

NATIONAL OCCUPATIONAL STANDARD FOR A PLUMBER AND PIPE FITTER

ZAMBIA QUALIFICATIONS AUTHORITY



APPROVING AUTHORITY

This National Occupational Standard has been prepared and published under the authority of the Zambia Qualifications Authority Board on [insert date when NOS was approved by the ZAQA Board].

ZAMBIA QUALIFICATIONS AUTHORITY

The Zambia Qualifications Authority Act No. 8 of 2024 was enacted by the Government of the Republic of Zambia to ***“provide for the development and implementation of a national qualifications framework; establish the Zambia Qualifications Authority; provide measures to ensure that standards and registered qualifications are internationally comparable; and provide for matters connected with, or incidental to the foregoing”***. Among other functions, ZAQA is responsible for ***determining national standards for any occupation***, through various sector specific National Occupational Standards Development Teams (NOSDTs).

REVISION OF NATIONAL OCCUPATIONAL STANDARDS

National Occupational Standards shall be revised every **5 years**, or whenever necessary, by the issue of either amendments or of revised editions. It is important that users of National Occupational Standards (NOS) should ascertain that they are in possession of the latest amendments or editions.

NOS DEVELOPMENT TEAM RESPONSIBLE

This National Occupational Standard was prepared by the Water National Occupational Standards Development Team and other industry players, upon which the following organisations were represented:



Plumbers Association of Zambia (PAZA)



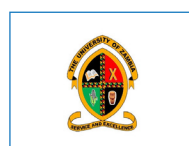
Industrial Plumber Zambia (IPZ)



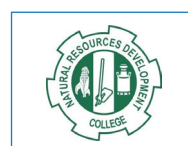
Ministry of Water Development and Sanitation



Barrick Gold



University of Zambia (UNZA)



Natural Resources Development College (NRDC)



Zambia Environmental Management Agency (ZEMA)



Ministry of Green Economy and Environment (MGEE)



Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)



GFA Consulting Group



Water for Water (WfW)



Technical Education, Vocational and Entrepreneurship Training Authority (TEVETA)



Zambia Qualifications Authority - Secretariat

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FOREWORD

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Among other functions, ZAQA is responsible for “*determining national standards for any occupation*”, through various sector specific National Occupational Standards Development Teams (NOSDTs) of experts composed of representation from appropriate authorities, government departments, industry, academia, regulators, consumer associations and non-governmental organizations, etc.

This National Occupational Standard (NOS) has been developed by the Water National Occupational Standards Development Team in accordance with the procedures and guidelines of ZAQA. All users should ensure that they have the latest edition of this publication as National Occupational Standards are revised from time to time.

This NOS shall be used by, among others, industry, employers, quality assurance bodies, awarding and professional bodies and education and training institutions, as a benchmark to identify training needs, develop job profiles/descriptions, develop curricula and learning programmes, in various sectors where the occupation exists. In the Water sector, demonstration of competency against this NOS may be required to run a business or practice a craft or profession.

JUSTIFICATION

Plumbing is one of the critical trades in the water industry which is common to all types of the sector. There is currently a shortage of qualified plumbers and Pipe Fitters, and this shortage is expected to create employment opportunities due to growth in the water sector and construction industry. However, existing plumbing systems in the residential and commercial sectors will continue to provide repair and maintenance jobs for plumbers.

This National Occupational Standard highlight core knowledge, skills, competencies and personal attributes that a Plumber must possess to be successful in their jobs.

ACRONYMS AND ABBREVIATIONS

CS	Core Skill
DNOS	Draft National Occupational Standard
NOS	National Occupational Standard
NOSDT	National Occupational Standards Development Team
OK	Organisational Knowledge
PC	Performance Criteria
PS	Professional Skill
RPL	Recognition of Prior Learning
TK	Technical Knowledge
ZAQA	Zambia Qualifications Authority
NQF	National Qualifications Framework
OSHE	Occupational Safety, Health and Environment

GLOSSARY OF TERMS

For the purposes of this NOS, the following terms and definitions shall apply:

Core Skills/Generic Skills:	are a group of skills that are key to learning and working in today's world. These skills are typically needed in any work environment. In the context of the NOS, these include communication related skills that are applicable to most job roles.
Disability:	Physical or mental impairment that substantially limits one or more major life activities.
Function:	is an activity necessary for achieving the key purpose of the sector, occupation, or area of work, which can be carried out by a person or a group of persons. Functions are identified through functional analysis and form the basis of NOS.
Job Title:	defines a unique set of functions that together form unique employment opportunities in an organisation.
Knowledge and Understanding:	are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual needs to perform to the required standard.
National Occupational Standards (NOS):	are statements of the standards of performance individuals must achieve when carrying out functions in the workplace, together with specifications of the underpinning knowledge and understanding. They are precise descriptions of what an individual is expected to be able to do in his/her work role.
National Occupational Standards (NOS) Code:	is a unique reference code that identifies a NOS.
National Occupational Standards Development Team (NOSDT):	means an established group of national stakeholders/experts responsible for the development of National Occupational Standards within a specific economic sector or occupation.
Occupation:	is a set of job roles, which perform similar/related set of functions in an industry.

Organisational Context:	includes the way the organisation is structured and how it operates, including the extent of operative knowledge that managers have in their relevant areas of responsibility.
Performance Criteria:	are statements that together specify the standard of performance required when carrying out a task.
Related tasks:	is the set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which has a critical impact on the quality of performance required.
Sector:	is a conglomeration of different business operations having similar businesses and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
Sub Sector:	is derived from a further breakdown based on the characteristics and interests of its components.
Technical Knowledge:	is the specific knowledge needed to accomplish specific designated responsibilities.
Competency Title:	gives a clear overall statement about what the incumbent should be able to do.

1.0 OVERVIEW

This is an introductory section providing a summary and specific information or commentary about the content of the NOS and the targeted sector and occupation to help the user judge whether it is relevant to them.

NOS Code	NOS.PPF.01
Occupation	Plumber and Pipe Fitter
Job Title	Plumber and Pipe Fitter
Job Description	A Plumber and Pipe Fitter plan, install, test, repair, and maintain plumbing fixtures and systems such as water, hydronic, drain, waste and vent (DWV), low pressure steam, residential fire, chemical and irrigation. They also install specialized systems such as medical gas, process piping, compressed air, water conditioners, fuel piping, sewage and water treatment, and storage and flow equipment. They also assemble and install pipes and fittings, test plumbing systems for leaks and proper functionality, clear clogged drains and sewer lines, repair or replace fixtures, such as faucets(taps and valves), toilets, and water heaters, identify and diagnose plumbing issues, read and interpret blueprints and drawings, follow safety procedures and building codes, provide estimates for plumbing services, collaborate with other construction professionals on projects, maintaining tools and equipment, plan, design, weld (arc, gas and plastic pipe welding), Keep up-to-date with industry trends and technologies.
Job Purpose	A Plumber and Pipe Fitter plans, installs, tests, repairs, and maintains plumbing fixtures and systems such as water, hydronic, drain, waste and vent (DWV), low pressure steam, residential fire, chemical and irrigation.
NQF Level	4
Sector	Water
Sub sector	Construction
Other Economic Sector(s) in which the Occupation is Practiced	Mining, Agriculture, Manufacturing, Health care, Education etc.

