

COMPETENCY STANDARDS FOR

PLUMBER

Unit No	Unit Title
1.	Work safely in the workplace
2.	Handle and maintenance of workplace tools and equipments
3.	Perform effective workplace communication
1.	Install & Repair Domestic Water Supply Pipeline & Fix Water Pumps
2.	Install Sanitary & other fittings
3.	Install & Maintain Domestic Waste Water & Sewerage Systems
4.	Prepare & Lay Metal Pipes

DESCRIPTION OF A PLUMBER

A painter who completes this training will be working in the construction industry, with a close inspection of a site supervisor. Participants who complete this course should be able to perform a variety of skilled duties involved installing repair and maintaining pipes, fixtures etc

COMPETENCY STANDARD DEVELOPMENT PROCESS

The competencies were determined based on the analysis of the tasks expected to be performed by a painter. The task analysis was based on the existing documents prepared among the experts and on the advice of the experts in the field of painting in Maldives.

Competency standards used for similar type of training in other countries were also examined

UNIT TITLE	Work safely in the workplace				
DESCRIPTOR	This unit incorporates safety guidelines and encompasses competencies necessary to apply basic safety and emergency procedures to maintain a safe workplace for staff, customers and others.				
CODE	TRN01S1U01V1	LEVEL	1	CREDIT	4

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Apply basic safety procedures	<p>1.1. procedures to achieve a safe working environment followed and maintained in line with existing regulations and requirements and according to worksite policy</p> <p>1.2. all unsafe situations recognized and reported according to worksite policy</p> <p>1.3. all breakdowns in relation to machinery and equipment reported to supervisor or nominated persons</p> <p>1.4. fire and safety hazards identified and precautions are taken or reported according to worksite policy and procedures</p> <p>1.5. dangerous goods and substances identified, handled and stored according to worksite policy and procedures</p> <p>1.6. worksite policy regarding manual handling practice followed</p>
2. Apply necessary emergency procedures	<p>2.1. worksite policies and procedures regarding illness or accidents identified and applied safety alarms identified</p> <p>2.2.</p> <p>2.3. qualified persons are contacted in the event of accident or sickness of customers or staff and accident details documented according to worksite accident/ injury procedures</p>

	2.4. worksite evacuation procedures identified and applied
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RANGE STATEMENT

Unsafe situations may include but are not limited to sharp cutting tools and instruments, the electricity/ water combination, toxic substances, damaged packing material or containers, broken or damaged equipment, flammable materials and fire hazards, lifting practices, spillages, waste and debris especially on floors, ladders, trolleys and glue guns/burns

Emergency procedures may include responding to sickness, accidents and fire, or store/shop evacuation involving staff or customers.

Tools, equipment and material used in this unit may include

Safety manuals, fire extinguishers and dangerous goods used in the workplaces.

ASSESSMENT GUIDE

Forms of assessment

Assessment for the unit needs to be holistic and must include real or simulated workplace activities. Evidence of performance may be provided by customers, team leaders/members or other persons, subject to agreed authentication arrangements.

Assessment context

Assessment of this unit must be completed on the job or in a simulated work environment which reflects a range of safe working practices.

Critical aspects (for assessment)

It is essential that competence is fully observed and there is ability to transfer competence to changing circumstances and to respond to unusual situations in the critical aspects of:

- Communicating effectively with others involved in or affected by the work.
- Identifying and assessing hazardous situations and rectifying, or reporting to the relevant persons.
- Operating fire-fighting appliances.

- Safely handling and storage of dangerous and/or hazardous goods and substances.
- Applying safe manual handling practices.
- Safely and effectively operating equipment and utilizing materials over the full range of functions and processes for work undertaken on worksite.
- Following worksite evacuation procedures.

This unit may be assessed in conjunction with all and units which form part of the normal job role.

Assessment conditions

It is preferable that assessment reflects a process rather than an event and occurs over a period of time to cover varying circumstances.

Special notes for assessment

Evidence of performance may be provided by customers, team leaders/members or other persons, subject to agreed authentication arrangements.

Resources required for assessment

The following should be made available:

- A workplace or simulated workplace
- Situations requiring safe working practices
- Worksite or equivalent instructions on safe working practice
- Hazardous chemicals and/or dangerous goods information
- Materials, tooling and equipment
- Fire-fighting appliances and fire test facilities

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
<ul style="list-style-type: none"> • General knowledge of the implications on efficiency, morale and customer relations • General knowledge of common automotive terminologies • Working knowledge of workplace 	<ul style="list-style-type: none"> • Undertake effective customer relation communications • Competent in communicating basic automotive terminologies • Competent to work according to safety regulations

<p>safety regulations/requirements, equipment, material and personal safety requirements.</p> <ul style="list-style-type: none"> □ Working knowledge of safe manual handling theories and practices □ Working knowledge of the selection and application of fire-fighting appliances □ Working knowledge of dangerous goods and hazardous chemicals handling processes □ Detailed knowledge of worksite reporting procedures 	<ul style="list-style-type: none"> □ Competent to work safely with workplace equipments, materials and colleagues □ Undertake safe manual handling jobs □ Skill to select and apply appropriate fire fighting appliances □ Ability to safely handle dangerous good and hazardous chemicals □ Competent to undertake appropriate worksite reporting procedures
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UNIT TITLE	Handle and maintenance of workplace tools and equipments				
DESCRIPTOR	This unit covers the competence required to select, safely use and maintain workplace tooling and equipment. The unit includes identification and confirmation of work requirement, preparation for work, selection, use, servicing, maintenance and storage of tooling and equipment and completion of work finalisation processes, including clean-up and documentation.				
CODE	TRN01S1U03V1	LEVEL	2	CREDIT	6

