



TECHNICAL &  
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TRAINING  
AUTHORITY



# National Competency Standard for Sewerage System Operation and Maintenance

**Standard Code: xxxxxxxx**

*[Endorsed by the MALDIVES QUALIFICATIONS AUTHORITY (MQA)]*



## **Standard Development Process**

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To begin with, Sewerage System Operation and Maintenance occupations were profiled through study of the occupation across Maldivian workplaces. During the study, relevant jobs at the utility enterprises were reviewed and the processes led to the development of the Draft National Competency Standard for Sewerage System Operation and Maintenance.

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 review and may recommend changes to the competency units mapped and selected. Purpose of this process is to develop a competency standard that reflects current work practices of today with provisions to cater for future growth across the utility enterprises of the Maldives. Technical Panel meetings will continue in reviewing this Competency Standard until Final Draft is agreed and accepted by all the participating members.

Final Draft of Sewerage System Operation and Maintenance Standard approved by the TP will then be submitted to the Construction Employment Sector Council for endorsement and validation. A brief report on how the National Occupational Standard of Sewerage System Operation and Maintenance reflecting the process of compilation will be presented to the Construction Employment Sector Council 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, Sewerage System Operation and Maintenance Standard will be endorsed by the Council.

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

## **Description of “Sewerage System Operation and Maintenance”**

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Sewer Technician play an important role within the Public Utility Sector of the Maldives as they undertake testing of treated water by the different utility providers. Referred occupations is vital to ensure water produced by the various public and private utility enterprises remained to be of highest quality and pass the standards set by the Environment Protection Agency (EPA) of the Maldives.

National Certificate-4 in “Sewerage System Operation and Maintenances” are 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 local construction industry.

## **Prospective Job opportunities**

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Upon successful completion of the National certificate-4 in for Sewerage System Operation and Maintenance students can work in the following jobs.

- Sewer Technician
- Sewerage system operator

## 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 SEWERAGE SYSTEM OPERATION AND MAINTENANCE****3. Qualification code:****Total Number of Credits: 123****4. Purpose of the qualification**

National Certificate IV Sewerage System Operation and Maintenance provides knowledge and skills training to effectively operate, maintain and service sewerage system operation and maintenance.

**5. Regulations for the qualification****6. Schedule of Units**

<b>Unit No</b>	<b>Unit Title</b>	<b>Code</b>
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**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	Apply science for Water Operations	
07	Plan to undertake a routine task	
08	Perform electrical service and maintenance	
09	Perform Install, commission and repair pumps	
10	Locate and clear blockages	
11	Install below ground Industrial sewerage systems	
12	Install sewerage pump station and sea outfall	
13	Operate and maintain Sewerage Treatment Plant (STP)	
14	Apply accident-emergency procedures	

**7. Accreditation requirements****8. Recommended sequencing of units**

## Units Details

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#	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	Apply science for Water Operations		IV	06
07	Plan to undertake a routine task		IV	05
08	Perform electrical service and maintenance		IV	09
09	Perform Install, commission and repair pumps		IV	20
10	Locate and clear blockages		IV	09
11	Install below ground Industrial sewerage systems		IV	10
12	Install sewerage pump station and sea outfall		IV	10
13	Operate and maintain Sewerage Treatment Plant (STP)		IV	09
14	Apply accident-emergency procedures		IV	06

**Packaging of National Qualifications:**

National Certificate IV in Sewerage System Operation and Maintenance will be awarded to those who are competent in units 1+2+3+4+5+6+7+8+9+10+11+12+13+14

**Qualification Code:**

## Competency Standard for Sewerage System Operation and Maintenance

<b>UNIT TITLE</b>	<b>Write technical reports</b>				
<b>DESCRIPTOR</b>	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.				
<b>CODE</b>		<b>LEVEL</b>	IV	<b>CREDIT</b>	07

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

UNIT TITLE		Apply and maintain Occupational Health and Safety			
DESCRIPTOR	This unit of competency describes the skills and knowledge to monitor and maintain work health and safety (WHS) within a work area where the person has supervisory responsibility for others.				
CODE		LEVEL	IV	CREDIT	10

