversion 2.10 Pressure pipe 2.11 Pipe pressure checking procedure
3. Underpinning Skills	3.1 Reading and comprehending manuals and specifications 3.2 Accessing information and data 3.3 Handling tools and equipment 3.4 Communicating with co-workers and supervisor 3.5 Performing pressure and leak test
4. Required 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 Implication	The following resources must be provided: 5.1 Relevant tools, Equipment, and facilities needed to perform the activities. 5.2 Required learning materials.
6. Methods of Assessment	Methods of assessment may include but not limited to: 6.1 Written test 6.2 Demonstration 6.3 Oral questioning
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

Accreditation Requirements

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Unit Code and Title	OUPF04L2V1: Install Overhead Piping System
Nominal Hours	80 Hours
Unit Descriptor	<p>This unit covers the knowledge, skills and attitudes required to install overhead piping system.</p> <p>It specifically includes the tasks of planning and preparing for work, laying pipes, installing and fit-up piping system and performing housekeeping</p>
Elements of Competency	<p>Performance Criteria</p> <p><u>Bold and Underlined</u> terms are elaborated in the range of variables</p>
1. Plan and prepare for work	<p>1.1 <u>Personal protective equipment (PPE)</u> is collected and worn</p> <p>1.2 Drawings/ blueprints are collected and interpreted according to <u>job specifications</u></p> <p>1.3 <u>Materials, tools and equipment</u> are selected and collected as per job requirement.</p> <p>1.4 Materials, tools and equipment are prepared in accordance to job requirements</p> <p>1.5 <u>Quality/Occupational health, safety and environmental plans</u> are complied with</p>
2. Lay pipes	<p>2.1. Hangers and support are installed as per drawing</p> <p>2.2. Installed hangers and supports are checked as per drawing</p> <p>2.3. Pipes for horizontal installation are lifted in the working platform and laid as per drawing</p> <p>2.4. Pipes for vertical installation are lifted as per drawing in the required position area and clamped/ hand tightened</p>
3. Install and fit-up piping system	<p>3.1 Pipe alignment and <u>fit-up procedure</u> are performed as per drawing and specifications</p> <p>3.2 Pipe connectors are installed according to approved construction procedures</p> <p>3.3 Installation and fit-up are checked according to approved procedure</p> <p>3.4 Pressure and leak test are performed</p>
4. Perform housekeeping	<p>4.1 Excess/un-used materials are returned to store according to workplace procedures</p> <p>4.2 Work area is cleaned according to safety and environmental regulations</p>

	4.3 Waste materials are disposed following workplace standard 4.4 Tools and other materials are cleaned and stored after use
Range of Variables	
Variables	Range (may include but not limited to):
1. Personal protective equipment (PPE)	1.1 Safety gloves 1.2 Safety goggles, glass and face shield 1.3 Safety helmet 1.4 Safety harness 1.5 Safety clothes 1.6 Safety shoes 1.7 Dust masks 1.8 Ear plug 1.9 Full body harness
2. Job specifications	2.1 Piping and structural code specifications 2.2 Material specification 2.3 Item code number specifications 2.4 Size, quantity and description 2.5 Bill of materials
3. Materials, tools and equipment	Materials 3.1 Metal pipes 3.2 Fittings 3.3 Gaskets, bolts and nuts 3.4 Valves 3.5 Flange 3.6 Hangers 3.7 Pipe supports Tools and equipment 3.8 Angle grinder 3.9 Steel square 3.10 Level bar 3.11 Center punch 3.12 Ballpeen hammer 3.13 Chain block with come along (cable puller) 3.14 Roller 3.15 Spirit level 3.16 Soft stone 3.17 Steel measuring tape / tape line 3.18 Plumb bob 3.19 Power brush