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
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<p>1. Select correct tooling and equipment for workplace applications</p>	<p>1.1. Tooling and equipment selected to meet job requirements</p> <p>1.2. Suitable tooling and equipment selected for use within the workplace environment</p> <p>1.3. Tooling and equipment selected according to enterprise procedures/policies</p>
<p>2. Use of tooling and equipment</p>	<p>2.1. Tooling and equipment used in a safe manner to prevent injury to self and others</p> <p>2.2. Tooling and equipment used in a manner that does not cause damage to other workplace equipment</p> <p>2.3. Observations noted during the use of tooling/ equipment</p>
<p>3. Service and maintain workplace tooling and equipment</p>	<p>3.1. Tooling and equipment regularly checked against manufacturer/component supplier recommendations to ensure safe operating condition</p> <p>3.2. Damaged/worn tooling and equipment tagged and removed from the workplace for repair or replacement and reported in accordance with enterprise requirements</p> <p>3.3. Tooling/equipment are serviced, adjusted and/or maintained per</p>
	<p>manufacturer/component supplier schedule to ensure safe and correct operation, within the scope of responsibility</p> <p>3.4. Servicing and maintenance operations carried out according to industry regulations/guidelines, enterprise procedures/policies</p>
<p>4. Store and secure tooling and equipment</p>	<p>4.1. Tooling and equipment cleaned, checked and stored</p> <p>4.2. Tooling and equipment securely stored</p>

	4.3. Documents completed according to enterprise policies and procedures
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RANGE STATEMENT

Tooling and equipment may include computer hardware/ software, calculators, general office equipment, hand and power tooling, specialist tooling for removal/adjustment, storage racks, protective covers, measuring devices, plastics repair equipment, sealing equipment, adhesive equipment, heating equipment, templates, welding equipment, including oxy, arc, MIG and TIG, vehicle cleaning equipment, service workshop manuals, product manuals, hydraulic breaker tooling, line oilers, filters and gauges, alternator and starting motor bench testers, paint mixers, key cutters, multimeters, load testers, brake and drum lathes, fuel injector cleaners, ignition module test instruments

Maintenance methods may include routine maintenance to tooling and equipment as per schedules, labelling faulty tooling and equipment, minor repairs to tooling and equipment, and the chocking, jacking and supporting of machines on level and incline planes

Specific requirements may include hydraulic jacks, air bags and overhead cranes for lifting heavy machines

Tools, equipment and materials used in this unit may include

- All the available workshop tools and equipments
- A fully operational workshop with all equipments and tools

ASSESSMENT GUIDE

Forms of assessment

Assessment for the unit needs to be a holistic one and must include real or simulated workplace activities.

Assessment context

Application of competence is to be assessed in the workplace or simulated worksite and needs to occur using standard and authorized work practices, safety requirements and environmental constraints.

Critical aspects (for assessment)

It is essential that competence in this unit signifies ability to transfer competence to changing circumstances and to respond to unusual circumstances in the critical aspects of:

- Selection and safe use of hand tooling
- Selection and safe use of workplace equipment
- Basic maintenance of tooling and equipment within the scope of operator responsibility
- Selection and safe use of personal protective equipment

Assessment conditions

It is preferable that assessment reflects a process rather than an event and occurs over a period of time to cover varying quality circumstances. Evidence of performance may be provided by customers, team leaders/members or other persons subject to agreed authentication arrangements

Special notes for assessment

Competence in this unit may be assessed in conjunction with other functional units which together form part of the holistic work role

Resources required for assessment

The following resources should be made available:

- Workplace location or simulated workplace
- Material relevant to the use and maintenance of workplace tooling and equipment
- Equipment, hand and power tooling appropriate to the use and maintenance of workplace tooling and equipment
- Activities covering mandatory task requirements
- Specifications and work instructions

UNDERPINNING KNOWLEDGE AND SKILLS

Analyst groups might be advised to include Key Competencies and Levels in this section

Underpinning Knowledge	Underpinning Skills
<ul style="list-style-type: none"> • Safety regulations/requirements, equipment, material and personal safety requirements • Tool and equipment selection procedures • Basic maintenance procedures for tooling and equipment • Tool and equipment safety and operating procedures • Types, characteristics, uses and limitations of hand tooling • Types, characteristics, uses and limitations of power tooling • Types, characteristics, uses and limitations of workplace equipment 	<ul style="list-style-type: none"> • Demonstrate understanding of workplace safety • Identify appropriate tools and equipments • Undertake maintenance of tools and equipments used in the workplace • Operate tools and equipments safely

UNIT TITLE	Perform effective workplace communication				
DESCRIPTOR	This unit covers the competence to communicate in the workplace by oral, written and electronic means.				
CODE	TRN01S1U05V1	LEVEL	2	CREDIT	7

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Write routine text	1.1. Routine texts of one or more sentences composed in accordance with workplace requirements

