



TECHNICAL &
VOCATIONAL
EDUCATION &
TRAINING
AUTHORITY



National Competency Standard for Plumber

Standard Code: xxxxxxxx

[Endorsed by the MALDIVES QUALIFICATIONS AUTHORITY (MQA)]



Standard Development Process

To begin with, Plumber occupations were profiled through study of the occupation across Maldivian workplaces. During the study, utility enterprises and their relevant occupations were reviewed and the job descriptions were further studied. In addition to that, current trends of occupations internationally were also reviewed. These processes led to the development of the Draft National Occupational Standard.

Referred draft occupational standard will be submitted through the TVETA to a team of Technical Panel (TP) selected from the Maldivian workplaces. Members of the TP will provide technical support by recommending changes to the Plumber Standard through incorporation of units of competencies and editing of the already included competency units. Purpose of this process is to develop a standard that reflects current work practices of Plumber across the various industry sectors of the Maldives. Technical Panel meetings will continue in reviewing the Plumber Standard until the Final Draft is drawn which is agreed and accepted by all the participating members.

Final Draft of Plumber Standard approved by the TP will then be submitted to the Construction Employment Sector Council (ESC) for endorsement and validation. A brief report on how the National Occupational Standard of Plumber reflecting the process of compilation will be presented to the Construction ESC together with the standard. Council members will further review and If Construction ESC recommends any change, MIT is required to bring those changes and once agreeable, National Occupational Standard of Plumber will be endorsed by the Council.

With the endorsement from the Construction Employment Sector Council, final document of the National Occupational Standard of Plumber will be submitted to the Maldives Qualification Authority (MQA) for final approval. With approval from MQA, the National Occupational Standard of Plumber will be published on TVETA website, to be used by training providers in delivering Plumber programs across the Maldives.

Description of “Plumber”

Plumbers play an important role within the Public Utility Sector of the Maldives as they undertake installation of plumbing networks and fixing sanitary wares when new buildings are constructed, contribute to other engineers and technicians in setting up and maintenance of water and sewer networks. Plumber occupations contribute for a safer and healthier community through proper management and maintenance of water and sewer systems that are available across any community across the Maldives.

National Certificate-4 in Plumber is mapped and organized in such a way to ensure those competent in the referred qualification will have the knowledge and skills to contribute positively to the construction and water and sanitation sectors of the country.

Prospective Job opportunities

Upon successful completion of the “National certificate-4 in Plumber” students can work in the following jobs.

- Plumber
- Assistant Plumber

KEY FOR CODING

Coding Competency Standards and Related Materials

DESCRIPTION	REPRESENTED BY
Industry Sector as per ESC (Three letters)	Construction Sector (CON) Fisheries and Agriculture (FNA) Information, Communication and Technology (ICT) Transport Sector (TRN) Tourism Sector (TOU) Social Sector (SOC) Foundation (FOU)
Competency Standard	S
Occupation with in an industry sector	Two digits 01-99
Unit	U
Common Competency	CR
Core Competency	CM
Optional / Elective Competency	OP
Assessment Resources Materials	A
Learning Resources Materials	L
Curricular	C
Qualification	Q1, Q2 etc.
MNQF level of qualification	L1, L2, L3, L4 etc.
Version Number	V1, V2 etc.
Year of Last Review of standard, qualification	By “/” followed by two digits responding to the year of last review, example /20 for the year 2020

1. Endorsement Application for Qualification 01

2. NATIONAL CERTIFICATE IV IN PLUMBING

3. Qualification code:

Total Number of Credits: 127

4. Purpose of the qualification

The Certificate IV in Plumbing provides comprehensive training for all plumbing covers the practical and theoretical aspects of the industry. You will gain skills in areas such as welding, water supply, drainage, sanitary, gas fitting, roofing and mechanical services.

5. Regulations for the qualification

6. Schedule of Units

Unit No	Unit Title	Code
Common Competencies		
01	Write technical reports	
02	Apply and maintain Occupational Health and Safety	
03	Carry out data entry and retrieval procedures	
04	Apply Mathematics for Water Operations	
Core Competencies		
05	Prepare basic technical drawing	
06	Plan to undertake a routine task	
07	Apply science for Water Operations	
08	Perform Industrial Welding Skill	
09	Install waste water pipe line	
10	Install trench support	
11	Install control valve assemblies, actuating devices and local alarms	
12	Install and commission water heating systems	
13	Test and maintain fire hydrant and hose reel installations	
14	Apply industrial electrical skills	
15	Install industrial water pipe systems	
16	Perform Install, commission and repair water pumps	
17	Perform plumbing work to support storm water drainage system	
7. Accreditation requirements		
8. Recommended sequencing of units		

Units Details

#	Unit Title	Code	Level	No of credits
01	Write technical reports		IV	07
02	Apply and maintain Occupational Health and Safety		IV	10
03	Carry out data entry and retrieval procedures		IV	10
04	Apply Mathematics for Water Operations		IV	07
05	Prepare basic technical drawing		IV	05
06	Plan to undertake a routine task		IV	05
07	Apply science for Water Operations		IV	06
08	Perform Industrial Welding Skill		IV	06
09	Install waste water pipe line		IV	10
10	Install trench support		IV	06
11	Install control valve assemblies, actuating devices and local alarms		IV	07
12	Install and commission water heating systems		IV	08
13	Test and maintain fire hydrant and hose reel installations		IV	07
14	Apply industrial electrical skills		IV	06
15	Install industrial water pipe systems		IV	10
16	Perform Install, commission and repair water pumps		IV	09
17	Perform plumbing work to support storm water drainage system		IV	08

Packaging of National Qualifications:

National Certificate IV in Plumber will be awarded to those who are competent in units
1+2+3+4+5+6+7+8+9+10+11+12+13+14+15+16+17

Qualification Code:

Competency Standard for Plumbing Techniques

UNIT TITLE	Write technical reports			
DESCRIPTOR	This unit covers the competence to identify and analyse requirements, to plan and conduct research, to evaluate information and findings, and to develop, document and present technical reports.			
CODE		LEVEL	IV	CREDIT
				10

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Plan the research and write the proposal	1.1 Purpose or objective of the research is identified, and confirmed with stakeholders 1.2 Scope and nature of the information requirements are identified. 1.3 All possible sources of the required information are researched and identified. 1.4 A systematic research or information collection plan is designed to optimize the process. 1.5 Resources are obtained and scheduled to service the research requirements.
2. Conduct research	2.1 Research is undertaken effectively in accordance with the plan 2.2 Experiments and tests to support the research effort are conducted in a manner which ensures the demonstrable integrity of the outcomes or findings. 2.3 Research findings are logged, documented and stored to maintain traceability. 2.4 Preliminary analysis is conducted to identify requirements for variations or additions to the research plan.
3. Analyse the information	3.1 Information is sorted, documented and prepared for the analytical process. 3.2 Information and data is manipulated to enable reasonable comparisons and judgements. 3.3 Clarification by way of expert advice and opinion is sought.
4. Prepare and present the report	4.1 Report clearly defines the objectives, process, findings and further actions. 4.2 Report addresses and satisfies the stated objective and timeframe 4.3 Report and associated presentation materials are of a standard and quality for the intended audience 4.4 Reader comprehension of the report is aided by use of executive summaries and attachments. 4.5 Information management requirements, including documenting and repository actions are satisfied in accordance with enterprise procedures.

Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

Tools, equipment and material used in this unit may include:

For the purpose of delivering the assignment, students need to be familiarized with the following.

- ✓ Workplace environment
- ✓ Personal protective equipment

ASSESSMENT GUIDE

Forms of assessment

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

Assessment context

- ✓ Assessment may occur on the job or in a workplace simulated activity.
- ✓ Access to a significant technical research and reporting requirement, information sources and a working environment.

Critical aspects (for assessment)

- ✓ Locate, interpret and apply information.
- ✓ Apply safety requirements throughout the work sequence, including the use of personal protective clothing and equipment.
- ✓ Complete a significant technical report covering:
 - detailed research of the topic area
 - a full analysis of the research outcomes
 - conclusions and recommendations clearly supported by the facts
 - satisfaction of legal, regulatory or intellectual property law requirements.
- ✓ Modify activities to cater for variations in research findings.
- ✓ Work effectively with others.

Assessment conditions

Assessment must reflect both events and processes over a period of time.

UNDERPINNING KNOWLEDGE AND SKILLS

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<p>Knowledge to be developed:</p> <ul style="list-style-type: none">✓ technical writing and presentation techniques.✓ enterprise (or equivalent) technical procedure formats, content rules, preparation and management techniques.✓ Technical report structures✓ Presentation techniques	<p>Skills to be developed:</p> <ul style="list-style-type: none">✓ research, collect, organise and understand technical information related to the subject area, developmental activities, testing processes, diagnostic methods and options and safety procedures.✓ communicate ideas and information to ensure the completeness, clarity and comprehension of the technical report by the target audience.