NOS Code	NOS.PPF.01
Other Similar Jobs that can be Performed in the Occupation	Sheet metal work, welding, heating and air conditioning, roof plumbing, pumps installations, meter installation, solar geyser, solar pumps installation and leak detection etc.
Minimum Educational Job Entry Qualification(s)	NQF Level 3 Certificate in Plumbing and Pipe Fitting
Practicing License Requirements (if any)	Membership with the Engineering Institution of Zambia (EIZ) Plumbers' association of Zambia (PAZA) Membership etc.
Minimum Job Entry Age	20 years
Prior Experience (Recommended)	Apprenticeship, Dual VET, Industrial attachment and / or internship
Performance Criteria	As described in the Competency under Section 4

2.0 RELATED TASKS

This National Occupational Standard highlight core knowledge, skills, competencies and personal attributes that Plumbers must possess to successfully do their jobs in protecting the community in promoting health and good sanitation. The Related tasks of a Plumber can vary depending on the specific job, location, and industry but there are some common tasks and responsibilities that a Plumber can perform such as:

Plan, Install, maintain and repair plumbing fixtures and systems such as water supply and sanitation, drainage, gas, heating and cooling and sanitary appliances.

3.0 PERSONAL ATTRIBUTES (VALUES, ETHICS AND ATTITUDES)

A Plumber should be able to work independently on his/her assignment, should be comfortable in performing laborious work, should be a good listener and follower of instructions, should be a good team player, should be a result oriented and positive in attitude. Should be collaborating with other construction professionals, such as architects and contractors, to plan and complete plumbing projects. Adhere to building and plumbing codes, regulations to ensure compliance and safety. Should be providing estimates for plumbing services and recommending solutions to customers. Should be maintaining tools and equipment and be updated on industry advancements and best practices. Overall, a plumber plays a crucial role in ensuring the proper functioning of water and waste systems in buildings and properties.

4.0 COMPETENCIES AND TASKS

This National Occupational Standard is divided into 16 Competencies Units representing the tasks that a jobholder should undertake in his/her day-to-day work. Each Competency is further broken down into tasks depicting the number of activities to be carried out for the successful execution of a particular task.

5.0 OVERVIEW OF COMPETENCIES FOR THE PLUMBING AND PIPE FITTER OCCUPATION

Competency		NQF Level		
No.	Title	II	III	IV
1.	Apply Safety, Health, Environment and Quality Principles and Regulations to a Plumbing Workplace	Partially Skilled Plumber & Pipe Fitter	Semi-Skilled Plumber & Pipe Fitter	Craftsman Skilled Plumber & Pipe Fitter
2.	Apply Plumbing Tools and Equipment			
3.	Perform Basic Plumbing Tasks			
4.	Install Sanitaryware According to Drawings and Specifications			
5.	Apply intermediate skills required for plumbing			
6.	Install Plumbing Systems and Appliances			
7.	Install Automatic Plumbing Systems According to Drawings, Specifications, Manufacturers Guidelines and Industry Best Practices			
8.	Install Cold Water Supply Systems and accessories according to drawings, specifications and industry best practices			
9.	Install Hot Water Supply Systems According to Drawings, Specifications and Industry Best Practices			
10.	Install Soil and Waste Systems According to Drawings, Specifications and Industry Best Practices			
11.	Join Plumbing Workpieces According to Drawings, Specifications and Site Requirements			
12.	Install Plumbing Systems and Components			
13.	Measure, Mark, Cut and Bend Sheet Metal for Plumbing Works			
14.	Supervise Plumbing Activities			
15.	Conduct Plumbing Maintenance According to Requirements			
16.	Collaborate and communicate			

UNIT 1: SAFETY, HEALTH, ENVIRONMENT AND QUALITY PRINCIPLES AND REGULATIONS TO A PLUMBING WORK PLACE

Unit No.	1
Unit Title	Safety Health Environment and Quality Principles and Regulations to a Plumbing work Place
Description	Applies to the application of the requirements of a safety, health, environmental and quality system to building construction operations and compliance with all legal requirements for Plumbing in Zambia.
Scope	This Competency covers the following: • Apply Health and Safety to a Construction Work Area (Signs, PPE, Electrical Safety, Housekeeping, Manual Handling) • Maintain Personal Wellbeing (HIV, STD's, TB, Malaria, Water Bourne Diseases) • Perform Basic Fire Fighting on a Construction Site • Apply Basic First Aid on a Construction Site • Report Incidents and Accidents • Conduct Risk Assessment for Construction Activities • Handle, Store and Dispose of Hazardous Goods • Comply with Building Codes and Regulations • Enhance Productivity and Efficiency on a Construction Site • Work at Heights in a Safe Manner • Erect Access Scaffolding and Use Lad
Performance Criteria (PC) with respect to the Related tasks	
Elements	Performance Criteria (PC) To be competent, the individual must be able to:
Apply Health and Safety to a Construction Work Area (Signs, PPE, Electrical Safety, Housekeeping, Manual Handling)	• PC1 Signage for safety is installed in the workplace according to requirements • PC2 Purpose of each sign type and sign is explained PPE is applied according to manufacturer's standards • PC3: Electrical safety is applied to all tools and equipment according to regulations and site procedures • PC4: Housekeeping is applied to plumbing workplaces using the 5S system according to site procedures • PC5 Manual handling is performed according to guidelines and site procedures

UNIT 1: SAFETY, HEALTH, ENVIRONMENT AND QUALITY PRINCIPLES AND REGULATIONS TO A PLUMBING WORK PLACE

Unit No.	1
Maintain Personal Wellbeing (HIV, STD's, TB, Malaria, Water Bourne Diseases)	PC6 Principles of personal wellbeing are applied to everyday life both in an outside the work environment according to best medical and preventative practices
Perform Basic Fire Fighting on a Construction Site	PC7 Basic firefighting is performed according to site procedures and industry best practices
Apply Basic First Aid on a Construction Site	PC8 Basic first aid is performed according to medical best practices and site procedures
Report Incidents and Accidents	PC9 Incidents and accidents are reported according to regulations and site procedures
Conduct Risk Assessment for Construction Activities	PC10 Risk assessment is conducted for all plumbing activities according to legal and site requirements and industry best practices
Handle, Store and Dispose of Hazardous Goods	PC11 Hazardous goods are handled, stored and disposed of according to legal requirements and site procedures
Comply with Building Codes and Regulations	PC12 Building codes and regulations are complied with for all plumbing activities
Enhance Productivity and Efficiency on a Construction Site	PC13 Productivity and efficiency of plumbing and pipe fitting operations is measured and improved using Kaizen
Work at Heights in a Safe Manner	PC14 Work at heights is conducted in a safe manner in compliance with regulations, site procedures and industry best practices
Erect Access Scaffolding and Use Lad	PC 15 Access scaffold is erected according to legal requirements, site requirements and industry best practices