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	1.5. Ensure hazard controls and PPE appropriate to the work requirements are available and functional 1.6. Provide and communicate current information about workplace health and safety policies, procedures and programs to others 1.7. Ensure <b>hazards</b> and control measures relating to work responsibilities are known by those in the work area 1.8. Provide support to those in the work area to implement procedures to support safety 1.9. 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 <b>risk controls</b> 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	5.1. Ensure that workplace procedures for dealing with incidents and emergencies are available



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

<b>UNIT TITLE</b>		<b>Carry out data entry and retrieval procedures</b>			
<b>DESCRIPTOR</b>	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.				
<b>CODE</b>		<b>LEVEL</b>	IV	<b>CREDIT</b>	10

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

UNIT TITLE <b>Apply mathematics for water operations</b>					
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	07

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

<b>UNIT TITLE</b>	<b>Prepare basic technical drawing</b>				
<b>DESCRIPTOR</b>	This unit covers identifying the drawing requirements, preparing or making changes to engineering drawings, preparing an engineering parts list and issuing the drawings				
<b>CODE</b>		<b>LEVEL</b>	IV	<b>CREDIT</b>	05

<b>ELEMENTS OF COMPETENCIES</b>	<b>PERFORMANCE CRITERIA</b>
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"><li>✓ requirements and purpose of the drawing to be produced</li><li>✓ procedures for producing an initial drawing and changing existing drawing</li><li>✓ drafting principles to be applied to the production/changing of a drawing</li><li>✓ standards to which the drawing is to be produced</li><li>✓ procedures for checking drawings</li><li>✓ procedures and reasons for recording completed drawings and or parts lists</li><li>✓ procedures for copying approved drawings and or parts lists</li><li>✓ procedures for issuing approved drawings and or parts lists</li></ul>	Skills to be developed: <ul style="list-style-type: none"><li>✓ using drafting equipment appropriate to the drawing method chosen</li><li>✓ 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</li><li>✓ where appropriate, copying and issuing approved drawings and or parts lists in accordance with standard operating procedures</li><li>✓ handling and storing the approved drawings and or parts lists in accordance with standard operating procedures</li></ul>

<b>UNIT TITLE</b>	<b>Apply science for Water Operations</b>				
<b>DESCRIPTOR</b>	This unit of competency covers the ability to relate fundamental laws of science with routine tasks and work environment.				
<b>CODE</b>		<b>LEVEL</b>	IV	<b>CREDIT</b>	06

<b>ELEMENTS OF COMPETENCIES</b>	<b>PERFORMANCE CRITERIA</b>
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"> <li>• States of matter, and properties related to it</li> <li>• Pure substances and mixtures</li> </ul> 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"> <li>✓ relating nature of physics to real world, and apply it in day to day work</li> <li>✓ understanding the scientific laws, and limits, and how they govern the real world applications</li> </ul>	<ul style="list-style-type: none"> <li>✓ working principles of machineries</li> <li>✓ principles of physics</li> <li>✓ scientific terminology and technical details</li> </ul>

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

<b>UNIT TITLE</b> Perform electrical service and maintenance					
<b>DESCRIPTOR</b>	The aim of this module is to enable the candidate to perform electrical maintenance and troubleshooting of systems and component in within the sewerage sectors.				
<b>CODE</b>		<b>LEVEL</b>	IV	<b>CREDIT</b>	09