UNIT TITLE		Apply and maintain Occupational Health and Safety			
DESCRIPTOR	This unit of competency describes the skills and knowledge to monitor and maintain OHS within a work area where the person has supervisory responsibility for others.				
CODE		LEVEL	IV	CREDIT	15

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Perform all work safely	1.1. Use established work practices and personal protective equipment (PPE) to ensure personal safety and that of other laboratory personnel 1.2. Clean, care for and store equipment, materials and reagents as required 1.3. Minimise the generation of wastes and environmental impacts 1.4. Ensure safe disposal of laboratory/hazardous wastes
2. Ensure others in the work group are able to implement safe work practices	2.1. Ensure hazard controls and PPE appropriate to the work requirements are available and functional 2.2. Provide and communicate current information about workplace health and safety policies, procedures and programs to others 2.3. Ensure hazards and control measures relating to work responsibilities are known by those in the work area 2.4. Provide support to those in the work area to implement procedures to support safety 2.5. Identify and address training needs within level of responsibility
3. Monitor observance of safe work practices in the work area	3.1. Ensure workplace procedures are clearly defined, documented and followed 3.2. Identify any deviation from identified procedures and report and address within level of responsibility 3.3. Ensure personal behaviour is consistent with workplace policies and procedures 3.4. Encourage and follow up others to identify and report hazards in the work area 3.5. Monitor conditions and follow up to ensure housekeeping standards in the work area are maintained
4. Participate in risk management processes	4.1. Report and address any identified hazards and inadequacies in existing risk controls within level of responsibility and according to workplace procedures 4.2. Participate in risk assessments to identify and analyse risks 4.3. Support the implementation of procedures to control risk (based on the hierarchy of control) 4.4. Ensure records of incidents in the work area and other required documentation are accurately completed and maintained.
5. Support the implementation of emergency procedures within the work group	5.1. Ensure that workplace procedures for dealing with incidents and emergencies are available and known by work group

	<p>5.2 Implement processes to ensure that others in the work area are able to respond appropriately to incidents and emergencies</p> <p>5.3 Participate, as required, in investigations of hazardous incidents to identify their cause</p>
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RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Range of activities may include the following.

- ✓ Common Hazards
- ✓ Risk control measures
- ✓ Risk Assessment

Tools, equipment and materials required may include:

Part of the tools and equipment may include the following.

- ✓ new information
- ✓ urgent requests
- ✓ modified activities
- ✓ changed situations
- ✓ late instructions
- ✓ substitution of materials or equipment

ASSESSMENT GUIDE

Forms of assessment

The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Competency standard.

Critical aspects (for assessment)

There must be evidence the candidate has completed the tasks outlined in the elements and performance criteria of this unit, and:

- ✓ effectively monitored and maintained work health and safety (WHS) within 1 work area, including:
- ✓ ensuring others in the workgroup work safely and follow procedures for hazard identification and risk control and implement safe work practices.

Assessment conditions

Skills must have been demonstrated in the workplace or in a simulated environment that reflects workplace conditions and contingencies. The following conditions must be met for this unit:

- ✓ use of suitable facilities, equipment and resources, including:
- ✓ typical laboratory/field work equipment and materials
- ✓ PPE and other safety equipment
- ✓ workplace WHS documentation, management system, policies and procedures.

UNDERPINNING KNOWLEDGE AND SKILLS

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<p>Knowledge to be developed:</p> <ul style="list-style-type: none"> ✓ strategies for controlling risks through the hierarchy of control, including: <ul style="list-style-type: none"> ▪ appropriate use of personal protective clothing ▪ eliminating hazards ▪ isolating hazards ▪ using administrative controls ▪ using engineering controls ✓ first aid procedures ✓ identification of hazards in the workplace, including: <ul style="list-style-type: none"> ▪ fire, chemical and electrical hazards ▪ managing broken or faulty equipment ▪ slip, trips and falls ▪ spills and leakage of materials ▪ storage of dangerous goods and hazardous substances ▪ waste ✓ management of WHS, including: <ul style="list-style-type: none"> ▪ communication and consultation processes ▪ interpreting symbols for WHS signage ▪ manual handling procedures ▪ reporting procedures 	<p>Skills to be developed:</p> <ul style="list-style-type: none"> ✓ Communication and interpersonal skills to: <ul style="list-style-type: none"> ▪ report unsafe work practices, faulty plant and equipment and incidents and accidents through clear and direct communication ▪ share information ▪ use and interpret non-verbal communication ✓ literacy and numeracy skills to: <ul style="list-style-type: none"> ▪ estimate weights, size, quantities and mixtures ▪ interpret symbols used for WHS signage ▪ read and interpret instructions ✓ technical skills to: <ul style="list-style-type: none"> ▪ dispose of waste appropriately ▪ handle broken or damaged equipment ▪ identify hazardous goods and substances ▪ locate and identify emergency exits and use safety alarms and fire extinguishers ▪ store and use chemicals and hazardous substances ▪ use personal protective gear and equipment

UNIT TITLE		Carry out data entry and retrieval procedures			
DESCRIPTOR	This unit deals with the skills and knowledge required to operate computer to enter, manipulate, and retrieve and to access data and communicate via the Internet.				
CODE		LEVEL	IV	CREDIT	15

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Initiate computer system	1.1. The hardware components of the computer and their functions are correctly identified. 1.2. Equipment is powered up correctly. 1.3. Access codes are correctly applied. 1.4. Appropriate software is selected or loaded from the menu.
2. Enter data	2.1 Types of data for entry correctly identified and collected. 2.2 Input devices selected and used are appropriate for the intended operations. 2.3 Manipulative procedures of Input device conform to established practices. 2.4 Computer files are correctly located or new files are created, named and saved. 2.5 Data is accurately entered in the appropriate files using specified procedure and format. 2.6 Back-up made in accordance with operative procedures.
3. Retrieve data	3.1 The identity and source of information is established. 3.2 Authority to access data is obtained where required. 3.3 Files and data are correctly located and accessed. 3.4 Integrity and confidentiality of data are maintained. 3.5 The relevant reports or information retrieved using approved procedure. 3.6 Formats of retrieved report or information conform to that required. 3.7 Copy of the data is printed where required.
4. Amend data	4.1 Source of data/information for amendment is established. 4.2 Data to be amended is correctly located within the file. 4.3 The correct data/information is entered, changed or deleted using appropriate input device and approved procedures. 4.4 The Integrity of data is maintained.

5. Monitor the operation of equipment	5.1. The system is monitored for correct operation of tasks. 5.2. Routine system messages are promptly and correctly dealt with. 5.3. Error conditions within level of authority are dealt with promptly and uncorrected errors are promptly reported. 5.4. Output devices and materials are monitored for quality.
6. Access and transmit information via the Internet	6.1. Access to the Internet is gained in accordance with the provider's operating procedures. 6.2. Evidence of the ability to negotiate web sites to locate and access specified information and other services is efficiently demonstrated. 6.3. E-mail is sent and retrieved competently.
7. Close down computer system	7.1. The correct shut down sequence is followed. 7.2. Problem with shutting down computer is reported promptly. 7.3. All safety and protective procedures are observed.

Range Statement

Software included: (at least 2)

- ✓ word processing
- ✓ spreadsheet
- ✓ Internet access
- ✓ power point
- ✓ database
- ✓ design Programme (CAD)

Input devices included: (at least 3)

- ✓ keyboard
- ✓ mouse
- ✓ scanner
- ✓ microphone
- ✓ camera
- ✓ light pen
- ✓ barcode scanner

Output devices (at least 1)

- ✓ printer
- ✓ monitors
- ✓ speakers
- ✓ multi-media projectors

Tools, equipment and materials required may include:

- ✓ Relevant procedure manuals
- ✓ Availability of telephone, printer, computer, internet, etc.
- ✓ Availability of data on projects and services; tariff and rates, promotional activities in place etc.

ASSESSMENT GUIDE

Form of assessment

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

Assessment context

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

Critical aspects (for assessment)

You must provide evidence that shows you have done this over a sufficient period of time. It is essential that competence be observed in the following aspects:

- ✓ initiate the use of the equipment
- ✓ locate and access data
- ✓ use file operations
- ✓ manipulate input devices
- ✓ key-in and format documents
- ✓ access to the Internet

Assessment conditions

Assessment methods must confirm consistency of performance over time and in a range of workplace relevant contexts. Assessment should be by direct observation of tasks and/or samples of work and questioning on underpinning knowledge.