UNIT NO.2: APPLY PLUMBING TOOLS AND EQUIPMENT

Unit No.	2
Unit Title	Plumbing Tools and Equipment
Description	This applies to the use, maintenance, care and storage of: Hand tools, Power tools, small plant, Equipment, Materials, fittings and fixtures
Scope	This Competency covers the following: • Select Handle and Store Plumbing Materials, Fittings and Fixtures (Including history of plumbing) • Select, Apply and Maintain Plumbing Hand Tools • Select, Apply and Maintain Plumbing Power Tools • Apply Small Plant and Plumbing Equipment
Performance Criteria (PC) with respect to the Related tasks	
Elements	Performance Criteria (PC) To be competent, the individual must be able to:
Select Handle and Store Plumbing Materials, Fittings and Fixtures	• PC1 Plumbing materials, fittings and fixtures are selected, handled and stored according to manufacturer's specifications and site procedures.
Select, Apply and Maintain Plumbing Hand Tools	• PC2 Hand tools for plumbing work are selected and safely applied according to manufacturer's specifications. • PC3 Hand tools are cleaned and stored safely according to site practices.
Select, Apply and Maintain Plumbing Power Tools	• PC4 Power tools for plumbing works are selected and safely applied according to manufacturer's specifications. • PC5 Hand and power tools are safely maintained where practicable according to site requirements. • PC6 Power tools are cleaned and stored safely according to site practices.

UNIT NO.2: APPLY PLUMBING TOOLS AND EQUIPMENT

Unit No.	2
Apply Small Plant and Plumbing Equipment	• PC7 Small plants and equipment are inspected prior to use and fluid levels are maintained • PC8 Small plants and equipment are started safely in accordance with manufacturers' specifications and site procedures • PC9 Small plants and equipment are operated according to site procedures • PC10 Small plants and equipment are safely shut down, cleaned and stored • PC11 Basic maintenance is performed to small plants and equipment (fluid levels, plugs, nuts and bolts, filters etc)

UNIT.3: PERFORM BASIC PLUMBING TASKS

This Competency covers the skills and knowledge required by a Plumber and Pipe Fitter to perform basic plumbing tasks

Unit No.	3
Unit Title	Basic Plumbing Tasks
Description	This applies to the performance of basic tasks required for the plumbing trade including measurement, calculations, interpreting of drawings, extraction of quantities, development of basic workplans, selection, cutting, bending and threading of different types of pipe, management of time and teamwork.
Competency	This Competency covers the following: • Perform Plumbing Measurements and Calculations • Read and Interpret Plumbing Drawings and Specifications and Develop a Work Plan • Select, Cut, Bend, Thread and Assemble GMS Pipe • Select, Cut, Bend and Assemble PVC, uPVC, HDPE, CPVC, PEX and PPR Pipes • Perform Basic Soldering • Select, Cut, Bend and Assemble Copper Pipes • Select, cut, bend and weld PPR Pipe • Apply Time Management Techniques • Work in a Team

UNIT.3: PERFORM BASIC PLUMBING TASKS

This Competency covers the skills and knowledge required by a Plumber and Pipe Fitter to perform basic plumbing tasks

Unit No.

3

Performance Criteria (PC) with respect to the Related tasks

Elements

Performance Criteria (PC)

To be competent, the individual must be able to:

Perform Plumbing Measurements and Calculations

PC1 Plumbing measurements and calculations are performed accurately and correctly.

Read and Interpret Plumbing Drawings and Specifications and Develop a Work Plan

PC2 Plumbing drawings and specifications are interpreted and quantities extracted accurately for the development of a workplan according to procedures and industry best practices.

Select, Cut, Bend, Thread and Assemble GMS Pipe

PC3 G.M.S. Pipe is selected, cut, threaded, bent and assembled according to drawings and specifications.

Select, Cut, Bend and Assemble PVC, uPVC, HDPE, CPvC, PEX and PPR Pipes

P4 PVC, uPVC, HDPE, CPvC, and PEX Pipes are selected, cut, threaded, bent and assembled according to drawings and specifications.

Perform Basic Soldering

PC5 Basic Soldering is performed according to procedures and industry best practices.

Select, Cut, Bend and Assemble Copper Pipes

PC6 Copper pipes are selected, cut, bent and assembled according to drawings and specifications.

Select, cut, bend and weld PPR Pipe

PC7 PPR Pipes are selected, cut, threaded, bent and assembled according to drawings and specifications.

Apply Time Management Techniques

PC8 Time management techniques are applied to a plumbing workplace.

Work in a Team

PC9 Teamwork is demonstrated in a plumbing workplace.

UNIT 4: INSTALL SANITARYWARE ACCORDING TO DRAWINGS AND SPECIFICATIONS

Unit NO	4
Unit Title	Install Sanitaryware According to Drawings and Specifications
Description	This applies to the installation of sanitaryware on a plumbing site according to standards and drawings.
Scope	This Competency covers the following: • Determine and Transfer Levels and Set Out a Plumbing Work Area • Install Shower Attachment for Asian Style Toilet • Install a Sink • Install Bidet • Install a Wall Hung Urinal • Install a WC/Commode (Wall Mounted) • Install a Wall Mounted Face Basin • Install a Wall Mounted Corner Basin • Install shower pan • Install Urinal (Stall) • Install a WC/Commode (Pedestal Type) • Install a Face Basin (Pedestal Type) • Carry out Basic Bricklaying (Including mixing mortar and patching) • carry out Basic Tiling (Floor, Wall and Mosaic repairs and setting) • Install In-Wall Cistern • Install a Bath Tub • Install a Shower Cubicle (Brick)
Performance Criteria (PC) with respect to the Related tasks	
Elements	Performance Criteria (PC) To be competent, the individual must be able to:
Determine and Transfer Levels and Set Out a Plumbing Work Area	PC1: Levels are determined, transferred and plumbing area set out according to drawings and specifications.
Install Shower Attachment for Asian Style Toilet	PC2: Shower attachment for Asian style toilet is installed according to drawings and specifications.