	3.20 Steel brush 3.21 Adjustable wrench 3.22 Grinder key 3.23 Welding machine 3.24 Air compressor 3.25 Electric lights / Handheld work lights 3.26 Safety / medical kit 3.27 Scaffolding 3.28 Pencil Grinder 3.29 Pipe Wrench 3.30 Hoists and jack 3.31 Hand trolley 3.32 Forklifts
4. Quality/ Occupational health, safety and environmental plans	Quality plan: 4.1 Inspection and Test Plans 4.2 Method Statements Occupational health and safety plan: 4.3 PPE 4.4 Compressed gas safety procedures 4.5 General sling information 4.6 Precautions in installation of ladders 4.7 Working at heights 4.8 Working in confined space 4.9 Portable equipment and tools procedures 4.10 Welding and gas cutting procedures Environmental plan: 4.11 Noise and vibration controls 4.12 Air pollution controls 4.13 Water pollution controls 4.14 Waste management controls
5. Fit-up procedures	5.1 Lifting and installation of materials and equipment 5.2 Trimming and cutting 5.3 Pipefitting alignment 5.4 Gradient 5.5 Tack welding 5.6 Fabrication of temporary supports 5.7 Use of Jigs 5.8 Use of Stoppers 5.9 Pipe clamping
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> <ol style="list-style-type: none"> 1.1 Planned and prepared for work 1.2 Laid-out pipes in accordance with approved construction drawings 1.3 Installed hangers and pipe supports for above ground piping system 1.4 Installed and fit-up above ground piping system 1.5 Performed housekeeping 1.6 Observed and complied with safety and environmental regulations 1.7 Communicated with others to ensure effective work operation 1.8 Observed and complied with the productivity requirements 1.9 Complied with attitudinal work requirements
2. Underpinning knowledge	<ol style="list-style-type: none"> 2.1 Guidelines of Occupational Safety and Health in the Construction Industry 2.2 Green Building Concept relative to Construction (3R, 5S) 2.3 Quality specification requirements 2.4 Isometric symbols, drawings, sketches 2.5 Piping material classification, specifications and uses 2.6 Procedures in pipe laying 2.7 Pipe fitting symbols 2.8 Installation procedures for connectors 2.9 Pipe connectors classification, specifications and uses 2.10 Factors affecting productivity 2.11 Productivity work measurements 2.12 Ways of improving productivity
3. Underpinning Skills	<ol style="list-style-type: none"> 3.1 Communicating in the workplace 3.2 Interpreting isometric symbols, drawings, sketches 3.3 Interpreting work schedule 3.4 Identification of materials tools and equipment 3.5 Applying basic mathematical concepts 3.6 Implementing 3R and 5S 3.7 Performing pressure and leak test
4. Required attitude	<ol style="list-style-type: none"> 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 Implication	<p>The following resources must be provided:</p> <p>5.1 Relevant tools, Equipment, software and facilities needed to perform the activities.</p> <p>5.2 Required learning materials.</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>
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>Accreditation Requirements</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 NSQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.</p>	

Unit Code and Title	OUPF05L2V1: Install Underground Piping System
Nominal Hours	85 Hours
Unit Descriptor	<p>This unit covers the knowledge, skills and attitudes required to install underground piping system.</p> <p>It specifically includes the tasks of planning and preparing for work, laying pipes, attaching pipe connectors, installing and fit-up underground piping system and performing housekeeping</p>
Elements of Competency	<p>Performance Criteria</p> <p><u>Bold and Underlined</u> terms are elaborated in the range of variables</p>
1. Plan and prepare for work	<p>1.1 <u>Personal protective equipment (PPE)</u> is collected and worn</p> <p>1.2 Construction drawings/ blueprint are collected and requirements are reviewed according to <u>job specifications</u></p> <p>1.3 Drawings/ blueprints are interpreted following job specification</p> <p>1.4 <u>Materials, tools and equipment</u> are selected and collected as per requirement.</p> <p>1.5 Materials, tools and equipment are prepared in accordance to work requirements</p> <p>1.6 Work area is cleaned as per workplace standard</p> <p>1.7 <u>Quality/Occupational health and safety standards</u> and other <u>regulatory requirements</u> are complied with</p>
2. Lay pipes	<p>2.1 Installation supports are selected and collected as per requirements</p> <p>2.2 Supports are installed as per construction drawing</p> <p>2.3 Installed supports are checked as per construction drawings</p> <p>2.4 Pipes are laid in accordance with construction drawings</p> <p>2.5 Work area is cleaned as per workplace standard</p>
3. Attach pipe connectors	<p>3.1 Pipe connectors are installed according to approved construction procedures</p> <p>3.2 Work area is cleaned following safety and environmental regulations</p>
4. Install and fit-up underground piping system	<p>4.1 Pipes are installed according to construction drawings</p> <p>4.2 Pipe alignment and <u>fit-up procedure</u> are performed according to construction drawings and procedures</p>

	<p>4.3 Location of pipes are checked according to construction drawings</p> <p>4.4 Installation and fit-up are checked according to approved procedure</p> <p>4.5 Pressure and leak test are performed</p> <p>4.6 Work area is cleaned according to safety and environmental regulations</p>
5. Perform housekeeping	<p>5.1 Excess/un-used materials are returned to storage area according to workplace procedures</p> <p>5.2 Work area is cleaned according to safety and environmental regulations</p> <p>5.3 Waste materials are disposed following workplace standard</p> <p>5.4 Tools and other materials are cleaned and stored after use</p> <p>5.5 Completion report is prepared and submitted to <u>personnel</u> as per workplace procedure</p>
Range of Variables	
Variables	Range (may include but not limited to):
1. Personal protective equipment (PPE)	<p>1.1 Safety gloves</p> <p>1.2 Safety goggles, glass and face shield</p> <p>1.3 Safety helmet</p> <p>1.4 Full body harness</p> <p>1.5 Safety clothes</p> <p>1.6 Safety shoes</p> <p>1.7 Dust masks</p> <p>1.8 Ear plug</p>
2. Job specifications	<p>2.1 Piping and structural code specifications</p> <p>2.2 Material specification</p> <p>2.3 Item code number specifications</p> <p>2.4 Size, quantity and description</p> <p>2.5 Bill of materials</p>
3. Materials, tools and equipment	<p>Materials</p> <p>3.1 Metal pipes</p> <p>3.2 Fittings</p> <p>3.3 Gaskets, bolts and nuts</p> <p>3.4 Valves</p> <p>3.5 Flange</p> <p>3.6 Hangers</p> <p>3.7 Pipe supports</p>