UNDERPINNING KNOWLEDGE AND SKILLS

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<p>Knowledge to be developed</p> <ul style="list-style-type: none">✓ Safety for working with and around computers.✓ Computer hardware and software systems.✓ The operation of the data entry management system.✓ Files operations and their applications.✓ Creating, locating and saving files.✓ Routine functions of a software.✓ Formatting function of software.✓ Graphic productions and manipulation.✓ Regard for accuracy and security of information.✓ Functions on the Internet.✓ Identify computer hardware.✓ Manipulate data input devices.✓ Access and retrieve data.✓ Amend, save and print data.✓ Search and retrieve data from the Internet.✓ Send and receive E-mail.	<p>Skills to be developed:</p> <ul style="list-style-type: none">✓ Ability to implement workstation adjustment according to OH&S guidelines✓ Basic analysis in relation to a limited range of routine tasks✓ Low-level decision making in relation to a limited range of routine tasks✓ Problem solving skills in known areas during normal routine activities✓ Reading and writing at a level where basic workplace documents are understood✓ Clear and precise communication✓ Ability to interpret user manuals✓ Using a PC and peripherals✓ Cultural understanding

UNIT TITLE		Apply mathematics for water operations			
DESCRIPTOR	The aim of this module is to enable the candidate to: Use calculation to solve simple problems, construct plane figures, and develop patterns.				
CODE		LEVEL	IV	CREDIT	10

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Perform simple mathematic calculations	1.1. Perform simple calculations on: fractions and decimals, calculations to a number of significant figures, decimal places 1.2. Identify and use the multiples and sub-multiples of units 1.3. Perform calculations on: perimeter and area of plane figures (i.e. square and rectangle, triangle, circle), volume and surface area (i.e. cube, rectangular prism, cylinder), mass of containers and their contents (i.e. cube, rectangular prism, cylinder) 1.4. Perform mathematical calculations involving formulas, angles, triangles and geometric construction 1.5. Identify and use formulas for SI quantities: length, area, volume, mass, density
2. Apply knowledge of mathematics in water operations	2.1 Identify and use units of Measurement 2.2 Perform calculations on: Conversion Factors, Weight, Concentration, and Flow 2.3 Perform mathematical calculations involving Typical Water/Wastewater Conversion Examples 2.4 Perform Temperature Conversions and Population Equivalent (PE) or Unit Loading Factor 2.5 Perform calculations on: Specific Gravity and Density, Flow and Detention Time 2.6 Perform chemical Addition Conversions
3. Undertake water/wastewater calculations	3.1. Perform Faucet Flow Estimation 3.2. Calculate Service Line Flushing Time 3.3. Perform Composite Sampling Calculation (Proportioning Factor) and Biochemical Oxygen Demand (BOD) Calculations 3.4. Perform mathematical calculations on Moles and Molarity, Normality, Settleability (Activated Biosolids Solids), Settleable Solids, Biosolids Total Solids, Fixed Solids, and Volatile Solids 3.5. Calculate Biosolids Volume Index (BVI) and Biosolids Density Index (BDI)

RANGE STATEMENT

As per the range of mathematics and drawing, students need to undertake the following.

- ✓ Use calculations to solve simple workshop problems.
- ✓ Make sketches of simple first and third angle orthographic projections from actual objects and pictorial views.
- ✓ Make sketches of simple sectional views.

- ✓ Develop patterns of three-dimensional figures and their frustums between parallel planes.
- ✓ Construct plane figures from given data

Tools, equipment and materials required may include:

Tools, equipment and materials used for this unit may include but not limited to the following.

- ✓ Calculator
- ✓ Drawing tools
- ✓ Drawing table
- ✓ Note pads
- ✓ Pens/pencils

ASSESSMENT GUIDE

Forms of assessment

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

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 mathematics and drawing. 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.

UNDERPINNING KNOWLEDGE AND SKILLS

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<ul style="list-style-type: none"> ✓ Use calculations to solve simple laboratory problems ✓ Use mathematics in laboratory related mathematical problems in linear measurements ✓ Apply formulas to solve problems in laboratory 	<ul style="list-style-type: none"> ✓ Perform simple laboratory calculations ✓ Solve laboratory related mathematical problems related to linear measurement ✓

UNIT TITLE		Prepare basic technical drawing			
DESCRIPTOR	This unit covers identifying the drawing requirements, preparing or making changes to engineering drawings, preparing an engineering parts list and issuing the drawings				
CODE		LEVEL	IV	CREDIT	10

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Identify drawing requirements	1.1 Requirements and purpose of drawing are determined from customer and/or work specification and associated documents. 1.2 All data necessary to produce the drawing is identified and collected. 1.3 Drawing requirements are confirmed with relevant personnel and timeframes for completion are established.
2. Develop knowledge and proper techniques in preparing drawings and sketches	2.1. Drafting equipment is selected appropriate to the drawing method chosen. 2.2. Drafting principles are applied to produce a drawing that is consistent with standard operating procedures within the enterprise. 2.3. All work is undertaken safely and to prescribed procedure. 2.4. Completed drawing is approved in accordance with standard operating procedures.
3. Perform drawing and sketches to workplace requirements	3.1 Drawings and or parts lists records are completed in accordance with standard operating procedures. 3.2 Approved drawings and or parts lists are copied and issued to relevant personnel in accordance with standard operating procedures. 3.3 Approved drawings and or parts lists are stored and catalogued in accordance with standard operating procedures.

Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

Tools, equipment and material used in this unit may include:

For the purpose of delivering the assignment, students need to be familiarized with the following.

- ✓ Drafting and drawing equipment includes the use of Computer Aided Drafting systems
- ✓ Drawing records may include cataloguing, issuing security classifications, filing, preparing distribution lists
- ✓ Drawings are issued in hard copy, photographic, slide or transparency form including presentation as a single drawing and/or with other drawings, support documentation as a package

ASSESSMENT GUIDE

Form of assessment

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

Assessment context

Assessment of this unit must be completed on the job or in a simulated work environment which reflects a range of 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. This unit may be assessed in conjunction with all units which form part of the normal job role.

Assessment conditions

- ✓ Theoretical assessment of this unit must be carried out in an examination room where proper examination rules are followed.

UNDERPINNING KNOWLEDGE AND SKILLS

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
Knowledge to be developed: <ul style="list-style-type: none">✓ requirements and purpose of the drawing to be produced✓ procedures for producing an initial drawing and changing existing drawing✓ drafting principles to be applied to the production/changing of a drawing✓ standards to which the drawing is to be produced✓ procedures for checking drawings✓ procedures and reasons for recording completed drawings and or parts lists✓ procedures for copying approved drawings and or parts lists✓ procedures for issuing approved drawings and or parts lists	Skills to be developed: <ul style="list-style-type: none">✓ using drafting equipment appropriate to the drawing method chosen✓ producing the component parts list with part name, description of part, material specification or part number, quantities and all other details specified by the customer and/or organisational procedures✓ where appropriate, copying and issuing approved drawings and or parts lists in accordance with standard operating procedures✓ handling and storing the approved drawings and or parts lists in accordance with standard operating procedures

UNIT TITLE		Plan to undertake a routine task			
DESCRIPTOR	This unit covers a person planning their own work where tasks involve one or more steps or functions and are carried out routinely on a regular basis. It includes the concepts of following routine instructions, specifications and requirements.				
CODE		LEVEL	IV	CREDIT	05

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Identify task requirements	1.1. Instructions and procedures are obtained, understood and where necessary clarified. 1.2. Relevant specifications for task outcomes are obtained, understood and where necessary clarified. 1.3. Task outcomes are identified. 1.4. Task requirements such as completion time and quality measures are identified.
2. Plan steps required to complete task	2.1 Based on instructions and specifications provided, the individual steps or activities required to undertake the task are understood and where necessary clarified. 2.2 Sequence of activities is identified. 2.3 Plan is checked to ensure it complies with specifications and task requirements.
3. Review plan	3.1 Effectiveness of plan is reviewed against specifications and task requirements. 3.2 If necessary, plan is revised to better meet specifications and task requirements.

Range Statement

Procedures included:

- ✓ Greeting procedure
- ✓ Complaint and comment handling procedure
- ✓ Incidence reporting procedures
- ✓ General knowledge of property
- ✓ Standard operating procedures for service deliveries
- ✓ Non-verbal and verbal communication
- ✓ Dress and accessories
- ✓ Gestures and mannerisms
- ✓ Voice tonality and volume
- ✓ Culturally specific communication customs and practices
- ✓ Cultural and social differences

Includes but are not limited to:

- ✓ Modes of greeting, fare welling and conversation
- ✓ Body language/ use of body gestures
- ✓ Formality of language

Interpersonal skills:

- ✓ Interactive communication
- ✓ Good working attitude
- ✓ Sincerity
- ✓ Pleasant disposition
- ✓ Effective communication skills

- ✓ Customer needs

Customer with limitation may include:

- ✓ Those with a disability
- ✓ Those with special cultural or language needs
- ✓ Unaccompanied children
- ✓ Parents with young children
- ✓ Pregnant women
- ✓ Single women

Tools, equipment and materials required may include:

- ✓ Relevant procedure manuals
- ✓ Availability of telephone, printer, computer, internet, etc.
- ✓ Availability of data on projects and services; tariff and rates, promotional activities in place etc.

ASSESSMENT GUIDE

Form of assessment

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

Assessment context

Assessment of this unit must be completed on the job or in a simulated work environment which reflects a range of 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. This unit may be assessed in conjunction with all units which form part of the normal job role.

Assessment conditions

- ✓ Theoretical assessment of this unit must be carried out in an examination room where proper examination rules are followed.
- ✓ Assessment of hygienic work practices must be constantly evaluated.