<b>ELEMENTS OF COMPETENCIES</b>		<b>PERFORMANCE CRITERIA</b>	
1. Develop Fundamentals of electricity	1.1 Interpret electrical safety 1.2 Familiarize with functions and applications of electrical tools and equipment 1.3 Perform simple electrical circuits 1.4 Perform electrical measurements using measuring devices on single phase and three phase equipment. 1.5 Diagnose faults on electrical connections on electrically operated appliances		
2. Diagnose equipment	2.1 Carry out diagnostic tests according to workplace procedures and safety requirements without causing damage to components or systems 2.2 Identify faults from diagnostic test results and determine causes of faults 2.3 Confirm and report diagnosis findings and develop recommendations for required repairs or adjustments according to workplace procedures		
3. Repair the equipment	3.1 Source and interpret repair information 3.2 Analyse and select repair options required by the circumstances 3.3 Check and select repair tools, equipment and materials 3.4 Carry out repairs and component replacements and adjustments according to manufacturer specifications, workplace procedures and safety requirements, and without causing damage to components or systems 3.5 Carry out post-repair testing according to workplace procedures to confirm fault rectification, and rectify any further problems introduced during the repair process		
4. Complete work processes	4.1 Conduct final inspection according to workplace procedures and confirm equipment is ready for use 4.2 Clear work area and dispose of or recycle materials according to workplace procedures 4.3 Complete documentation according to workplace procedures		

#### **RANGE STATEMENT**

This section specifies work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Equipment may include the following:

- ✓ Blower
- ✓ Waste water pump
- ✓ Vacuum pump

## Tools, equipment and materials used for this unit may include

- ✓ Power tools
- ✓ Calculator
- ✓ Multi-meter
- ✓ Megger

## 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. Assessors must verify performance evidence through questioning on skills and knowledge to ensure correct interpretation and application.

## UNDERPINNING KNOWLEDGE AND SKILLS

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<p><b>Knowledge to be developed:</b></p> <ul style="list-style-type: none"><li>✓ Workplace health and safety requirements, equipment and material relating to testing and repairing electrical circuits, including personal safety requirements</li><li>✓ electrical principles, including:<ul style="list-style-type: none"><li>• current, voltage, resistance and power</li><li>• series circuits</li><li>• parallel circuits</li><li>• series and parallel circuits</li><li>• Ohm's law</li></ul></li><li>✓ basic electrical circuit components, including:<ul style="list-style-type: none"><li>• cable types and sizes and current carrying capacity</li><li>• circuit protection devices</li><li>• switches</li><li>• relays</li></ul></li><li>✓ diagnose techniques and reading and interpreting technical information, including circuit types, diagrams and symbols</li><li>✓ types and operation of electrical testing equipment, including digital multimeters and other tools</li><li>✓ Locating faults, validation and reporting</li></ul>	<p><b>Skills to be developed:</b></p> <ul style="list-style-type: none"><li>✓ Interpret safety and electrical fundamentals</li><li>✓ Develop electrical circuits of diverse range</li><li>✓ methods to locate and interpret information required to diagnose and repair pumps and motors</li><li>✓ Interpret operating principles of pumps and motors and associated components</li><li>✓ application, purpose and operation of electric pumps and motors and components, including drive motors, electric controls, wiring harness</li><li>✓ Application of measuring and diagnostic tools equipment</li><li>✓ Demonstrate diagnostic testing procedures for pumps and motors, including:<ul style="list-style-type: none"><li>• using diagnostic flow charts</li><li>• testing electrical systems,</li></ul></li><li>✓ repair procedures for pumps and motors, including removing and replacing faulty or damaged components, adjusting drive speed and replacing electric motors</li><li>✓ post-repair testing procedures for pumps and motors</li></ul>

<b>UNIT TITLE</b> Perform Install, commission and repair pumps					
<b>DESCRIPTOR</b>	This unit of competency describes the skills and knowledge required to carry out installation, and commissioning of centrifugal and positive displacement pumping systems for outdoor power equipment.				
<b>CODE</b>		<b>LEVEL</b>	IV	<b>CREDIT</b>	20