UNIT 4: INSTALL SANITARYWARE ACCORDING TO DRAWINGS AND SPECIFICATIONS

Unit NO	4
Install a Sink	PC3: Sink is installed according to drawings and specifications.
Install Bidet	PC4: Bidet is installed according to drawings and specifications.
Install a Wall Hung Urinal	PC5: Wall hung urinal is installed according to drawings and specifications.
Install a WC/Commode (Wall Mounted)	PC6: Wall mounted WC is installed according to drawings and specifications.
Install a Wall Mounted Face Basin	PC7: Wall mounted face basin is installed according to drawings and specifications.
Install a Wall Mounted Corner Basin	PC8: Wall mounted corner face basin is installed according to drawings and specifications.
Install shower pan	PC9: Shower pan is installed according to drawings and specifications.
Install Urinal (Stall)	PC10: Stall type urinal is installed according to drawings and specifications.
Install a WC/Commode (Pedestal Type)	PC11: Pedestal type WC is installed according to drawings and specifications.
Install a Face Basin (Pedestal Type)	PC12: Pedestal type face basin is installed according to drawings and specifications.
Carry out Basic Bricklaying (Including mixing mortar and patching)	PC13 Brickwork patching is performed according to drawings and specifications. PC14: Mortar is mixed according to specifications by hand.
Carry out Basic Tiling (Floor, Wall and Mosaic repairs and setting)	PC15: Basic tiling is performed to patch walls and floors according to installation requirements. PC16: Mosaic tiles are applied to a shower.
Install In-Wall Cistern	PC17: In-wall cistern is installed according to drawings and specifications.
Install a Bath Tub	PC18: Bathtub is installed according to drawings and specifications.

UNIT 4: INSTALL SANITARYWARE ACCORDING TO DRAWINGS AND SPECIFICATIONS

Unit NO	4
Install a Shower Cubicle (Brick mortar and patching)	PC19: Shower cubicle is constructed and shower fitted according to drawings and specifications.

5.5 UNIT.5: APPLY INTERMEDIATE SKILLS REQUIRED FOR PLUMBING

This Competency covers the skills and knowledge required by a Plumber and Pipe Fitter to apply intermediate skills required for plumbing

Unit No	5
Unit Title	Apply Intermediate Skills in Plumbing
Description	This applies to the application of intermediate skills required for the effective operation of a plumbing site.
Scope	This Competency covers the following: • Compile Basic Drawings by Hand • Communicate Effectively in the Workplace • Estimate and Cost Plumbing Materials • Transfer Levels with a Dumpy
Performance Criteria (PC) with respect to the Related tasks	
Elements	Performance Criteria (PC) To be competent, the individual must be able to:
Compile Basic Drawings by Hand	PC1: Basic isometric and construction drawings are compiled by hand for plumbing works.
Communicate Effectively in the Workplace	PC2: Effective communication techniques are demonstrated on a plumbing site
Estimate and Cost Plumbing Materials	PC3 Estimating and costing is performed for plumbing activities according to site procedures, drawings and specifications.
Transfer Levels with a Dumpy	PC4 Levels are transferred using a dumpy level.

UNIT 6: INSTALL PLUMBING SYSEMS AND APPLIANCES

This Competency covers the skills and knowledge required by a Plumber and Pipe Fitter to install plumbing systems and appliances.

Unit No	6
Unit Title	Install Plumbing Systems and Appliances
Description	This applies to the installation of plumbing systems and appliances according to drawings, specifications and industry best practices.
Related Tasks	This Competency covers the following: • Install water fountain • Install washing machine • Install dishwasher • Install and maintain a Jacuzzi • Install Solar Pumps • Install a gas stove
Performance Criteria (PC) with respect to the Related tasks	
Elements	Performance Criteria (PC)
	To be competent, the individual must be able to:
Install water fountain	PC1 Water fountain is installed according to drawings, specifications, manufacturers guidelines and industry best practices.
Install washing machine	PC2 Washing machine is installed according to drawings, specifications, manufacturers guidelines and industry best practices.
Install dishwasher	PC3 Dishwasher is installed according to drawings, specifications, manufacturers guidelines and industry best practices.
Install and maintain a Jacuzzi	PC4 : Jacuzzi is installed according to drawings, specifications, manufacturers guidelines and industry best practices. PC5: Jacuzzi is maintained according to requirements, manufacturers guidelines and industry best practices.

UNIT 6: INSTALL PLUMBING SYSEMS AND APPLIANCES

This Competency covers the skills and knowledge required by a Plumber and Pipe Fitter to install plumbing systems and appliances.

Unit No	6
Install Solar Pumps	PC6 Solar pumps are installed according to drawings, specifications, manufacturers guidelines and industry best practices.
Install a gas stove	PC7 Gas stove is installed according to drawings, specifications, manufacturers guidelines and industry best practices.

UNIT 7: INSTALL AUTOMATIC PLUMBING SYSTEMS ACCORDING TO DRAWINGS, SPECIFICATIONS, MANUFACTURERS GUIDELINES AND INDUSTRY BEST PRACTICE

Unit No	7
Unit Title	Instal Automatic Plumbing Systems According to Drawing Specifications, Manufacturers Guidelines and Industry Best Practice
Description	This applies to the installation of automated plumbing systems according to drawings, specifications, manufacturers guidelines and industry best practices.
Scope	This Competency covers the following: • Install Automated Flushing System for Toilets • Install Automated Flushing System for Urinals • Install Automated Tap System

Performance Criteria (PC) with respect to the Related tasks

TASKS	Performance Criteria (PC)
Install Automated Flushing System for Toilets	PC1: Automated flushing systems for toilets and cisterns are installed according to drawings, specifications, manufacturers guidelines and industry best practices.
Install Automated Flushing System for Urinals	PC2: Automated flushing systems for urinals are installed according to drawings, specifications, manufacturers guidelines and industry best practices.
Install Automated Tap System	PC3: Automated taps are installed according to drawings, specifications, manufacturers guidelines and industry best practices

UNIT8: INSTALL COLD WATER SUPPLY SYSTEMS AND ACCESSORIES ACCORDING TO DRAWINGS, SPECIFICATIONS AND INDUSTRY BEST PRACTICES

Unit No	8
Unit Title	Install Cold Water Supply Systems and Accessories According to Drawings, Specifications and Industry Best Practices
Description	This applies to the installation and commissioning of cold-water supply systems for domestic properties from the stop cock after the residential water meter.
Scope	This Competency covers the following: • Install Pumps for residential use (including swimming pool pump and piping) • Pressure Test Plumbing Systems • Install an Indirect System of Cold-Water Supply (Storage Tank) • Install Water Treatment System • Install Underground Cold-Water Reticulation Systems
Performance Criteria (PC) with respect to the Related tasks	
Elements	Performance Criteria (PC) To be competent, the individual must be able to:
Install Pumps for residential use (including swimming pool pump and piping)	PC1 Pumps for residential use are installed according to drawings, specifications and industry best practices. PC2 Swimming pool pump is installed according to drawings, specifications and industry best practices.
Pressure Test Plumbing Systems	PC3 Plumbing systems are pressure tested according to industry standards and site requirements.
Install an Indirect System of Cold-Water Supply (Storage Tank)	PC4 Indirect system of cold-water supply is installed with a storage tank according to drawings, specifications and industry best practices. PC5 Cold water systems are commissioned, functional and leak free.