UNDERPINNING KNOWLEDGE AND SKILLS

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
Knowledge to be developed: <ul style="list-style-type: none"> ✓ correct sources of information for a particular task ✓ procedures for obtaining instructions and clarification ✓ specifications for the task ✓ hazards and established control measures associated with the routine task, including housekeeping ✓ safe work practices and procedures 	Skills to be developed: <ul style="list-style-type: none"> ✓ obtaining instructions for tasks from correct source of information such as job card. ✓ clarifying tasks and required outcomes with appropriate personnel where necessary ✓ identifying relevant specifications from documentation, job cards, or other information source ✓ preparing plans and sequencing of task activities ✓ comparing planned steps against specifications and task requirements ✓ communicating and interpreting information among stakeholders

UNIT TITLE Apply science for Water Operations					
DESCRIPTOR	This unit of competency covers the ability to relate fundamental laws of science with routine tasks and work environment.				
CODE		LEVEL	IV	CREDIT	10

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Apply principals and theories of physics in real world	1.1 Perform scalars and vector arithmetic 1.2 Understand kinetics and perform simple calculations 1.3 Understand circulation motion, and governing laws 1.4 Understand and apply the laws of Forces in real world examples 1.5 Understand the Conservation of Energy principals and apply in real world 1.6 Understand the momentum and impulse 1.7 Understand kinematics 1.8 Understand wave principals
2. Apply principals and theories of chemistry in real world examples	2.1 Understanding matter <ul style="list-style-type: none"> • States of matter, and properties related to it • Pure substances and mixtures 2.2 Understanding atoms, molecules, elements and compounds, and basic understanding of chemical reactions 2.3 Understanding solvents, solutions, saturation facts, and concentration limits 2.4 Observing properties of acids and bases, and understanding strong and weak acids

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

Tools, equipment and material used in this unit may include,

- ✓ Lab equipment
- ✓ Motors
- ✓ Fans
- ✓ pendulum

ASSESSMENT GUIDE

Forms of assessment

The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Competency standard.

Critical aspects (for assessment)

Assessors should ensure that candidates have knowledge of:

- ✓ principles vector units and scalar units

- ✓ principles of kinematics
- ✓ principles of circular motion
- ✓ laws of forces
- ✓ laws of conservation of energy
- ✓ principle of momentum
- ✓ states of matter and how chemical properties and physical properties of matter are related
- ✓ atoms, molecule, elements, compounds
- ✓ solvents, solutions, saturation
- ✓ acids and bases

Assessment conditions

- ✓ use of suitable facilities, equipment and resources, including:
 - laboratory/field work environment, equipment and materials
- ✓ modelling of industry operating conditions, including:
 - access to staff and students.

UNDERPINNING KNOWLEDGE AND SKILLS

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<ul style="list-style-type: none"> ✓ relating nature of physics to real world, and apply it in day to day work ✓ understanding the scientific laws, and limits, and how they govern the real world applications 	<ul style="list-style-type: none"> ✓ working principles of machineries ✓ principles of physics ✓ scientific terminology and technical details

UNIT TITLE Perform Industrial Welding Skill					
DESCRIPTOR	This unit covers performing welding/fabrication inspection by selecting, conducting or verifying appropriate non-destructive tests, establishing and validating welding procedures, ensuring quality assurance is carried out, and monitoring procedures.				
CODE		LEVEL	IV	CREDIT	06

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Prepare and undertake basic welding.	1.1 Determine welding requirements for polymer pipes and installation methods from relevant job plans and specifications. 1.2 Demonstrate welding safety 1.3 Interpret functions and applications of various welding equipment 1.4 Develop basic arc welding knowledge and skills 1.5 Select and check the serviceability of the appropriate tools, equipment and personal protective equipment (PPE).
2. Identify welding requirements.	2.1 Create a materials list and collect materials. 2.2 Check welding equipment for correct operation according to manufacturer instructions.
3. Weld and inspect pipe joints.	3.1 Prepare joints using tools and techniques according to manufacturer specifications and relevant standards. 3.2 Conduct test welds and verify according to job specifications. 3.3 Carry out fusion welds according to relevant job plans and specifications and codes 3.4 Visually inspect fusion welds for compliance with relevant job plans and specifications and codes,
4. Clean Up	4.1 Clear the work area, and dispose of, reuse or recycle materials in accordance with state and territory legislation and workplace policies and procedures. 4.2 Clean tools and equipment, check for serviceability and report any damage, and store and secure.

Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Tools, equipment and material used in this unit may include:

For the purpose of delivering the assignment, students need to be familiarized with all the general and special workplace tools required for performing industrial welding skills.

ASSESSMENT GUIDE

Forms of assessment

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Competency standard.

Assessment context

This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.

Critical aspects (for assessment)

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

Assessment conditions

Assessment need to cover both theoretical and practical assessment of this unit and must be carried out in an examination room where the students are supplied with all the relevant tools and equipment required for the assessment

UNDERPINNING KNOWLEDGE AND SKILLS

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<p>Knowledge to be developed:</p> <ul style="list-style-type: none">✓ Welding safety✓ Functions of various welding equipment and types of welding✓ safe operation procedures for fusion welding of polymer pipe✓ effect of heat and other products on the properties of polymer pipe✓ operating principles of fusion welding equipment✓ characteristics and limitations of materials✓ surface preparation in the welding process✓ how to access relevant information, including codes and standards	<p>Skills to be developed:</p> <ul style="list-style-type: none">✓ Demonstrate safe welding practices✓ Proper application of welding equipment✓ Perform basic arc welding✓ Perform oxy-acetylene welding✓ Surface preparation skills✓ butt welding three joints up to DN110 (OD) for a non-pressure application✓ electro-fusion welding one socket joint up to DN110 (OD) for a pressure application.

UNIT TITLE		Install waste water pipe line			
DESCRIPTOR	This competency unit covers the process of installing surface and/or subsurface drainage systems. It requires the ability to interpret site specifications and drainage system plans, set out drainage system works, measure materials, and level and align earthworks, and use relevant equipment, tools and machinery.				
CODE		LEVEL	IV	CREDIT	10

ELEMENTS OF COMPETENCIES		PERFORMANCE CRITERIA
1. Prepare for drainage system installation activities		<p>1.1 The construction site for the drainage system and construction method is identified according to the site and drainage system plans and enterprise work procedures.</p> <p>1.2 Materials, tools, equipment and machinery are selected according to drainage system design requirements and enterprise work procedures.</p> <p>1.3 Pre-operational and safety checks are carried out on tools, equipment and machinery according to manufacturer's specifications and enterprise work procedures.</p> <p>1.4 OHS hazards are identified, risks assessed, controls implemented and reported to the supervisor.</p> <p>1.5 Suitable safety and personal protective equipment (PPE) are selected, used and maintained.</p>
2. Co-ordinate installation work		<p>2.1 Enterprise work team, contractors and design consultants are identified and work tasks are coordinated in a sequential, timely and effective manner in consultation with the supervisor.</p> <p>2.2 Installation of the drainage system is undertaken according to OHS requirements and with due consideration of the environmental implications and relevant legislation and regulations.</p> <p>2.3 A clean and safe work area is maintained throughout and on completion of work.</p>
3. Prepare the site for installation of drainage system		<p>3.1 Symbols and terminology are interpreted to ensure the concept of the drainage system plan is clearly understood according to industry practice.</p> <p>3.2 Layout of services is identified, depths checked against the site or drainage system plan and discrepancies are reported to the supervisor and the relevant authority.</p> <p>3.3 Survey, measurement and marking out of the site and confirmation of soil characteristics relevant to the planned drainage system are completed according to plan specifications and enterprise work procedures.</p>
4. Undertake installation of drainage system		<p>4.1 Excavations are completed without damage to services, facilities, features and established plants</p>

	<p>according to plan specifications and enterprise work procedures.</p> <p>4.2 The drainage system is installed according to the drainage system plan and enterprise work procedures.</p> <p>4.3 The drainage system is tested for configuration, flow rates and capacity consistent with the drainage system plan and according to enterprise work procedures.</p> <p>4.4 The supervisor is consulted and remedial action is taken when the drainage system operation does not meet the plan specifications.</p>
<p>5. Complete installation of drainage system</p>	<p>5.1 Earthworks are finished off to the plan specifications and enterprise work procedures.</p> <p>5.2 The site is restored and waste material is removed from the site and disposed of in an environmentally aware and safe manner according to enterprise work procedures.</p> <p>5.3 Tools, equipment and machinery are cleaned, maintained and stored according to enterprise work procedures.</p> <p>5.4 Work outcomes are recorded or reported to the supervisor according to enterprise work procedures.</p>

Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Types of drainage systems:

- ✓ Drainage systems may include surface drains, culverts, mole drains, sand slit, sub-surface traps, pit and trap systems, dune and swale systems, reed beds, water-recycling pumps and baffles.

Tools, equipment and material used in this unit may include:

For the purpose of delivering the assignment, students need to be familiarized with the following.

- ✓ Glues, and welds, construction materials for drain surfaces and slopes, and backfill materials.
- ✓ Tools, equipment and machinery may include surveying and levelling equipment such as automatic level, laser level, dumpy level, Cowley level, staff, boning rods, pegs, notebook, pencil and calculator; hand tools such as rakes, shovels, spades, rollers, wheelbarrows, hoses and hose fittings; machinery such as bobcats, ditch witches, backhoes, front-end loaders, graders, mechanical rollers, trucks, hydraulic trailers, and tractors and 3-point linkage equipment; pumps and pump fittings; and fitting and welding tools appropriate to the drainage system.

ASSESSMENT GUIDE

Forms of assessment

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Competency standard.