	<p>Tools and equipment</p> <p>3.8 Angle grinder</p> <p>3.9 Steel square</p> <p>3.10 Level bar</p> <p>3.11 Center punch</p> <p>3.12 Ball peen hammer</p> <p>3.13 Chain block with come along (cable puller)</p> <p>3.14 Roller</p> <p>3.15 Spirit level</p> <p>3.16 Soft stone</p> <p>3.17 Measuring steel tape / tape line</p> <p>3.18 Plumb bob</p> <p>3.19 Piles</p> <p>3.20 Power brush</p> <p>3.21 Steel wire brush</p> <p>3.22 Adjustable slide wrench</p> <p>3.23 Grinder key</p> <p>3.24 Arc welding machine</p> <p>3.25 Air compressor</p> <p>3.26 Electric lights</p> <p>3.27 Safety / medical kit</p> <p>3.28 Scaffolding</p> <p>3.29 Pencil Grinder</p> <p>3.30 Pipe Wrench</p>
4. Quality/ Occupational health, safety and environmental plans	<p>Quality plan:</p> <p>4.1 Inspection and Test Plans</p> <p>4.2 Method Statements</p> <p>Occupational health and safety plan:</p> <p>4.3 PPE</p> <p>4.4 Compressed gas safety procedures</p> <p>4.5 General sling information</p> <p>4.6 Precautions in installation of ladders</p> <p>4.7 Working at heights</p> <p>4.8 Working in confined space</p> <p>4.9 Portable equipment and tools procedures</p> <p>4.10 Welding and gas cutting procedures</p> <p>Environmental plan:</p> <p>4.11 Noise and vibration controls</p> <p>4.12 Air pollution controls</p> <p>4.13 Water pollution controls</p> <p>4.14 Waste management</p>
5. Regulatory requirements	<p>5.1 Cold work permit</p> <p>5.2 Hot work permit</p>

	5.3 Job order
6. Fit-up procedures	6.1 Trimming, cutting and beveling 6.2 Orientation of flanges and fittings/ valves 6.3 Pipefitting alignment 6.4 Tack welding 6.5 Fabrication of temporary supports 6.5.1 Jigs 6.5.2 Stoppers 6.5.3 Pipe clamps 6.5.4 Brazing
7. Personnel	7.1 In charge 7.2 Foreman 7.3 Supervisor 7.4 Leadman
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 interpreted drawings/ blueprints following job specification 1.2 planned and prepared for work 1.3 observed safety measures 1.4 installed pipe supports for below ground piping system 1.5 installed and fit-up below ground piping system 1.6 performed housekeeping
2. Underpinning knowledge	2.1 Isometric symbols, drawings, sketches 2.2 Occupational health and safety standards for installation and fit-up of underground piping system 2.3 Installation and fit-up procedure of underground piping system 2.4 Pipe fittings 2.5 Connectors 2.6 Valves 2.7 Pipe supports 2.8 Pressure pipes 2.9 Pressure test of pipes 2.10 Leakage test of pipes 2.11 Safe handling and standard specification of materials, tools and equipment 2.12 Safety signs and symbols
3. Underpinning Skills	3.1 Reading and comprehension skills required to identify and interpret construction manuals and specifications

	3.2 Accessing information and data 3.3 Communicating in the workplace 3.4 Performing pressure and leak test 3.5 Working in a team environment 3.6 Following occupational health and safety procedure 3.7 Applying trade mathematics
4. Required 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 Implication	The following resources must be provided: 5.1 Relevant tools, Equipment, software and facilities needed to perform the activities. 5.2 Required learning materials.
6. Methods of Assessment	Methods of assessment may include but not limited to: 6.1 Written test 6.2 Demonstration 6.3 Oral questioning
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
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Development of Competency Standard

The Competency Standards for National Skills Certificate in **Pipe Fitting, NSQF Level - 02** qualification is developed by TSC and approved by NSDA on 18– 21 April, 2022.

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

The Competency Standards for National Skills Certificate in **Pipe Fitting, NSQF Level-2**, Standard is validated by SCVC on 18 May 2022.

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This Competency Standard for **Pipe Fitting** 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 to meet the qualification of individuals who graduated through the established standard via competency-based assessment for a relevant job.

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

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