	<p>1.2. Routine forms completed in accordance with workplace requirements</p> <p>1.3. Spelling, punctuation and grammar rules followed</p> <p>1.4. Texts self-checked for accuracy and presented for progress checks by relevant persons</p>
2. Read routine documents	<p>2.1. Purpose of the text understood and described</p> <p>2.2. Main points or ideas presented described</p> <p>2.3. New technical words comprehended</p> <p>2.4. The meaning of key words and phrases explained</p>
3. Contribute to workplace communications	<p>3.1. Information accessed to ensure effective communication when sending or receiving information</p> <p>3.2. Assistance provided to colleagues in the workplace , to foster common understanding</p> <p>3.3. Requests for information from colleagues met</p> <p>3.4. Documents kept and maintained in accordance with workplace/enterprise procedures and Government legislation</p>
4. Apply basic computer skills	<p>4.1. Computer turned on according to manufacturer/ component supplier specifications or workplace procedures</p> <p>4.2. Software loaded or selected from menu</p>
	<p>4.3. File identified and selected or new file produced</p> <p>4.4. Information entered, edited or deleted using an input device and within workplace designated speed and accuracy requirements</p> <p>4.5. Document saved regularly to avoid loss of information</p>

	<p>4.6. Document proof read and amended for accuracy</p> <p>4.7. Document produced in required style and format</p> <p>4.8. Document printed</p> <p>4.9. Files saved and closed and program closed or exited according to manufacturer/component supplier specifications or workplace procedures</p> <p>4.10. Computer turned off according to manufacturer/ component supplier specifications or workplace procedures</p> <p>4.11. Workplace guidelines relating to screen-based equipment and computer workstations observed</p>
<p>5. Operate workplace telephone systems</p>	<p>5.1. Telephone system functions used according to enterprise policy</p> <p>5.2. Outgoing calls completed in accordance with manufacturer instructions and enterprise policy and procedures</p> <p>5.3. Incoming calls answered promptly and in accordance with enterprise policy and procedures</p> <p>5.4. Calls transferred or placed on hold</p> <p>5.5. Caller kept informed of delays and action being taken</p> <p>5.6. Caller details and purpose of call obtained and documented</p> <p>5.7. Messages documented and calls promptly</p>
	<p>returned if required</p>

RANGE STATEMENT

- Enterprise may vary in size, type and location, the range of work activities conducted, hours of operation and the number and type of staff

- Staff may work in teams or groups of varying size and structure
- Communication may include face-to-face, telephone, written or electronic means □
Staff must be aware of industry codes.

Tools, equipment and materials used in this unit may include

- Computers and Telephones
- Enterprise policies and procedures relating to workplace forms and documents, computer, telephone use and system operating procedures and necessary industry codes if available.

ASSESSMENT GUIDE

Forms of assessment

Assessment for the unit needs to be a holistic one and must include real or simulated workplace activities.

Assessment context

Elements of competence contain both knowledge and practical components. Knowledge components may be assessed off the job. Practical components should be assessed on the job or in a simulated work environment

Evidence is best gathered using the products, processes and procedures of the workplace as the means by which the candidate achieves industry competencies

Critical aspects (for assessment)

It is essential that competence is fully observed and there is ability to transfer competence to changing circumstances and to respond to unusual situations in the critical aspects of:

- Writing short routine texts using correct spelling, punctuation and grammar
- Reading, interpreting and applying routine texts in the workplace
- Interpreting and conveying workplace information
- Maintaining workplace communications, including documents
- Applying keyboard skills to prepare and/or edit simple documents using a computer
- Applying enterprise requirements for document style and format
- Applying enterprise requirements for electronic storage and retrieval of documents

- Applying enterprise procedures for incoming and outgoing telephone calls

Assessment conditions

It is preferable that assessment reflects a process rather than an event and occurs over a period of time to cover the varying circumstances. Evidence of performance may be provided by customers, team leaders/members or other appropriate persons, subject to agreed authentication arrangements

Special notes for assessment

- Enterprise may vary in size, type and location, the range of work activities conducted, hours of operation and the number and type of staff
- Staff may work in teams or groups of varying size and structure
- Communication may include face-to-face, telephone, written or electronic means

Resources required for assessment

- A workplace or simulated workplace
- documentation, such as enterprise or sample policies and procedures manuals related to workplace document style, format and layout, workplace communication procedures, workplace documents, telephone protocols and operating procedures, computer system operating procedures
- Enterprise or sample stationery, documents and forms
- Access to enterprise or similar computer hardware and software
- Access to enterprise or similar telephone system

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
<input type="checkbox"/> General knowledge of enterprise forms, documents and stationery	<input type="checkbox"/> Appropriate skills in handling enterprise forms, documents and stationery

<ul style="list-style-type: none"> □ Operational knowledge of enterprise policies and procedures in regard to: <ul style="list-style-type: none"> ➤ workplace document style, format and layout ➤ workplace communication procedures ➤ workplace documents ➤ telephone protocols and operating procedures ➤ computer system operating procedures 	<ul style="list-style-type: none"> □ Skills in handling the following: <ul style="list-style-type: none"> ➤ workplace document style, format and layout ➤ workplace communication procedures ➤ workplace documents ➤ telephone protocols and operating procedures
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UNIT TITLE	Install & Repair Domestic Water Supply Pipeline & Fix Water Pumps
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DESCRIPTOR	This unit covers the competencies required to install and repair domestic plumbing systems conforming to plumbing standards, ensuring safe working conditions and safe use of tools, equipment & material.				
CODE	CON07S2U01VI	Level	3	Credit	20