Assessment context

This competency is to be assessed using standard and authorized work practices, safety requirements and environmental constraints. Assessment of essential underpinning knowledge will usually be conducted in an off-site context.

Critical aspects (for assessment)

A person who demonstrates competency in this unit must be able to provide evidence of:

- ✓ locating, interpreting and applying relevant information, standards and specifications to install and test sanitary drainage systems
- ✓ applying safety requirements throughout the work sequence, including electrical safety requirements and the use of personal protective clothing and equipment
- ✓ given the plans and specifications, installing and testing a below ground sanitary drain to connect a bathroom, WC, kitchen, laundry and soil or waste stack (to a minimum of 30 fixture units), where the drain is to be at least 10 metres long and terminate at ground level
- ✓ cutting in a branch to connect a new water closet and fixture

Assessment conditions

Skills must have been demonstrated in the workplace or in a simulated environment that reflects workplace conditions and contingencies.

UNDERPINNING KNOWLEDGE AND SKILLS

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
Knowledge to be developed: <ul style="list-style-type: none"> ✓ characteristics and application of different pipe fittings and fixture supports, including fixing and joining techniques ✓ excavation processes and procedures ✓ hazardous materials ✓ levelling and alignment processes ✓ materials relevant to sanitary drainage ✓ principles of drainage design ✓ process of installing and testing sanitary drains ✓ relevant statutory and authority requirements related to installing and fitting off sanitary fixtures ✓ SI system of measurements ✓ sources of information and processes for calculating material requirements ✓ water and air test systems and procedures ✓ workplace and equipment safety requirements 	Skills to be developed: <ul style="list-style-type: none"> ✓ access information ✓ determine requirements ✓ follow instructions ✓ planning and organising skills ✓ teamwork skills ✓ technical skills to: <ul style="list-style-type: none"> • install and test below ground sanitary drains • transfer sewage from sanitary fixtures to a sewage authority's point • make alterations to existing sanitary drainage ✓ technology skills to: <ul style="list-style-type: none"> • access and understand site-specific instructions in a variety of media ✓ use mobile communication technology equipment safety requirements

UNIT TITLE		Install trench support			
DESCRIPTOR	This unit describes a participant's skills and knowledge required to install trench support in Civil construction.				
CODE		LEVEL	IV	CREDIT	06

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Plan and prepare for installing trench support	1.1 Access, interpret and apply trench support documentation, and ensure the work activity is compliant 1.2 Obtain, read, interpret, clarify and confirm work requirements 1.3 Identify and address potential risks, hazards and environmental issues, and implement control measures 1.4 Select and wear personal protective equipment appropriate for work activities 1.5 Identify, obtain and implement traffic signage requirements 1.6 Select, and check for faults, equipment and/or attachments for work activities 1.7 Obtain and interpret emergency procedures, and be prepared for fire/accident/emergency
2. Install trench shoring	2.1 Communicate with plant operator and ensure the excavation of trenches complies with site plan, line and depth 2.2 Determine and prepare shoring method 2.3 Set out positioning of shoring 2.4 Position/erect shoring within the trench 2.5 Secure shoring in position and ensure structural conformity with regulations 2.6 Clean out excavation 2.7 Locate ladders for safe access and egress
3. Remove trench shoring	3.1 Release jacking mechanisms and remove ladders 3.2 Check shoring and prepare it for lifting from the trench 3.3 Remove shoring from trench and store it
4. Conduct housekeeping activities	4.1 Clear work area and dispose of or recycle materials 4.2 Clean and maintain condition of equipment, ensure suitability for use, and address/report issues 4.3 Manage/report hazards, and maintain a safe working environment 4.4 Process written records

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Tools, equipment and material used in this unit may include,

- ✓ bending equipment
- ✓ chain blocks
- ✓ compression cutters
- ✓ dropsaws
- ✓ forklifts
- ✓ grinders
- ✓ hacksaws
- ✓ hand and power tools
- ✓ hand excavation tools
- ✓ hand trolleys
- ✓ heating equipment
- ✓ hoists and jacks
- ✓ levelling equipment and threading
- ✓ lifting and load shifting equipment
- ✓ measuring equipment
- ✓ mechanical excavation equipment
- ✓ pipe relining equipment
- ✓ rollers
- ✓ trench shoring equipment

ASSESSMENT GUIDE

Forms of assessment

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Competency standard.

Critical aspects (for assessment)

A person who demonstrates competency in this unit must be able to provide evidence of:

- ✓ locating, interpreting and applying relevant information, standards and specifications to install and test sanitary drainage systems
- ✓ applying safety requirements throughout the work sequence, including electrical safety requirements and the use of personal protective clothing and equipment
- ✓ given the plans and specifications, installing and testing a below ground sanitary drain to connect a bathroom, WC, kitchen, laundry and soil or waste stack (to a minimum of 30 fixture units), where the drain is to be at least 10 metres long and terminate at ground level
- ✓ cutting in a branch to connect a new water closet and fixture, ensuring:
 - ✓ application of sustainability principles and concepts
 - ✓ correct identification of location, design and details of the proposed installation
 - ✓ correct selection and use of appropriate processes, tools and equipment
 - ✓ completing all work to specification
 - ✓ compliance with regulations, standards and organisational quality procedures and processes
 - ✓ communicating and working effectively and safely with others.

Assessment conditions

This unit of competency could be assessed in the workplace or a close simulation of the workplace environment providing that simulated or project-based assessment techniques fully replicate plumbing and services workplace conditions, materials, activities, responsibilities and procedures.

UNDERPINNING KNOWLEDGE AND SKILLS

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<ul style="list-style-type: none"> ✓ identifying and reporting on hazards related to the worksite and work activity ✓ applying materials handling methods and using safety data sheets ✓ organising work activities ✓ using relevant tools and equipment safely ✓ equipment types, characteristics, technical capabilities and limitations ✓ excavation techniques ✓ construction techniques ✓ site isolation and traffic control responsibilities and authorities ✓ using civil construction terminology ✓ completing housekeeping activities 	<ul style="list-style-type: none"> ✓ implements the requirements, procedures and techniques for the safe, effective and efficient completion of trench support installation ✓ works effectively with others to undertake and complete the installation of trench support ✓ demonstrates completion of installing trench support that safely, effectively and efficiently meets all of the required outcomes on more than one (1) occasion including: <ul style="list-style-type: none"> • installation of trench support in trenches deeper than 1.5 metres requiring the trench support to be installed, moved along or within the trench, and removed from the trench

UNIT TITLE		Install control valve assemblies, actuating devices and local alarms			
DESCRIPTOR	This unit of competency specifies the outcomes required to install control valve assemblies, actuating devices and local alarms for fire protection systems in commercial, industrial, residential and domestic situations.				
CODE		LEVEL	IV	CREDIT	07

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Prepare for work.	1.1 Plans and specifications are obtained from relevant authority. 1.2. Quality assurance requirements are identified and adhered to in accordance with workplace requirements. 1.3. Tasks are planned and sequenced in conjunction with others involved in or affected by the work. 1.4. Tools and equipment for installing control valve assemblies, actuating devices and local alarms, including personal protective equipment, are selected and checked for serviceability. 1.5. Work area is prepared to support efficient installation of control valve assemblies, actuating devices and local alarms.
2. Identify installation requirements.	2.1. System requirements are identified 2.2. Quantities of materials required are calculated from plans and specifications. 2.3. Materials and equipment are identified, ordered and collected in accordance with workplace procedures. 2.4. Materials and equipment are checked for compliance with standards, docket and order form, and for acceptable condition.
3. Install and test system components.	3.1. Components are set out in accordance with plans, specifications and job instructions. 3.2. Pipe supports and fixings are installed to plans and manufacturer specifications. 3.3. Assemblies, devices, alarms, piping and materials are installed in accordance with standards, plans and specifications. 3.4. Jointing systems are installed in compliance with standards. 3.5. Installed system is subjected to pressure testing in accordance with standards, plans and specifications. 3.6. Test data is recorded in format required by job specifications and quality assurance procedures.
4. Clean up	4.1. Work area is cleared, with materials disposed of or recycled in accordance with state or territory statutory and regulatory authority legislation. 4.2. Tools and equipment are cleaned, checked, maintained and stored in accordance with manufacturer recommendations and workplace procedures. 4.3. Information is accessed and documentation completed in accordance with regulatory authorities and workplace requirements.

Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Tools, equipment and material used in this unit may include,

- ✓ cutting and threading equipment
- ✓ elevated work platforms
- ✓ hand and power tools
- ✓ ladders
- ✓ testing equipment
- ✓ welding equipment.

ASSESSMENT GUIDE

Forms of assessment

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Competency standard.

Critical aspects (for assessment)

A person who demonstrates competency in this unit must be able to provide evidence of:

- ✓ locating, interpreting and applying relevant information, standards and specifications to install and test control valve assemblies, actuating devices and local alarms
- ✓ applying safety requirements throughout the work sequence, including the use of personal protective clothing and equipment
- ✓ as a minimum the ability to, given the plans and specifications of an automated fire sprinkler system, install and test a control valve assembly, two actuating devices and an alarm to design criteria and standards, ensuring:
 - ✓ correct identification of location, design and details of proposed installation
 - ✓ correct selection and use of appropriate processes, tools and equipment
 - ✓ completing all work to specification
 - ✓ compliance with regulations, standards and organisational quality procedures and processes
 - ✓ communicating and working effectively and safely with others.