UNIT8: INSTALL COLD WATER SUPPLY SYSTEMS AND ACCESSORIES ACCORDING TO DRAWINGS, SPECIFICATIONS AND INDUSTRY BEST PRACTICES

Unit No	8
Install Water Treatment System	PC6 Water treatment system is installed with a storage tank according to drawings, specifications and industry best practices.
Install Underground Cold-Water Reticulation Systems	PC7 Underground cold-water reticulation system is installed according to drawings, specifications and industry best practices.

UNIT 9: INSTALL HOT WATER SUPPLY SYSTEMS ACCORDING TO DRAWINGS, SPECIFICATIONS AND INDUSTRY BEST PRACTICES

Unit No	9
Unit Title	Install Hot Water Supply Systems according to Drawings, Specifications and Industry best practices
Description	This applies to the installation of hot water supply systems according to drawings, specifications, manufacturers guidelines and industry best practices. Elective tasks include basic electrical circuit testing and connection of geysers and water heaters to an existing electrical supply.
Scope	This Competency covers the following: • Install a water heater Competency • Install a Push Through Geyser • Install a Combination Geyser • Install a High-Pressure Geyser • Install a Solar Geyser • Basic Electrical Skills • Test Circuits Using a Multimeter
Performance Criteria (PC) with respect to the Related tasks	
Elements	Performance Criteria (PC) To be competent, the individual must be able to:

UNIT 9: INSTALL HOT WATER SUPPLY SYSTEMS ACCORDING TO DRAWINGS, SPECIFICATIONS AND INDUSTRY BEST PRACTICES

Unit No	9
Install a water heater Competency	PC1 Water heater is installed according to drawings, specifications, manufacturers guidelines and industry's best practices.
Install a Push Through Geyser	PC2 Push through geyser is installed according to drawings, specifications, manufacturers guidelines and industry best practices.
Install a Combination Geyser	PC3 Combination geyser is installed according to drawings, specifications, manufacturers guidelines and industry best practices.
Install a High-Pressure Geyser	PC4 High pressure geyser is installed according to drawings, specifications, manufacturers guidelines and industry best practices.
Install a Solar Geyser	PC5: Solar geyser is installed according to drawings, specifications, manufacturers guidelines and industry best practices. PC6 Water heater is installed according to drawings, specifications, manufacturers guidelines and industry best practices.
Basic Electrical Skills	PC7 Basic electrical skills are applied to connect geysers and water heaters.
Test Circuits Using a Multimeter	PC8 Circuits are tested using a multi-meter according to manufacturer's guidelines and industry best practices.

UNIT 10. INSTALL SOIL AND WASTE SYSTEMS ACCORDING TO DRAWINGS, SPECIFICATIONS AND INDUSTRY BEST PRACTICES

This Competency describes the skills and knowledge required by a Plumber and Pipe Fitter to Install Soil and Waste Systems According to Drawings, Specifications and Industry Best Practices

Unit No	10
Unit Title	Install Soil and Waste Systems according to Drawings, Specifications and Industry best practices

UNIT 10. INSTALL SOIL AND WASTE SYSTEMS ACCORDING TO DRAWINGS, SPECIFICATIONS AND INDUSTRY BEST PRACTICES

This Competency describes the skills and knowledge required by a Plumber and Pipe Fitter to Install Soil and Waste Systems According to Drawings, Specifications and Industry Best Practices

Unit No	10
Description	This applies to the setting out and installation of soil and waste systems in a domestic environment according to drawings, specifications and industry best practices for the effective removal or treatment of wastewater and effluent.
Scope	This Competency covers the following: • Clear Construction Site and Excavate (and Shore) Trenches • Determine and Transfer Levels and Set Out Soil and Waste Systems • Install Pre-fabricated Inspection Openings and Chambers • Recognise and Install Soil and Waste Systems • Recognise and Install Below Ground Drainage Systems • Construct a French Drain (Soak Away) • Install Bio-Digester • Collect Gray Water for use • Construct Corbelled Manhole • Size and Build a Septic Tank
Performance Criteria (PC) with respect to the Related tasks	
Elements	Performance Criteria (PC) To be competent, the individual must be able to:
Clear Construction Site and Excavate (and Shore) Trenches	PC1 Construction site is cleared, trenches excavated and shored where necessary according to drawings, specifications and industry best practices.
Determine and Transfer Levels and Set Out Soil and Waste Systems	PC2 Levels are determined, transferred and setting out conducted according to drawings, specifications and industry best practices. PC3 Gray water is harvested and stored according to drawings, specifications and industry best practices.

UNIT 10. INSTALL SOIL AND WASTE SYSTEMS ACCORDING TO DRAWINGS, SPECIFICATIONS AND INDUSTRY BEST PRACTICES

This Competency describes the skills and knowledge required by a Plumber and Pipe Fitter to Install Soil and Waste Systems According to Drawings, Specifications and Industry Best Practices

Unit No	10
Install Pre-fabricated Inspection Openings and Chambers	PC4 Pre-fabricated inspection openings and chambers are installed according to drawings, specifications and industry best practices.
Recognise and Install Soil and Waste Systems	PC5 Soil and waste systems are installed according to drawings, specifications and industry best practices.
Recognise and Install Below Ground Drainage Systems	PC6 Below ground drainage systems are installed according to drawings, specifications and industry best practices.
Construct a French Drain (Soak Away)	PC7 French drain (soak away) is constructed according to drawings, specifications and industry best practices.
Install Bio-Digester	PC8 Bio-digester is installed according to drawings, specifications and industry best practices.
Collect Gray Water for use	PC9 Gray water is harvested and stored according to drawings, specifications and industry best practices.
Construct Corbelled Manhole	PC10 Corbelled manhole is constructed according to drawings, specifications and industry best practices.
Size and Build a Septic Tank	PC11 Septic tank is sized and constructed according to drawings, specifications and industry best practices.