ELEMENTS OF COMPETENCE	PERFORMANCE CRITERIA
1. Read and interpret drawings	1.1. A layout of items identified, to ascertain details in relation to drawing 1.2. Further clarifications obtained from supervisors / client if necessary 1.3. All requirements for domestic water supply system finalized with specifications 1.4. Drawings on paper and layout plans, read and interpreted
2. Prepare Estimates	2.1. All work involved in domestic water supply system identified with specifications as per requirements of superior officer / client / drawings 2.2. A complete list of material and equipment required for work prepared, as specified 2.3. Manpower requirements for work estimated 2.4. Machinery hours estimated if any machinery is to be used 2.5. Estimate of quantities and all other costs compiled 2.6. Estimate presented to client and approval obtained with any variations if necessary
3. Lay PVC / UPVC Pipe Lines	3.1. Locations set out and marked as per drawings for pipe laying 3.2. Necessary pipes / fittings selected as per specifications 3.3. Excavations carried out as per marked locations

	<p>3.4. Walls cut and openings made in buildings to embed pipes according to drawings and observing safety requirements</p>
	<p>3.5. Pipes cut to required lengths, laid, installed with necessary fittings and specials as per marked locations according to required standards</p> <p>3.6. Fittings selected to minimize pressure drop and fixed them to ensure that there are no leaks</p> <p>3.7. Whole system rechecked to assure quality and standard</p> <p>3.8. System checked under to identify and operational defects and the causes</p> <p>3.9. All operational defects attended to, and system pressure tested again to make sure that there are no further defects</p>
<p>4. Fix Accessories</p>	<p>4.1. Fittings selected to suit specifications and location</p> <p>4.2. Fittings selected to minimize pressure loss and appropriate direction to ensure easy flow</p> <p>4.3. Member fittings selected for use should be bare minimum to minimize pressure losses</p> <p>4.4. All threaded accessories either metal or PVC, firmly joined with thread seal to ensure there are no leaks</p> <p>4.5. All other joints perfectly fitted using necessary PVC adhesives, ensuring that they are fitted to expected standard</p>
<p>5. Lay hot water pipe lines and fix accessories</p>	<p>5.1. Drawings and layout plans read interpreted</p> <p>5.2. Walls cut and openings made in buildings to embed pipes according to drawings and observing safety requirements</p> <p>5.3. Brick walls cut to lay/ embed pipes</p> <p>5.4. Suitable pipes selected of required specifications</p> <p>5.5. Selected pipes cut to required lengths</p>

	<p>5.6. Pipes laid / embedded accurately as per laying plan</p> <p>5.7. Embedded / laid pipes clipped firmly to walls and other surfaces</p> <p>5.8. Fix accessories to pipe lines as per specifications and to required standards</p> <p>5.9. All joints checked and necessary remedial action</p>
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	<p>5.10. taken to ensure any water leaks and heat losses Hot water system operated and checked, using mixer tap, that it is able to supply hot water at required temperature and further adjustments needed are attended</p>
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<p>6. Carry out repairs to the domestic water supply system</p>	<p>6.1. Carry out a complete check of domestic water supply system</p> <p>6.2. Operational defects in taps, cisterns, valves, showers, pumps and related accessories identified and causes and remedies to be carried out</p> <p>6.3. A list of materials prepared to attend to the operational defects</p> <p>6.4. All materials obtained together with necessary tools and equipment</p> <p>6.5. All defects rectified and replacements made where necessary</p> <p>6.6. Water supply system was pressure tested inclusive of all items and corrective measures taken where necessary</p>
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<p>7. Fix water pumps</p>	<p>7.1. Pump selected according to the location and the manufacturer's specifications</p> <p>7.2. Pump base requirements identified from drawings and specifications</p> <p>7.3. Required materials and equipment identified and ordered / collected in accordance with workplace procedures</p>
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	<p>7.4. Materials and equipment checked for compliance with standards for acceptable condition</p> <p>7.5. Tasks planned sequenced in conjunction with others involved</p> <p>7.6. Tools & equipment for installing water pump, including personal safety equipment selected and checked for serviceability</p> <p>7.7. Pump base set out to comply with drawings and specifications</p>
	<p>7.8. Pump base constructed in accordance with drawings and specifications</p> <p>7.9. Pump is installed in accordance with standards, drawings and specifications and manufacturers' instructions</p> <p>7.10. Pipe system pressure tested in accordance with specifications</p> <p>7.11. Pump set is tested in accordance with specifications and test data recorded</p> <p>7.12. Work area is cleared & unwanted material disposed</p>

RANGE STATEMENT

The work connected to this unit shall take place at a residential building, at a worksite, or in a training centre. The unit covers the installation of cold and hot water systems, accessories, pumps, booster pumps, geysers, and water tank in a domestic setting.

The following operations are included in this unit:

- Marking
- Drilling
- Fixing
- Use of personal protective equipment
- Trenching
- Cutting
- Pressure testing

The following tools, equipment and material may be used for this unit:

- Pliers
- Hammer
- Pipe wrench
- Box spanner set
- Wire brushes
- Measuring tape
- Water pump wrench
- Hacksaws and blades
- Domestic water pump
- Safety belt, helmet, boots
- Spirit level
- Thread seal
- Lubricants
- Relevant pipes, pipe fittings, fixtures other accessories
- Screw drivers
- Double ended spanners
- Centre punch
- Plumb bob with makily
- Steel files
- Marking chalk
- Glue fixes
- Blow lamps
- Pipe reamers
- Pressure testing apparatus
- Solvent cement
- Cotton waste

The following publications may be useful for the best performance of this unit

- Manufacturers Instructions manual

The performances of this unit are expected to be carried out to the following standards

- Health and safety regulations

- Plumbing standards
- Water supply regulations

ASSESSMENT GUIDE

Forms of assessment

Continuous assessments together with collected evidence of performance will be suitable for this unit.