Assessment conditions

This unit of competency could be assessed in the workplace or a close simulation of the workplace environment providing that simulated or project-based assessment techniques fully replicate plumbing and services workplace conditions, materials, activities, responsibilities and procedures. Resource implications for assessment include:

- ✓ an induction procedure and requirement
- ✓ realistic tasks or simulated tasks covering the minimum task requirements
- ✓ relevant specifications and work instructions
- ✓ tools and equipment appropriate to applying safe work practices
- ✓ support materials appropriate to activity
- ✓ workplace instructions relating to safe work practices and addressing hazards and emergencies
- ✓ material safety data sheets
- ✓ research resources, including industry-related systems information.

UNDERPINNING KNOWLEDGE AND SKILLS

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<p>Knowledge to be developed:</p> <ul style="list-style-type: none"> ✓ accessing information and the processes for calculating material requirements ✓ characteristics and application of different pipe fittings and fixture supports, including fixing and joining techniques ✓ function and operation of a range of taps and valves ✓ materials relevant to installation of control valve assemblies, actuating devices and local alarms ✓ pressure test systems and procedures ✓ process of installing control valve assemblies, actuating devices and local alarms ✓ structural systems, building materials and building services <p>workplace and equipment safety requirements.</p>	<p>Skills to be developed:</p> <ul style="list-style-type: none"> ✓ follow and give instructions ✓ plan and sequence tasks with others ✓ read and interpret: ✓ documentation from a variety of sources including drawings and specifications ✓ identifying and accurately reporting to appropriate personnel any faults in tools, equipment or materials ✓ installing and testing control valve assemblies, actuating devices and alarms for an automated fire sprinkler system ✓ technological skills to access and understand site-specific instructions in a variety of media

UNIT TITLE		Install and commission water heating systems			
DESCRIPTOR	This unit of competency specifies the outcomes required to install and commission water heaters for domestic and commercial applications.				
CODE		LEVEL	IV	CREDIT	08

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Prepare for work.	1.1 Drawings, plans and specifications are obtained. 1.3 Quality assurance requirements are identified and adhered to according to workplace requirements. 1.4 Tasks are planned and sequenced in conjunction with others involved in or affected by the work and statutory and regulatory authorities' requirements. 1.5 Tools and equipment for installing water heaters, including personal protective equipment, are selected and checked for serviceability. 1.6 Work area is prepared to support efficient installation of water heaters.
2. Identify installation requirements.	2.1 Installation position is assessed for compliance with authorities' requirements, manufacturer recommendations. 2.2 Quantity and type of materials required are calculated from job specifications and site inspection. 2.3 Materials and equipment are identified, ordered and collected according to workplace procedures. 2.4 Materials and equipment are checked for compliance 2.5 Sustainability principles and concepts are observed when preparing for and undertaking work process.
3. Install, commission and maintain system.	3.1 Water heating system is installed according to relevant standards, job specifications and manufacturer recommendations. 3.2 Pipe joints are fitted correctly and according to relevant standards. 3.3 Installation is tested according to relevant standards, manufacturer specifications and authorities' requirements. 3.4 Water heating system is commissioned according to relevant standards and manufacturer specifications. 3.5 Water heating system is maintained according to manufacturer instructions.
4. Clean up.	4.1 Work area is cleared and materials disposed of, reused or recycled. 4.2 Tools and equipment are cleaned, checked, maintained and stored according to manufacturer recommendations and workplace procedures. 4.3 Documentation is completed according to workplace requirements.

Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Water heaters may include:

- ✓ electric storage heaters
- ✓ solar water heaters

Tools and equipment may include:

- ✓ flaring tools
- ✓ hand and power tools
- ✓ ladders
- ✓ lifting and load shifting equipment
- ✓ mechanical bending equipment
- ✓ silver brazing equipment.

ASSESSMENT GUIDE

Forms of assessment

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Competency Standard.

Assessment context

This competency is to be assessed using standard and authorized work practices, safety requirements and environmental constraints. Assessment of essential underpinning knowledge will usually be conducted in an off-site context.

Critical aspects (for assessment)

A person who demonstrates competency in this unit must be able to provide evidence of locating, interpreting and applying relevant information, including electrical safety requirements and the use of personal protective clothing and equipment

Assessment conditions

Skills must have been demonstrated in the workplace or in a simulated environment that reflects workplace conditions and contingencies.

UNDERPINNING KNOWLEDGE AND SKILLS

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
Knowledge to be developed: <ul style="list-style-type: none"> ✓ characteristics and application of different mounting fittings, including fixing and joining techniques and methods ✓ levelling and alignment processes ✓ performance measures for various water heaters ✓ process of installing water heaters ✓ processes for accessing information and for calculating material requirements ✓ properties of water, including pressure and flow rates ✓ relevant statutory requirements related to installing water heaters ✓ SI system of measurements ✓ use of test equipment and procedures ✓ workplace and equipment safety requirements 	Skills to be developed: <ul style="list-style-type: none"> ✓ follow instructions ✓ identify requirements ✓ use and interpret non-verbal communication, such as hand signals ✓ initiative and enterprise skills to identify and accurately report to appropriate personnel any faults in tools, equipment or materials ✓ literacy skills to complete workplace documentation ✓ read and interpret technical skills to install and commission low pressure, mains pressure, continuous flow and solar water heating systems ✓ technology skills to access and understand site-specific instructions in a variety of media

UNIT TITLE		Test and maintain fire hydrant and hose reel installations			
DESCRIPTOR	This unit of competency specifies the outcomes required to test and maintain fire hydrant and hose reel installations in commercial and domestic situations. The unit requires the conduct of routine testing and maintenance of fire hydrant and hose reel installations in the full range of domestic and commercial situations.				
CODE		LEVEL	IV	CREDIT	07

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Prepare for work.	<p>1.1 Plans, specifications, maintenance manuals, previous maintenance reports and equipment data are obtained.</p> <p>1.2 Work health and safety (WHS) and environmental requirements associated with testing and maintaining fire hydrant and hose reel installations are adhered to throughout the work.</p> <p>1.3 Quality assurance requirements are identified and adhered to according to workplace requirements.</p> <p>1.4 Tasks are planned and sequenced in conjunction with others involved in or affected by the work.</p> <p>1.5 Tools, equipment and materials for testing and maintaining fire hydrant and hose reel installations, including personal protective equipment, are selected and checked for serviceability.</p> <p>1.6 Work area is prepared to support efficient testing and maintenance of fire hydrant and hose reel installations.</p>
2. Perform routine maintenance.	<p>2.1 Maintenance tasks detailed in maintenance schedule are performed to specification.</p> <p>2.2 Mechanical equipment and system components are checked with appropriate instruments according to standards and job specifications.</p> <p>2.3 Faulty items or components are identified and appropriate service procedure is selected.</p>
3. Repair and replace faulty components and test job.	<p>3.1 Equipment is safely isolated according to regulations and health and safety requirements.</p> <p>3.2 Faulty items or components are removed using appropriate tools, equipment and procedures.</p> <p>3.3 Replaceable items are selected from manufacturers' catalogue.</p> <p>3.4 Replacement or service items are fitted according to manufacturer recommendations and site specifications.</p> <p>3.5 Adjustments are made to equipment or components to ensure specifications are met.</p> <p>3.6 Operational check of system is carried out to ensure compliance with job specifications.</p> <p>3.7 Maintenance report is documented in format required by maintenance specification.</p> <p>3.8 Sustainability principles and concepts are observed when preparing for and undertaking work process.</p>
4. Clean up.	<p>4.1 Work area is cleared and materials disposed of, reused or recycled according to legislation, regulations, codes of practice and job specification.</p> <p>4.2 Tools and equipment are cleaned, checked,</p>

	<p>maintained and stored according to manufacturer recommendations and workplace procedures.</p> <p>4.3 Information is accessed and documentation completed according to regulatory authorities and workplace requirements.</p>
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RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

Tools, materials and equipment may include:

- ✓ elevated work platforms
- ✓ hand and power tools
- ✓ ladders
- ✓ scaffolds
- ✓ testing equipment.
- ✓ fire hydrants
- ✓ fittings and connections
- ✓ hoses
- ✓ hose reels.

ASSESSMENT GUIDE

Forms of assessment

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the competency standard.

Assessment context

This competency is to be assessed using standard and authorized work practices, safety requirements and environmental constraints. Assessment of essential underpinning knowledge will usually be conducted in an off-site context.

Critical aspects (for assessment)

A person who demonstrates competency in this unit must be able to provide evidence of locating, interpreting and applying relevant information, standards and specifications to test and maintain fire hydrants and hose reel installations. Besides that, the assessment need to applying safety requirements throughout the work sequence, including electrical safety requirements and the use of personal protective clothing and equipment.

Assessment conditions

Skills must have been demonstrated in the workplace or in a simulated environment that reflects workplace conditions and contingencies.