UNIT NO. 11: JOIN PLUMBING WORKPIECES ACCORDING TO DRAWINGS, SPECIFICATIONS AND SITE REQUIREMENTS

Unit No	11
Unit Title	Join Plumbing Workpieces According to Drawings, Specifications and Site Requirements
Description	This applies to the cutting, preparation and welding of mild steel workpieces according to drawings, specifications and site requirements.
Scope	This Competency covers the following: • Prepare Welding Work Pieces • Cut Using Oxy-Acetylene Cutter • Arc Weld Mild Steel Components • Gas Weld and Braise Mild Steel Components
Performance Criteria (PC) with respect to the Related tasks	
Elements	Performance Criteria (PC) To be competent, the individual on the job must be able to:
Prepare Welding Work Pieces	PC1: Mild steel is cut using an oxy-acetylene cutting torch according to drawings, specifications and site requirements.
Prepare Welding Work Pieces	PC2: Welding workpieces are prepared according to drawings, specifications and site requirements.
Cut Using Oxy-Acetylene Cutter	PC3: Mild steel components are welded using gas welding according to drawings, specifications and site requirements.
Arc Weld Mild Steel Components	PC4: Mild steel components are welded using an arc welder according to drawings, specifications and site requirements.

UNIT NO. 12: INSTALL PLUMBING SYSTEMS AND COMPONENTS

Unit No	12
Unit Title	Install Plumbing Systems and Components
Description	Applies to the installation of gas systems and components for domestic use in Zambia
Scope	This Competency covers the following: • Install LPG Tanks and Piping Systems • Install Gas Pressure Control Equipment • Purge Consumer Piping • Install LPG Sub-meter • Install and Test Hydronic Heating and Cooling Equipment
Performance Criteria (PC) with respect to the Related tasks	
Elements	Performance Criteria (PC)
	To be competent, the user/individual on the job must be able to:
Install LPG Tanks and Piping Systems	PC1: LPG tanks and piping systems are installed in a domestic environment according to drawings, specifications and industry best practices.
Install Gas Pressure Control Equipment	PC2: Gas pressure control systems in a domestic environment according to drawings, specifications and industry best practices.
Purge Consumer Piping	PC3: Customer piping is purged in a domestic environment according to drawings, specifications and industry best practices.
Install LPG Sub-meter	PC4: An LPG sub-meter is installed in a domestic environment according to drawings, specifications and industry best practices.
Install and Test Hydronic Heating and Cooling Equipment	PC5: Hydronic heating and cooling equipment is installed and tested according to drawings, specifications and site requirements.

UNIT No. 13: MEASURE, MARK, CUT AND BEND SHEET METAL FOR PLUMBING WORKS.

Unit No	13
Unit Title	Measure, Mark, Cut and Bend Sheet Metal for Plumbing works
Description	This applies to the fabrication of sheet metal components for plumbing works in a domestic environment.
Scope	This Competency covers the following: • Measure, Mark, Cut and Bend GMS Sheet Metal • Fit G.M.S. Gutters and Rainwater Pipes • Mark out and Join Sheet Metal • Fit PVC Gutters and Rainwater Pipes • Fabricate and Fit GMS Vent Pipe Flashing • Fabricate a Box Gutter with Stopped End, Circular Outlet and Abutment Flashing • Collect and Store Rainwater • Fabricate and Install Ducts • Install Roof Sheeting
Performance Criteria (PC) with respect to the Related tasks	
Elements	Performance Criteria (PC) To be competent, the user/individual on the job must be able to:
Measure, Mark, Cut and Bend GMS Sheet Metal	PC1: G.M.S. Sheeting is measured, marked, cut and bent according to drawings, specifications, site requirements and industry best practices.
Fit G.M.S. Gutters and Rainwater Pipes	PC2: G.M.S. Gutters and rainwater pipes are fitted according to drawings, specifications, site requirements and industry best practices.
Mark out and Join Sheet Metal	PC3: Sheet metal is marked out and joined according to drawings, specifications, site requirements and industry best practices.

UNIT No. 13: MEASURE, MARK, CUT AND BEND SHEET METAL FOR PLUMBING WORKS.

Unit No	13
Fit PVC Gutters and Rainwater Pipes	PC4: P.V.C. gutters and rainwater pipes are fitted according to drawings, specifications, site requirements and industry best practices.
Fabricate and Fit GMS Vent Pipe Flashing	PC5: G.M.S. vent pipe flashing is fabricated according to drawings, specifications, site requirements and industry best practices.
Fabricate a Box Gutter with Stopped End, Circular Outlet and Abutment Flashing	PC6: Box gutter with stopped end, circular outlet and abutment flashing is fabricated according to drawings, specifications, site requirements and industry best practices
Collect and Store Rainwater	PC7: Rainwater is collected and stored according to drawings, specifications, site requirements and industry best practices.
Fabricate and Install Ducts	PC8: Ducts are fabricated and installed according to drawings, specifications, site requirements and industry best practices.
Install Roof Sheetting	PC9: Roof sheetting is installed according to drawings, specifications, site requirements and industry best practices.

UNIT No. 14: SUPERVISE PLUMBING ACTIVITIES

Unit No	14
Unit Title	Supervise Plumbing Activities
Description	This applies to the procurement of materials, preparation of quote, reporting, conflict management and record keeping on a plumbing worksite.

UNIT No. 14: SUPERVISE PLUMBING ACTIVITIES

Unit No	14
Scope	This Competency covers the following: • Procure Plumbing Materials • Prepare Plumbing Quotations • Compile Basic Reports • Manage Conflict in the Workplace • Keep Records of Maintenance Activities
Performance Criteria (PC) with respect to the Related tasks	
Elements	Performance Criteria (PC) To be competent, the individual on the job must be able to:
Procure Plumbing Materials	PC1: Plumbing materials are procured according to requirements while following company procurement procedures and processes.
Prepare Plumbing Quotations	PC2: Plumbing quotes are prepared from the specifications given according to company procedures and policies.
Compile Basic Reports	PC3: Basic reports are compiled according to site and company requirements in a given format.
Manage Conflict in the Workplace	PC4: Conflict is managed on a plumbing worksite according to procedures and requirements.
Keep Records of Maintenance Activities	PC5: Maintenance records are kept according to activities and company requirements.

5.15 COMPETENCY No. 15: CONDUCT PLUMBING MAINTENANCE ACCORDING TO REQUIREMENTS

Unit No	15
Unit Title	Conduct Plumbing Maintenance According to Requirements

5.15 COMPETENCY No. 15: CONDUCT PLUMBING MAINTENANCE ACCORDING TO REQUIREMENTS

Unit No	15
Description	This applies to the maintenance of plumbing tasks including but not limited to: Troubleshooting and diagnosis, Pipework repairs and alterations, Removal of blockages, Maintenance of components, Repairs and maintenance of common domestic systems
Scope	This Competency covers the following: • Troubleshoot Plumbing Systems and Diagnose Faults • Conduct Repairs and Alterations to Pipework • Remove Blockages and Repair Waste, Soil and Drainpipes • Repair and Maintain Taps, Valves and Stop Cocks • Repair Water Fountains • Repair the swimming pool piping and motor • Replace Worn Washers, Gaskets and Seals • Maintain Gas Systems and Appliances • Repair/Replace Cistern Components • Flush and Clean Water Heaters
Performance Criteria (PC) with respect to the Related tasks	
Elements	Performance Criteria (PC) To be competent, the user/individual on the job must be able to:
Troubleshoot Plumbing Systems and Diagnose Faults	PC1 Troubleshooting is conducted to plumbing systems and faults are diagnosed and recorded according to site and company procedures.
Conduct Repairs and Alterations to Pipework	PC2 Repairs and alterations to pipework are conducted according to site needs and company processes.
Remove Blockages and Repair Waste, Soil and Drainpipes	PC3 Blockages in waste, soil and drains are removed and repairs conducted as required by site installation according to company procedures and processes.