Assessment context

This unit may be assessed "on the job". The competencies covered by these units would be demonstrated by an individual working alone, or in a team.

Critical aspects

Locate, interpret and apply relevant information, standards & specifications to install & repair domestic water supply pipe lines.

Assessment condition

The candidate will have access to:

- All tools, equipment, material and documentation required.

The candidate will be permitted to refer to the following documents:

- Drawings or sketches available of the systems
 - Plumbing regulations
 - Instructional details made available by manufacturers
 - Details of pressure pumps and lines
- The candidate will be required to:
- Orally, or by other methods of communication, answer questions asked by the assessor.
 - Identify superiors who can be approached for the collection of competency evidence where appropriate.
 - Present evidence of credit for any off-job training related to this unit.

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, and that he/she possess the required underpinning knowledge.

Special notes

During assessment, the individual will:

- Demonstrate safe-working practices at all times;
- Communicate information about processes, events or tasks being undertaken to ensure a safe and efficient working environment;
- Take responsibility for the quality of their own work;
- Plan tasks in all situations and review task requirements as appropriate;
- Perform all tasks in accordance with standard operating procedures;
- Perform all tasks to specification;
- Use accepted engineering techniques, practices, processes and workplace procedures.

Tasks involved will be completed within reasonable time frames relating to typical workplace activities.

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
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<ul style="list-style-type: none"> • Knowledge of various pipe line material classes and their selection and compatibility • Functional knowledge of all accessories, fixtures, fittings, specials, pumps, booster pumps and filters • Types of solvents used for pipe fittings • Methods and precautions to be taken when pipe lines are laid under ground • Methods of excavation, breaking and making of walls, preparation of foundation beds and laying • Safe handling of toxic material • Proper installation of pumps, booster tanks and filters • Knowledge in laying initial back filling / anchoring and supporting • Knowledge in pressure testing • Knowledge in safety requirements and standards 	<ul style="list-style-type: none"> • Skills in proper preparation for making pipe joints • Skills in aligning of pipe lines, providing necessary support and anchoring skills in preparing foundation beds including levelling and maintaining the gradient • Locating and positioning of fixtures and fittings providing necessary supports • Skills in identifying defects in piped systems and restoring it • Skills in utilizations of safety methods • Skills in pressure testing • Skills in proper installation of pumps, booster tanks and filters • Handling of personal protective equipment installing & testing Water pumps & booster pumps
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UNIT TITLE	Install Sanitary & other fittings				
DESCRIPTOR	The unit covers the competencies required to install and maintain sanitary fittings and other related accessories conforming to plumbing standards, maintaining safety standards, safe use of tools, equipment & material.				
CODE	CON07S2U02VI	Level	3	Credit	8

ELEMENTS OF COMPETENCE	PERFORMANCE CRITERIA
1. Read and interpret drawings	1.1. Drawings and sketches related to work read and interpreted

	<p>1.2. Locations identified and marked for installation of sanitary and other fittings</p> <p>1.3. Discussed with the client, locations and installation plans clarified and approval obtained to carryout the work</p> <p>1.4. Finalized material requirements of domestic water supply system with specifications</p> <p>1.5. Tools & equipment including safety gear are selected and checked for serviceability</p> <p>1.6. Work area is prepared to support efficient installation & fitting off of sanitary & other fittings</p>
2. Prepare estimates	<p>2.1. Total work involved in installation of sanitary fittings identified with specifications as per requirements</p> <p>2.2. A complete list of material and equipment required for work prepared</p> <p>2.3. Manpower requirements for work estimated</p> <p>2.4. If any machinery needed to be used, required machinery hours estimated</p> <p>2.5. Total cost of materials, labour, overheads estimated inclusive of profit margin</p> <p>2.6. Clients' approval obtained for estimate</p>
3. Install sanitary fittings	<p>3.1. Selected sanitary fittings to match specifications given in drawing</p> <p>3.2. Before installing checked items against manufacturer's instructions and assembled any sub</p>
	<p>components as necessary</p> <p>3.3. Set out is checked for compliance with design drawings & manufacturer's instructions</p> <p>3.4. Sanitary fittings positioned and installed to comply with plans/client's requirements</p>

	<p>3.5. Fittings, components & pipe work assembled, installed & tested to required specifications & standards</p> <p>3.6. Fittings are installed and connected without damage or distortion to fittings, pipe work, environment or to other services</p> <p>3.7. Completed installation, checked for correct functioning and compliance with correct specifications</p>
<p>4. Install kitchen water supply fittings</p>	<p>4.1. Selected kitchen water supply fitting to match specifications given in drawing</p> <p>4.2. Before installing checked items against manufacturers instructions and assembled any sub components as necessary</p> <p>4.3. Kitchen fixtures installed at identified locations and all other fixtures and fittings connected as per specifications and to required standard</p> <p>4.4. Water supply connected and operation of items checked to identify any operational defects and causes</p> <p>4.5. Defects or faults identified and corrected as necessary</p> <p>4.6. Whole system re-checked to assure quality and standard</p>
<p>5. Install garden water supply fittings</p>	<p>5.1. Selected garden water supply fitting to match specifications given in drawing</p> <p>5.2. Before installing checked items against manufacturer's instructions and assembled any sub components as necessary</p> <p>5.3. The garden fixtures installed at identified locations</p>
	<p>and all other fixtures and fittings connected as per specifications and to required standard</p>

	<p>5.4. Water supply connected and operation of item checked to identify any operational defects and causes</p> <p>5.5. Defects or faults identified and corrected as necessary</p> <p>5.6. The whole system rechecked to assure quality and standard</p>
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RANGE STATEMENT

Work connected to this unit will take place at a residential house/commercial building, training centre or at a work site.