UNDERPINNING KNOWLEDGE AND SKILLS

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<p>Knowledge to be developed:</p> <ul style="list-style-type: none"> ✓ locating, interpreting and applying relevant information, standards and specifications to test and maintain fire hydrants and hose reel installations ✓ applying safety requirements throughout the work sequence, including electrical safety requirements 	<p>Skills to be developed:</p> <ul style="list-style-type: none"> ✓ communication skills to access information ✓ determine requirements ✓ follow and give instructions ✓ literacy skills to complete workplace documentation ✓ read and interpret documentation

<p>and the use of personal protective clothing and equipment</p> <ul style="list-style-type: none"> ✓ given four faulty fire hydrants and hose reel installations, conducting routine testing and maintenance to diagnose and repair faults and perform component service, ensuring: ✓ application of sustainability principles and concepts ✓ correct identification of the requirement and conduct of testing and maintaining the installations ✓ correct selection and use of appropriate processes, tools and equipment ✓ completing all work to specification ✓ communicating and working effectively and safely with others. 	<p>from a variety of sources</p> <ul style="list-style-type: none"> ✓ record test results in writing ✓ numeracy skills to apply measurements and calculations ✓ planning and organising skills to plan and sequence tasks with others ✓ plan and set out work ✓ teamwork skills to work with others \ ✓ technical skills to conduct operational checks to confirm system is operating to specification and diagnose faults and undertake necessary repairs or replacement of faulty components ✓ technology skills to: access and understand site-specific instructions in a variety of media ✓ use mobile communication technology
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UNIT TITLE		Apply industrial electrical skills			
DESCRIPTOR	This unit covers installing and testing electrical wiring and circuits and conduct workplace tasks required to undertake inspection, diagnosis and repair of electrically operated equipment and systems.				
CODE		LEVEL	IV	CREDIT	06

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Plan the installation	1.1. Special work, hazard and safety requirements are determined and incorporated in plan. 1.2. Work plan/strategy is devised and confirmed in accordance with legislative and regulatory requirements and standard operating procedures.
2. Prepare for electrical installation	2.1. All work is undertaken safely and to workplace procedures, State/Territory regulations and legislative requirements. 2.2. Materials are checked for correct specifications.
3. Install the wiring/enclosures and/or support systems	3.1. All cables/conductors/conduit/enclosures and support systems are installed to specifications using correct appropriate techniques, tools and equipment. 3.2. Cabling is marked or labelled for identification and to specification.
4. Commission and test the installed wiring system	4.1. All completed wiring/systems and enclosures are tested for compliance with specifications, regulations, and legislative requirements, utilising appropriate test procedures and equipment. 4.2. Where appropriate, the installation may be energised and tested for compliance with specifications. 4.3. Faults are rectified to specification. 4.4. Documentation is completed correctly to required specifications.

Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry standards

Installation covers:

- ✓ Applies to electrical installation work and electrical equipment work. Involves utilisation of a range of methods, tools and equipment appropriate to the work

Cables /conductors:

- ✓ Single insulated, thermoplastic insulated and sheathed, flat and circular, MIMS, steel wire armored, flexible cords and cables, copper and aluminium, catenary systems, shielded

- ✓ **Tools and equipment include the following:**
- ✓ All the relevant Tools and equipment need to be supplied to the students prior to the assessment.

ASSESSMENT GUIDE

Forms of assessment

Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Assessment context

This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations.

Critical aspects (for assessment)

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

Assessment conditions

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with installing and testing electrical wiring and circuits.

UNDERPINNING KNOWLEDGE AND SKILLS

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
Knowledge to be developed: <ul style="list-style-type: none"> ✓ hazard control and safe work practices and procedures ✓ cable selection/support fit for purpose ✓ the legislative and regulatory requirements appropriate to the work to be done ✓ work planning procedures ✓ procedures to be followed if materials and or supports do not conform to specification ✓ techniques, tools and equipment required to install cables, wires, conduit, enclosures and support systems ✓ the marking and/or labelling requirements for cabling ✓ the reasons for marking and/or labelling cables ✓ the procedures and equipment to test before and after energizing wiring and systems ✓ reasons for carrying out all tests 	Skills to be developed: <ul style="list-style-type: none"> ✓ interpreting circuits, drawings, specifications and instructions ✓ following relevant standards and regulatory requirements. ✓ using measurement for installing and testing electrical wiring and circuits ✓ selecting cables ✓ installing cables, conduit/enclosures and support systems ✓ marking and labelling cabling for identification ✓ testing wiring/systems ✓ energizing and testing installation ✓ identifying and rectifying faults ✓ completing reports and documentation using short descriptions, comments and relevant terminology ✓ considering potential points of danger when planning a rescue or provision of assistance ✓ isolating electrical hazards in accordance with safety procedures

<ul style="list-style-type: none">✓ common wiring system faults✓ method(s) for rectifying faults✓ the documentation to be completed	<ul style="list-style-type: none">✓ reading/interpreting specifications, test procedures,
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UNIT TITLE Install Industrial water pipe systems					
DESCRIPTOR	This unit of competency specifies the outcomes required to install and test water pipes larger than DN65, or large water services.				
CODE		LEVEL	IV	CREDIT	10

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Plan and prepare.	1.1 Work instructions and relevant information, including plans, specifications, quality requirements and operational details. 1.2 Signage requirements are identified and obtained from project traffic management plan and traffic conditions and are implemented. 1.3 Plant, tools and equipment selected to carry out tasks are consistent with requirements of the job.
2. Set out and excavate.	2.1 Work area and materials are prepared to support efficient installation of the pipe work. 2.2 Dewatering requirements are determined and applied. 2.3 Location, alignment direction, level and grade of mains pipe system are determined from job drawings and specifications. 2.4 Works are set out to specification. 2.5 Plant operator is advised of excavation requirements and levels are monitored. 2.6 Mains pipe system support mechanism is installed according to plans, specifications and standards in compliance with statutory and regulatory authorities' requirements.
3. Install mains pipeline.	3.1 Pipes are lowered joined according to manufacturer specifications using pipe joining methods. 3.2 Pipes are placed and fittings, valves and flow control devices are fitted according to drawings, specifications and installation procedures. 3.3 Alignment level and grade are checked continuously for conformance with design. 3.4 Mains pipe system support structure is checked. 3.5 Backfill procedure is monitored to ensure work is completed to specification, where specified. 3.6 Sustainability principles and concepts are observed and applied
4. Test mains pipe system.	4.1 Testing is performed to relevant authorities' requirements as determined by specifications. 4.2 Mains pipe system test procedures are performed, establishing pressurization, functionality and serviceability. 4.3 Test results are recorded and reported
5. Clean up.	5.1 Work area is cleared and materials disposed. 5.2 Plant, tools and equipment are cleaned, checked, maintained and stored according to manufacturer recommendations and standard work practices.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Signage may include:

- ✓ barricades
- ✓ site safety signage
- ✓ temporary signage for benefit of motorists and pedestrians
- ✓ traffic conditions signage.

Pipe joining methods may include:

- arc welded and mechanical jointed
- rubber ring
- solvent welded
- other approved jointing methods.

Valves and flow control devices include:

- air release valves
- energy dissipaters
- flow control valves
- non-return valves
- pressure control valves
- stop valves.

Tools, equipment and material used in this unit may include:

- crow bars
- grinders
- hammers
- jointing equipment
- levelling equipment
- lifting equipment
- oxy-acetylene equipment
- saws
- scaffolding
- shovels.

ASSESSMENT GUIDE

Forms of assessment

Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required.

Assessment context

This competency is to be assessed using standard and authorized work practices, safety requirements and environmental constraints. Assessment of essential underpinning knowledge will usually be conducted in an off-site context. Assessment is to comply with relevant regulatory requirements.

Critical aspects (for assessment)

Critical aspects of assessment should facilitate applying sustainability principles and concepts, locating, interpreting and applying relevant information, standards and specifications, complying with site safety plan and comply with organisational policies and procedures, including quality requirements

Assessment conditions

Assessment need to cover both theoretical and practical assessment of this unit and must be carried out in an examination room where the students are supplied with all the relevant tools and equipment required for the assessment

UNDERPINNING KNOWLEDGE AND SKILLS

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<p>Knowledge to be developed:</p> <ul style="list-style-type: none">✓ confined space entry requirements✓ dewatering✓ equipment types, characteristics, technical capabilities and limitations✓ excavation and trench safety✓ installation of booster systems✓ installation of thrust blocks✓ mains pipe systems and installation procedures✓ mains water pressure✓ materials safety data sheets (MSDS) and materials handling methods✓ operational, maintenance and basic diagnostic procedures✓ processes for calculating pipeline grades and percentages✓ sedimentation and erosion controls✓ site and equipment safety requirements✓ valves and flow control devices✓ water reticulation	<p>Skills to be developed:</p> <ul style="list-style-type: none">✓ communication skills to determine requirements✓ initiative and enterprise skills to identify and accurately report to appropriate personnel any faults in tools, equipment or materials✓ literacy skills to complete written records and reports of test results✓ numeracy skills to apply measurements and calculations✓ planning and organising skills to plan and sequence tasks with others✓ teamwork skills to work with others to action tasks and relate to people from a range of cultural and ethnic backgrounds and with varying physical and mental abilities✓ technology skills to access and understand site-specific instructions in a variety of media✓ use mobile communication technology