5.15 COMPETENCY No. 15: CONDUCT PLUMBING MAINTENANCE ACCORDING TO REQUIREMENTS

Unit No	15
Repair and Maintain Taps, Valves and Stop Cocks	PC4 Taps, Valves and Stopcocks are repaired and maintained according to site needs and company processes.
Repair Water Fountains	PC5 Water fountains are repaired according to site needs and company processes.
Repair swimming pool piping and motor	PC6 Swimming pool piping and motors are repaired according to site needs and company processes.
Replace Worn Washers, Gaskets and Seals	PC7 Worn washers, gaskets and seals are replaced according to site needs and company processes.
Maintain Gas Systems and Appliances	PC8 Gas systems and appliances are maintained and repaired according to site needs and company processes.
Repair/Replace Cistern Components	PC9 Cistern components are replaced according to site needs and company processes.
Flush and Clean Water Heaters	PC10 Water heaters are flushed and cleaned according to site needs and company processes.

5.16 COMPETENCY No. 16. COLLABORATING WITH OTHER PROFESSIONALS

This Competency is about collaborating with other professionals in Building construction and water sector to achieve smooth and hazard free workflow.

Unit No	16
Unit Title	Collaborating with Other Professionals
Description	This Competency is about Collaborating with other professionals in Building construction and water sector to achieve smooth and hazard free workflow
Scope	This Competency covers the following: • Interact with colleagues within and outside the team • Communicate and discuss workflow, problems faced, possible solutions and pass on the learning within and outside the team

5.16 COMPETENCY No. 16. COLLABORATING WITH OTHER PROFESSIONALS

This Competency is about collaborating with other professionals in Building construction and water sector to achieve smooth and hazard free workflow.

Unit No

16

Performance Criteria (PC) with respect to the Related tasks

Elements

Performance Criteria (PC)

To be competent, the user/individual on the job must be able to:

Interact with colleagues within and outside the team

- PC1 Work as a team with colleagues and share work as per the workload and skills
- PC2 Work with colleagues of other professionals

Communicate and discuss workflow, problems faced, possible solutions and pass on the learning within and outside the team

- PC3 Communicate and discuss workflow-related difficulties to find a solution with mutual agreement
- PC4 Taking instructions from the reporting authority
- PC5 Report problem/incident, etc.
- PC6 Put team over individual goals
- PC7 Resolve conflicts

Knowledge and Understanding (K)

Organisation-al Context (Knowledge of the company/ organisation and its processes)

- The user/individual on the job needs to know and understand:
- OK1. Company's policies on: preferred language of communication, quality delivery standards and personnel management
 - OK2. Reporting structure
 - OK3. National Occupational standard
 - OK4. Plumbing codes and regulations
 - OK5. Industrial standards
 - OK6. Manufacturer instructions
 - OK7. Safety data sheets

Technical Knowledge

- The individual on the job must demonstrate knowledge and understanding on:
- TK1. Communicate effectively
 - TK 2. Build team co-ordination

5.16 COMPETENCY No. 16. COLLABORATING WITH OTHER PROFESSIONALS

This Competency is about collaborating with other professionals in Building construction and water sector to achieve smooth and hazard free workflow.

Unit No
16
Other Skills (S)
Core Skills/ Generic Skills

Writing Skills

The individual on the job must be able to:

- CS1. Write in English (at least working level) and be able to or have the means to give simple instructions in the local language used at the site
- CS2. Prepare and provide clear and simple instructions, details and sketches to co-workers

Reading Skills

The individual on the job must be able to:

- CS3. Read English and be able to or have the means to give simple instructions in the local language used at the site
- CS4. Read and interpret sketches, drawings or instructions provided for the required work
- CS5. Read and interpret various safety and general signage, safety rules and tags, etc., provided at the workplace, including directions for exit routes during emergencies

Oral Communication (Listening and Speaking skills)

The individual on the job must be able to:

- CS6. Speak in English (at least working level) and be able to or have the means to give simple instructions in the local language used at the site
- CS7. Listen attentively and interpret communication/ instructions from the supervisor and other co-workers
- CS8. Convey information clearly and concisely to co-workers

5.16 COMPETENCY No. 16. COLLABORATING WITH OTHER PROFESSIONALS

This Competency is about collaborating with other professionals in Building construction and water sector to achieve smooth and hazard free workflow.

Unit No

16

Professional Skills

DECISION MAKING

The individual on the job must be able to:

- PS1. Communicate clearly.
- PS2. Clearly define roles and responsibilities.
- PS3. Have shared goals and objectives.
- PS4. Have respect for each profession and expertise.
- PS5. Collaborate with other professions in problem solving.
- PS6. Establish clear decision-making process
- PS7. Establish conflict resolution process
- PS8. Document and maintain good record keeping

PLAN AND ORGANISE

The individual on the job should be able to:

- PS9. Plan work and organise required resources in co-ordination with other professionals
- PS10. Thoroughly evaluate the job site to identify the specific tools and equipment needed in collaboration with other professionals.
- PS11. Develop a project plan
- PS12. Establish clear communication channels.
- PS13. Define roles and responsibilities.
- PS14. Identify and manage risks.
- PS15. Monitor progress and adjust
- PS 16. Foster a collaborative culture
- PS 17. Use collaboration tools
- PS 18. Develop a conflict resolution process
- PS 19. Conduct post-project reviews.

5.16 COMPETENCY No. 16. COLLABORATING WITH OTHER PROFESSIONALS

This Competency is about collaborating with other professionals in Building construction and water sector to achieve smooth and hazard free workflow.

Unit No

16

PROBLEM SOLVING

The individual on the job should be able to:

- PS 20. Identify the root cause of the problem.
- PS 21. Understand common plumbing issues and their solutions.
- PS 22. Know how to use tools and equipment effectively to address various problems.
- PS 22. Analyse complex problems and breaking them down into smaller, manageable steps.
- PS 23. Pay Attention to detail:
- PS 24. Have Communication skills:
- PS 25. Adapt to changes
- PS 26. Continue learning or staying updated with latest technologies

ANALYTICAL THINKING

The individual on the job should be able to:

- PS 27. Problem solving skills
- PS 28. Identify problems by recognising symptoms and be able to analyse root cause in collaboration with other professionals
- PS29. Critical thinking skills
- PS30. Data analysis skills.
- PS31. System thinking skills
- PS32. Decision- making skills
- PS33 Collaboration skills
- PS34. Adaptability skills

CRITICAL THINKING

The individual on the job should be able to:

- PS27. Analyze information from various sources, such as client descriptions, visual inspections, and diagnostic tools.