The unit covers installation of sanitary fittings such as urinals, squatting pans, high/low level cistern, water closet, bidets, wash basins, kitchen sinks, bath tubs types of showers and bottle traps, while ensuring safe working conditions and safe use of tools, equipment & material.

The following operations are included in this unit:

- Marking
- Trenching
- Drilling
- Cutting
- Fixing
- Pressure testing
- Supporting, suspending and anchoring

The following tools, equipment and material may be used for this unit:

- Pliers-small / large
- Hammer
- Pipe wrench-two sizes
- Box spanner set
- Wire brushes
- Measuring tape
- Glue fixes
- Blow lamps

- Thread seal
- Lubricants
- Relevant pipes, pipe fittings, fixtures other accessories
- Measuring tape
- Spirit level
- Chalk
- Pipe cleaning machines
- Screw drivers- two types in three sizes
- Double ended spanners
- Centre punch
- Plumb bob with makiyo
- Steel files
- Marking chalk
- Hacksaws and blades
- Solvent cement
- Cotton waste
- Relevant pipes, pipe fittings, fixtures other accessories
- Scale/ ruler
- Try square
- Marker pen
- Smoke testing equipment
- Personal protective equipment

The following publications may be useful for the best performance of this unit

Manufacturers Instructions manual

Specifications for specific jobs

The performances of this unit are expected to be carried out to the following standards

- Health and safety regulations
- Plumbing standards

ASSESSMENT GUIDE

Forms of assessment

Continuous assessments together with collected evidence of performance will be suitable for this unit.

Assessment context

This unit may be assessed “on the job”. The competencies covered by this unit would be demonstrated by an individual working alone, or in a team.

Critical aspects

Locate, interpret and apply relevant information, standards & specifications to install & repair domestic water supply pipe lines.

Assessment condition

The candidate will have access to:

- All tools, equipment, material and documentation required.

The candidate will be permitted to refer to the following documents:

- Drawings and sketches of the systems
- Plumbing regulations
- Specifications for the jobs
- Instructional details made available by manufacturers
- Details of pressure pumps and lines The candidate will be required to:
- Orally, or by other methods of communication, answer questions asked by the assessor.
- Identify superiors who can be approached for the collection of competency evidence where appropriate.
- Present evidence of credit for any off-job training related to this unit.

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, and that he/she possess the required underpinning knowledge.

Special notes

During assessment, the individual will:

- Demonstrate safe-working practices at all times;

- Communicate information about processes, events or tasks being undertaken to ensure a safe and efficient working environment;
- Take responsibility for the quality of their own work;
- Plan tasks in all situations and review task requirements as appropriate;
- Perform all tasks in accordance with standard operating procedures;
- Perform all tasks to specification;
- Use accepted engineering techniques, practices, processes and workplace procedures.

Tasks involved will be completed within reasonable time frames relating to typical workplace activities.

Resources required for assessment include;

These include material, tools, equipment and machines listed within this unit.

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
<ul style="list-style-type: none"> • Knowledge of pipeline material classes and their selection and compatibility • Functional knowledge of all accessories, fixtures, fittings, specials, pumps and filters • Methods of excavation, breaking and making of walls, preparation of foundation beds and laying • Various types of sanitary fittings • Knowledge in safety requirements and standards 	<ul style="list-style-type: none"> • Skills in proper preparation for making pipe joints • Skills in aligning of pipe lines, providing necessary support and anchoring skills in preparing pipe beds including levelling and gradients • Locating and positioning of fixtures and fittings providing necessary supports • Skills in identifying defects in piped systems and restoring it • Skills in utilizations of safety methods including signals and signs • Skills in pressure testing, leak detection and rectifications • Handling of personal protective equipment-

UNIT TITLE	Install & Maintain Domestic Waste Water & Sewerage Systems				
DESCRIPTOR	This unit covers competencies required to read and interpret domestic waste water and sewerage system drawings, install and maintain same system conforming to related plumbing standards, ensuring safe working conditions & safe use of tools, equipment & material.				
CODE	CON07S2U03VI	Level	3	Credit	8

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Read and interpret drawings	1.1. Drawings and plans for the required job, read and interpreted 1.2. Layout of the items carried out, to ascertain details in relation to actuals 1.3. Any further clarifications obtained from superiors / clients 1.4. Work requirements finalized as per specifications
2. Prepare estimates for the domestic water and sewerage disposal system	2.1. As per finalized requirements work to be carried out identified 2.2. List of material prepared as per work involved 2.3. Manpower requirements estimated 2.4. Machinery hours estimated if any machinery is to be used 2.5. Full estimate of quantities and costs compiled 2.6. Approval obtained from client for estimate after necessary adjustments
3. Install domestic waste water and sewerage system	3.1. System locations set out and marked according to drawings 3.2. Material & equipment identified and ordered in accordance with working drawings 3.3. Material and equipment checked for compliance with standards 3.4. Set out is checked for compliance with design and drawings.