UNIT TITLE	Perform Install, commission and repair water pumps				
DESCRIPTOR	This unit of competency describes the skills and knowledge required to carry out testing and repair of centrifugal and positive displacement pumping systems for outdoor power equipment				
CODE		LEVEL	IV	CREDIT	09

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Prepare to undertake test	1.1. Confirm nature and scope of work requirements 1.2. Identify and source procedures, information and tooling required 1.3. Analyse method options, select those most appropriate to the circumstances and make preparations 1.4. Source technical and/or calibration requirements for testing and prepare support equipment 1.5. Identify chemical cleaning agents, their safe handling and disposal methods with respect to environmental requirements
2. Conduct test and analyse results	2.1. Observe workplace health and safety (WHS) requirements, including individual state/territory regulatory requirements and personal protection needs, throughout the work 2.2. Carry out tests in accordance with workplace procedures and manufacturer/component supplier specifications 2.3. Compare test results with specifications to indicate compliance or non-compliance 2.4. Document results with evidence and supporting information and make recommendations 2.5. Process report or forward to persons for action in accordance with workplace procedures
3. Prepare for repair operation	3.1. Confirm work to be carried out 3.2. Plan repair operation, including post-repair testing 3.3. Access and interpret service procedures, workshop manuals and manufacturer information 3.4. Identify and prepare tools, equipment and materials required for servicing job 3.5. Set up work area
4. Repair pumping system	4.1. Identify and observe applicable WHS requirements, including state/territory regulatory requirements and personal protection needs 4.2. Select tooling and equipment to meet job requirements and check to ensure they are in good working order 4.3. Repair pump system following

	<p>manufacturer/component supplier recommended procedures and specifications</p> <p>4.4. Complete repair operations without causing damage to any vehicle/machine or component</p> <p>4.5. Make necessary adjustments in accordance with manufacturer/component supplier specifications</p>
5. Complete work and prepare relevant documents	<p>5.1. Complete repair schedule documentation and update customer and warranty information as required</p> <p>5.2. Inspect repaired unit to ensure protective guards, cowlings and safety features are in place</p> <p>5.3. Clean unit to workplace expectations</p> <p>5.4. Clean work area, dispose of waste, and store tools and equipment in accordance with workplace procedures</p> <p>5.5. Provide customer report on repair and explain use and care of equipment and warranty requirements</p>

Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Pumping systems

- centrifugal pumps as used for firefighting, irrigation and water transfer
- high-pressure piston pumps as used in pressure cleaners
- diaphragm pumps as used in orchard spraying

Pump system variables

- heating devices as found in hot pressure washes
- high-pressure low volume centrifugal
- low-pressure high volume centrifugal
- vane, rotor, piston and gear pumps

Servicing methods

- on- and off-site testing and repair
- isolation of faults, including internal and external leakage
- dismantling, inspection and evaluation
- replacement of components parts
- assembly and completion of operational tests
- adjustments
- testing of unit for pressure, suction and discharge
- communicating with customers
- documenting and reporting on repairs and tests

Tools, equipment and material used in this unit may include:

- specific service/repair and general workshop equipment and tooling
- pressure gauges
- flow meters
- cleaning equipment

ASSESSMENT GUIDE

Forms of assessment

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

Assessment context

The application of competency is to be assessed in the workplace or a simulated environment that reflects as far as possible the actual working environment. Assessment is to occur using standard and authorized work practices, safety requirements and environmental constraints. Assessment should comply with relevant regulatory requirements, including specified regulations from the TVETA.

Critical aspects (for assessment)

Critical aspects related to the assessment include observing safety procedures and requirements, communicating with stakeholders, identifying application, purpose and operation of the pumping system, conducting testing and undertaking of standard repair as recommended by the manufacturer.

Assessment conditions

Assessment need to cover both theoretical and practical assessment of this unit and must be carried out in an examination room where the students are supplied with all the relevant tools and equipment required for the assessment

UNDERPINNING KNOWLEDGE AND SKILLS

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<p>Knowledge to be developed:</p> <ul style="list-style-type: none"> ✓ operating principles of pumps ✓ chemical cleaning agents and HAZCHEM warnings ✓ identification of the unit application, purpose and operation ✓ identification of component parts to include physical, fluid, gases and heat generation ✓ types, characteristics, uses and limitations of centrifugal and positive displacement pumps ✓ pressure and force and their relationship to each other ✓ types and causes of problems in pumping systems ✓ types and layout of service/repair manuals (hard copy and electronic) ✓ pump system service procedures ✓ selection, checking and use of tooling and equipment ✓ manufacturer and/or component supplier specifications 	<p>Skills to be developed:</p> <ul style="list-style-type: none"> ✓ technical skills related to the use of workplace technology and tools related to testing and repairing pumping systems ✓ communication skills to the level required to confirm work requirements and specifications, to communicate effectively regarding work requirements with supervisor, other workers and customers. ✓ literacy and numeracy skills to the level required to understand information from the manufactures prior to repair. ✓ problem-solving skills to the level required to plan and undertake repair ✓ team skills to the level required to work effectively and cooperatively to optimize workflow and productivity

UNIT TITLE Perform plumbing work to support storm water drainage system					
DESCRIPTOR	This unit of competency specifies the outcomes required to design systems for the collection, storage, distribution and re-use of rainwater for drinking and non-drinking uses, including irrigation, toilet flushing and other uses approved by relevant authorities.				
CODE		LEVEL	IV	CREDIT	08

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Evaluate design parameters.	1.1. Scope of work is established for rainwater harvesting systems 1.2. Design requirements are determined from client brief. 1.3. Rainfall patterns analyzed and system is reviewed 1.4. Cost-benefit analysis is conducted comparing a range of pipe materials and system designs. 1.5. Manufacturer requirements and trade and technical manuals are interpreted. 1.6. Additional research, including a desktop study, is conducted to outline design parameters. 1.7. Performance requirements are reviewed
2. Plan and detail system components.	2.1. Layout of pipework systems and type and location of fittings, valves and controls are planned. 2.2. Pipe size calculations are completed for a range of applications. 2.3. Separation of services and backflow prevention devices are designed and detailed. 2.4. Pump and ancillary requirements are sized and detailed. 2.5. Installation requirements are specified. 2.6. Allowance for expansion and contraction is provided
3. Install storm water system	3.1. Lower pipes and place in position 3.2. Join pipes correctly 3.3. Continuously check alignment level and grade continuously for conformance 3.4. Position side support and/or overlay beside the pipes. 3.5. Fit inspection openings 3.6. Monitor backfill procedure and ensure work is completed to requirements
4. Prepare documentation.	4.1. Testing and commissioning schedule is prepared. 4.2. Operation and maintenance manual or instructions sheets are prepared and submitted

Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the

candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Scope of work must include:

- ✓ interpreting plans and specifications
- ✓ sizing and documenting layout of storm water drainage system
- ✓ may be for new projects or an existing structure being renovated, extended, restored or maintained.

Design requirements must include:

- ✓ architectural plans
- ✓ owner requirements
- ✓ pipework identification
- ✓ sizing of pipework

Tools and equipment include the following:

- ✓ All the relevant Tools and equipment need to be supplied to the students prior to the assessment.

ASSESSMENT GUIDE

Forms of assessment

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

Assessment context

This competency is to be assessed using standard and authorized work practices, safety requirements and environmental constraints. Assessment of essential underpinning knowledge will usually be conducted in an off-site context.

Critical aspects (for assessment)

A person who demonstrates competency in this unit must be able to provide evidence of locating, interpreting and applying relevant information, standards and specifications to set out, install and test stormwater drainage systems. Should also apply safety requirements throughout the work sequence, including electrical safety requirements and the use of personal protective clothing and equipment.

Assessment conditions

Assessment need to cover both theoretical and practical assessment of this unit and must be carried out in an examination room where the students are supplied with all the relevant tools and equipment required for the assessment

UNDERPINNING KNOWLEDGE AND SKILLS

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
Knowledge to be developed: <ul style="list-style-type: none"> ✓ characteristics and application of different pipe fittings and fixture supports, including fixing and jointing techniques ✓ excavation processes and procedures ✓ levelling and alignment processes ✓ process of installing stormwater and sub-soil drainage systems ✓ processes for accessing information and 	Skills to be developed: <ul style="list-style-type: none"> ✓ communication skills to access information ✓ determine requirements ✓ follow instructions ✓ complete workplace documentation ✓ numeracy skills to apply measurements and calculations ✓ planning and organising skills to plan and sequence tasks with others ✓ plan and set out work

<p>for calculating material requirements</p> <ul style="list-style-type: none"> ✓ properties of water, including pressure and flow rates ✓ relevant requirements related to installing stormwater systems ✓ SI system of measurements ✓ water and air test systems and procedures ✓ workplace and equipment safety requirements 	<ul style="list-style-type: none"> ✓ teamwork skills to work with others to action tasks ✓ technical skills to install a drainage system to take stormwater from a downpipe or surface collection pit, and groundwater to a legal point of discharge ✓ technology skills to access and understand site-specific instructions in a variety of media ✓ use mobile communication technology
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