6.0 OTHER SOFT SKILLS FOR THE PLUMBER AND PIPE FITTER

NO.	WORK READINESS COMPETENCIES
1	COMMUNICATION
1.1	Verbally communicate with others
1.2	Communicate with others in writing
1.3	Write a basic business report
2	TEAMWORK
2.1	Work within a team
2.2	Solve disputes and negotiate with others
2.3	Know your rights and responsibilities at work
2.4	Time and resource management
2.5	Make decisions
3	SELF-MARKETING
3.1	CV writing
3.2	Job interviews
3.3	Presentation skills
3.4	Write a formal letter
4	PROBLEM SOLVING
4.1	Identify and analyse work problems
4.2	Solve problems at a work site
4.3	Evaluate results and make decisions
5	COMPUTER/ICT SKILLS
5.1	Use a computer in the workplace
5.2	Use internet
6	LANGUAGES
6.1	Basic communication skills
6.2	Use English technical terms related to plumbing

NO.	WORK READINESS COMPETENCIES
7	MATHEMATICAL SKILLS
7.1	Perform basic measurement operations
7.2	Perform mathematical operations
8	HEALTH AND HYGIENE
8.1	Maintain personal hygiene
8.2	HIV/Aids/Covid 19 Awareness
9	BASIC BUSINESS SKILLS
9.1	Business Terms and Meanings (Profit, loss, margin)
9.2	Procurement Principles and Procedures

7.0 EQUIPMENT, TOOLS AND CONSUMABLE MATERIALS

Equipment, tools and consumable materials used by the job holder include, but are not limited to:

- Hand Tools: Chisel, Hammer, Bar tying hook, Bending lever, Gauge measure, Spanners, Hack saw blade and frame, Steel cutting blade, Bar tying hook, bending lever, Pipe wrenches, Pipe cutters, dies, screw drivers etc.
- Measuring Instruments: Steel scale, Try Scale, Spirit level, Plumb bob, Measuring tape, etc.
- Power Tools: Cutting machine, Bending machine, Threading machine, etc.
- Consumables and General requirements: Reinforcement steel bar, Welding electrodes, Binding wires, Cover blocks, Wooden planks, Steel reinforcement bars tying machine, Lifting appliance (Sling, Shackle, Belts), Mechanical coupler, Firstaid kit, Fire extinguishers, etc.
- Personal Protective Equipment: Safety helmet, Safety goggles, Safety shoes, Safety belt, Cotton gloves, PVC gloves, leather gloves, knee pads, apron, Ear plugs, Reflective jackets, Dust mask, Fire prevention kit, etc.

8.0 DILEMMAS/CHALLENGES AND COMPLEXITIES FOR A JOB HOLDER

Dilemmas associated with the job of Plumber and Pipe Fitter: exposure flames and electrical power supply, working around and with machinery having moving parts, working in dangerous areas with likelihood of sharp or falling materials and objects, working in confined spaces and at heights with likelihood of falls, working in extreme weather such as hot and cold conditions, working in noisy, wet and dusty environments, exposure to welding fumes and odors, lifting/pulling/pushing heavy materials, long working hours, pressure from supervisors and colleagues, pressure from government regulators, etc.

8.1 Alternative Choices (Solutions) to Dilemmas and Complexities

Solutions to dilemmas include wearing protective clothing and ensuring their availability and use by other employees, exercising regularly to maintain physical fitness, exercising proper work ergonomics, participating in workplace safety sensitisation and awareness meetings/training sessions, adhering to company's safety and standard operating procedures at all times, consulting extensively within and outside one's department/team on WATER safety issues, planning and prioritising work, etc.

9.0 WORKING CONDITIONS/ENVIRONMENT

Working conditions include indoor and outdoor water sites as well as workshops and factories, may also work in commercial buildings or private homes, confined spaces, handling machines with moving parts, working at heights, working in conditions that may be dirty and noisy, exposure to seasonal heat and cold or adverse weather conditions, emergency call-outs, standing or squatting for long hours and lifting relatively heavy objects. In most cases, the job involves working normal hours, but in some instances, shift work and regular overtime may be required. The job also requires wearing suitable protective clothing such as works suits, ear protectors, safety visors or goggles, gloves and hardhats, safety harnesses etc.

10.0 PARTIES INVOLVED/INTERACTING WITH THE JOB HOLDER OR TRAINEE

10.1 Internal/Within the Organisation

Parties involved/interacting with the job holder who are internal to the organization include supervisors/superiors, trainers, occupational health and safety team, other colleagues, etc.

10.2 External/Outside the Organisation

Parties involved/interacting with the job holder who are external to the organization include government regulators, trainers, clients, suppliers of equipment/ tools/ consumables, fellow Environment and Water Quality Officers from other companies, labor unions/ occupational health and safety associations, etc.

11.0 PHYSICAL DEMANDS ON THE BODY

Ability to sustain strenuous conditions such as climbing heights;

1. Walk and stand for long periods of time;
2. Bend, stretch, twist, or reach out;
3. Lift, carry, push and pull heavy objects;
4. Use fingers, hands and feet with ease to complete the assigned task (dexterity);
5. Strenuous works that may cause musculoskeletal disorders; Etc.

ANNEX A

Criteria for Assessments based on this NOS

A.1 Guidelines for Assessment

- A.1.1** Criteria for assessment for curricula and learning programmes based on this NOS will be created by curricula and programmes developers. Each Performance Criteria (PC) will be assigned marks proportional to its importance in the NOS. Curricula and programmes developers will also lay down proportion of marks for theory and practical skills for each performance criteria, giving more weight to practical skills.

There shall be allocated the 'Total Mark', which will be the sum of all marks in each Competency, distributed across the number of PCs in that particular Competency. The 'out of' mark will be the mark allocated to each PC, which will be shared between theory and skills practical assessments.

- A.1.2** Individual awarding/assessment bodies or institutions and other users of the NOS will create competency-based assessments instruments for their respective candidates.

ANNEX B

NOS Version Control

This Annex gives details necessary for the tracking of the NOS versions based on the number of revisions.

NOS Code	DNOS.PPF.01		
NQF Level		Version Number	01
Sector	Water	Date of Approval	
Sub Sector		Date of Last Review	N/A
Occupation	Plumber and Pipe Fitter	Date of Next Review	



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