	<p>3.5. Work areas such as excavations and openings in buildings prepared</p>
	<p>3.6. Pipe bed (trench bed) prepared according to required levels, lines maintaining specified gradient</p> <p>3.7. Pipelines laid and fabricated according to the plan and required standards</p> <p>3.8. All fittings, fixtures and specials installed and connected to pipe lines</p> <p>3.9. Gullies and catch pits are constructed as necessary</p>
<p>4. Install rain water gutters and down pipes</p>	<p>4.1. As per drawings set out and marked system location to suit roof edge</p> <p>4.2. Gutters and down pipes fixed according to drawings and manufacturer's specifications</p>
<p>5. Maintain domestic waste water and sewerage system</p>	<p>5.1. Routine maintenance work such as cleaning of gullies, traps and roof gutters and down pipes carried out</p> <p>5.2. Operational defects in unit items and related accessories identified and the causes</p> <p>5.3. Carried out repairs to identified operational defects to required standards and ensured expected performance</p> <p>5.4. System tested and corrective measures taken as necessary</p>

RANGE STATEMENT

Work connected to this unit will take place at a residential/commercial building, or at a worksite.

The unit includes installation and maintenance of sewerage, waste and kitchen waste systems, roof plumbing, sanitary fittings, fixtures, accessories.

The following operations are included in this unit:

- Marking
- Trenching
- Breaking and reinstating walls

- Drilling
- Cutting
- Fixing
- Testing for leakage and blockages

The following tools, equipment and material may be used for this unit:

- Pliers
- Hammer
- Pipe wrench
- Box spanner set
- Wire brushes
- Measuring tape
- Glue fixes
- Blow lamps
- Thread seal
- Lubricants
- Maintenance tools
- Scale/ ruler
- Try square
- Plumb bob
- Chalk
- Pipe cleaning machines
- Screw drivers- two types in three sizes
- Double ended spanners
- Centre punch
- Plumb bob with makily
- Steel files
- Marking chalk
- Hacksaws and blades
- Solvent cement
- Cotton waste
- Relevant pipes, pipe fittings, fixtures other accessories
- Spirit level
- Marker pen
- Smoke testing equipment

- Personal protective equipment

The following publications may be useful for the best performance of this unit

- Manufacturer's instructions manual
- Local government regulations

The performances of this unit are expected to be carried out to the following standards

- Health and safety regulations
- Plumbing standards

ASSESSMENT GUIDE

Forms of assessment

Continuous assessments together with collected evidence of performance will be suitable for this unit.

Assessment context

This unit may be assessed "on the job". The competencies covered by these units would be demonstrated by an individual working alone, or in a team.

Critical aspects

Locate, interpret and apply relevant information, standards & specifications to install & repair domestic water supply pipe lines.

Assessment condition

The candidate will have access to:

- All tools, equipment, material and documentation required.

The candidate will be permitted to refer to the following documents:

- Plumbing standards
- Manufacturer's instructions manual
- Local government regulations

- The candidate will be required to:
 - Orally, or by other methods of communication, answer questions asked by the assessor.

- Identify superiors who can be approached for the collection of competency evidence where appropriate.
- Present evidence of credit for any off-job training related to this unit.

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, and that he/she possess the required underpinning knowledge.

Special notes

During assessment, the individual will:

- Demonstrate safe-working practices at all times;
- Communicate information about processes, events or tasks being undertaken to ensure a safe and efficient working environment;
- Take responsibility for the quality of their own work;
- Plan tasks in all situations and review task requirements as appropriate;
- Perform all tasks in accordance with standard operating procedures;
- Perform all tasks to specification;
- Use accepted engineering techniques, practices, processes and workplace procedures.

Tasks involved will be completed within reasonable time frames relating to typical workplace activities.

Resources required for assessment include;

These include material, tools, equipment and machines listed within this unit.

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
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<ul style="list-style-type: none"> • Knowledge of pipeline material classes and their selection and compatibility • Knowledge of all accessories, fixtures and fittings • Methods of excavation, breaking and making of walls, preparation of beds and laying 	<ul style="list-style-type: none"> • Skills in aligning of pipe lines, providing necessary support and anchoring skills in preparing pipe beds including levelling and grading • Skills in proper preparation for making pipe joints • Locating and positioning of fixtures and fittings providing necessary supports
<ul style="list-style-type: none"> □ Knowledge in testing for leaks □ Knowledge in laying back filling / anchoring and supporting □ Knowledge in local authority requirements □ Knowledge in safety requirements and standards 	<ul style="list-style-type: none"> □ Skills in identifying defects in piped systems and restoring it □ Skills in utilizations of safety methods □ Skills in leak testing □ Handling personal protective equipment

UNIT TITLE	Prepare & Lay Metal Pipes				
DESCRIPTOR	This unit covers competencies required to prepare and lay metal pipes and fittings ensuring safe working conditions and safe use of tools, equipment & material.				
CODE	CON07S2U04VI	Level	3	Credit	7

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Read and interpret drawings	1.1. Pipe laying drawings read and interpreted 1.2. Drawings converted to prototypes in relation to actuals 1.3. Clarifications obtained from superiors / clients 1.4. Requirements of metal pipe laying system checked and finalized as per specifications
2. Prepare estimates	2.1. Total work involved identified according to specifications and requirements of Client 2.2. A list of material prepared for work involved 2.3. Total manpower requirements estimated 2.4. Machinery hours estimated if any machinery are to be used 2.5. Estimate of quantities and costs compiled with profit margin and approval obtained from Client
3. Prepare metal pipes for laying	3.1. Suitable type of metal pipe selected according to job and given specifications 3.2. Required machinery and equipment selected to prepare metal pipe for joining 3.3. Pipe length cut to required sizes 3.4. Pipe ends are prepared by cutting threads to required length to accepted standards or for a welded joint depending on the type and requirement

	<p>3.5. Pipes prepared as necessary are joined either by welding or by using union depending on types of pipe and required joint</p> <p>3.6. Match with drawings and make sure that pipe joints</p>
	<p>to have a smooth finish and any bends match to required standards</p>
<p>4. Lay metal pipes and fix accessories</p>	<p>4.1. Plans / specifications and any special instructions are read and interpreted</p> <p>4.2. Drawings converted to prototypes in relation to the actuals</p> <p>4.3. Clarifications obtained from superiors / clients</p> <p>4.4. Fixings and supports are installed to manufacturers' requirements, job plans / specifications and workplace requirements</p> <p>4.5. Pipe system is fabricated and joined in accordance with job plans / specifications and manufacturers' requirements for mechanical type joints</p> <p>4.6. Pipe system is installed in specified location without damage or distortion to pipe work</p> <p>4.7. Defects are detected and rectified and attended accordingly with necessary adjustments as required (commissioning)</p> <p>4.8. Work area cleared & un-used material disposed ensuring environmental safety</p> <p>4.9. Tools & equipment cleaned, checked and stored</p>

RANGE STATEMENT

Work connected with unit shall take place in a residential/commercial building or at a worksite.

The unit includes installation & testing metal pipe systems, fittings, fixtures and accessories.

The following operations are included in this unit:

- Marking

- Trenching
- Breaking and reinstating walls
- Drilling
- Cutting
- Fixing
- Testing for leakage and blockages

The following tools, equipment and material may be used for this unit:

- Pliers
- Hammer
- Pipe wrench
- Box spanner set
- Wire brushes
- Measuring tape
- Glue fixes
- Blow lamps
- Thread seal
- Lubricants
- Maintenance tools
- Scale/ ruler
- Spirit level
- Marker pen
- Smoke testing equipment
- Personal protective equipment
- Stock and dies
- Screw drivers
- Double ended spanners
- Centre punch
- Plumb bob with makily
- Steel files
- Marking chalk
- Hacksaws and blades
- Solvent cement
- Cotton waste
- Relevant pipes, pipe fittings, fixtures other accessories

- Try square
- Plumb bob
- Chalk
- Pipe cleaning machines
- Pipe cutter

The following publications may be useful for the best performance of this unit

- Manufacturer's instructions manual
- Local government regulations
- ICTAD accepted norms specifications

ASSESSMENT GUIDE

Forms of assessment

Continuous assessments together with collected evidence of performance will be suitable for this unit.

Assessment context

This unit may be assessed "on the job". The competencies covered by these units would be demonstrated by an individual working alone, or in a team.

Critical aspects

Locate, interpret and apply relevant information, installation & testing metal pipe systems, pipe cutting & welding skills, and also use Oxy-acetylene.

Assessment condition

The candidate will have access to:

- All tools, equipment, material and documentation required.

The candidate will be permitted to refer to the following documents:

- Plumbing standards
 - Manufacturer's instructions manual
 - ICTAD specifications
 - Local government regulations
- The candidate will be required to:
- Orally, or by other methods of communication, answer questions asked by the assessor.

- Identify superiors who can be approached for the collection of competency evidence where appropriate.
- Present evidence of credit for any off-job training related to this unit.

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, and that he/she possess the required underpinning knowledge.

Special notes

During assessment, the individual will:

- Demonstrate safe-working practices at all times;
- Communicate information about processes, events or tasks being undertaken to ensure a safe and efficient working environment;
- Take responsibility for the quality of their own work;
- Plan tasks in all situations and review task requirements as appropriate;
- Perform all tasks in accordance with standard operating procedures;
- Perform all tasks to specification;
- Use accepted engineering techniques, practices, processes and workplace procedures.

Tasks involved will be completed within reasonable time frames relating to typical workplace activities.

Resources required for assessment include;

These include material, tools, equipment and machines listed within this unit.

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
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<ul style="list-style-type: none"> • Knowledge of pipeline material classes and their selection and compatibility • Functional knowledge of all accessories, fixtures and fittings • Methods of excavation, breaking and making of walls, preparation of beds and laying • Knowledge in testing for leaks • Knowledge in laying back filling / 	<ul style="list-style-type: none"> • Skills in aligning of pipe lines, providing necessary support and anchoring skills in preparing pipe beds including levelling and grading • Skills in proper preparation for making pipe joints • Locating and positioning of fixtures and fittings providing necessary supports • Skills in identifying defects in piped systems and restoring it
<p style="text-align: center;">anchoring and supporting</p> <ul style="list-style-type: none"> □ Knowledge in local authority requirements □ Knowledge in safety requirements and standards 	<ul style="list-style-type: none"> □ Skills in utilizations of safety methods □ Skills in leak testing □ Handling personal protective equipment