<b>ELEMENTS OF COMPETENCIES</b>		<b>PERFORMANCE CRITERIA</b>			
1. Identify scope of machine installation, commissioning or modification task		1.1.	Examine machine and equipment drawings, manufacturer's manuals and other technical data on machines and equipment		
		1.2.	Determine performance and production requirements expected from machines and equipment after installation, commissioning or modification		
		1.3.	Determine relevant regulatory requirements		
		1.4.	Inspect site and determine appropriateness of structural supports, ventilation, services, security and other critical requirements		
		1.5.	Determine mechanical, electrical, fabrication and machine control skills and task requirements		
		1.6.	Produce or review installation, commissioning or modification schedule		
2. Brief team on requirements		2.1	Distribute and discuss drawings, schedules, and major materials and equipment with team		
		2.2	Arrange for request for further information (RFIs) with designers, where required		
		2.3	Brief team on key compliance and risk factors, including regulatory, occupational health and safety (OHS) and environmental requirements		
		2.4	Agree with team on critical control points and reporting requirements		
3. Commence installation, commissioning or modification task		3.1	Supervise machine and equipment shutdowns required for task		
		3.2	Supervise unloading of any new machines, equipment and materials required for task		
		3.3	Check and determine that supply of services to work are adequate for task commencement		
		3.4	Ensure all tradespersons have correct drawing		
4. Monitor progress and deal with contingencies		4.1	Establish procedures to ensure assembly and connections are against drawing specifications		
		4.2	Ensure electrical, fluid power, and control systems and circuits are consistent with specifications and regulations		
		4.3	Identify problems and contingencies and establish and rectify root cause		
5. Finalise installation, commissioning or modification		5.1	Conduct final check to ensure installation, commissioning or modification is consistent with drawings, manufacturer manuals and any regulatory requirements		
		5.2	Conduct test run of equipment		
		5.3	Identify and correct any malfunctions or errors in required output		



6. Conduct handover and finalize documentation	6.1 Brief client and operators on machine or equipment operation after installation 6.2 Prepare and submit any required reports on installation, commissioning or modification
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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. 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:

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

## ASSESSMENT GUIDE

### Forms of assessment

Assessment methods must confirm consistency and accuracy of performance (over time and in a range of workplace relevant contexts) together with application of Required Skills and Knowledge. Assessment methods must be by direct observation of tasks and include questioning on Required Skills and Knowledge to ensure its correct interpretation and application.

### Critical aspects (for assessment)

Assessors must be satisfied that the candidate can competently and consistently:

- ✓ observe safety procedures and requirements
- ✓ communicate effectively with others involved in or affected by the work
- ✓ identify the application, purpose and operation of the pumping system
- ✓ select testing and repair methods and techniques appropriate to the circumstances
- ✓ complete preparatory activity in a systematic manner
- ✓ accurately interpret test results
- ✓ conduct testing and repairs in accordance with workplace and manufacturer/component supplier requirements
- ✓ follow correct handling and disposal procedures for chemical cleaning agents
- ✓ present repaired pumping system to customer in compliance with workplace requirements
- ✓ complete workplace records.

### Assessment conditions

The candidate will have access to

- ✓ All tools, equipment, material, blue prints, sketches, workshop drawings and other documentation required.
- ✓ The candidate will have access to all welding tools and equipment including welding accessories

The candidate will be required to:

- ✓ Orally, or by other methods of communication, answer questions asked by the assessor.
- ✓ Identify superiors who can be approached for the collection of competency evidence, where appropriate.
- ✓ Present evidence of credit for any off-job training related to this unit.

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

## UNDERPINNING KNOWLEDGE AND SKILLS

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<p><b>Knowledge to be developed:</b></p> <ul style="list-style-type: none"> <li>✓ operating principles of positive and non-positive displacement pumping systems</li> <li>✓ identification of the unit application, purpose and operation</li> <li>✓ identification of component parts to include physical, fluid, gases and heat generation</li> <li>✓ types, characteristics, uses and limitations of centrifugal and positive displacement pumps</li> <li>✓ pressure and force and their relationship to each other</li> <li>✓ types and causes of problems in pumping systems</li> <li>✓ types and layout of service/repair manuals (hard copy and electronic)</li> <li>✓ pump system service procedures</li> <li>✓ selection, checking and use of tooling and equipment</li> <li>✓ manufacturer and/or component supplier specifications</li> </ul>	<p><b>Skills to be developed:</b></p> <ul style="list-style-type: none"> <li>✓ literacy skills to the level required to understand information related to work orders and to locate, interpret and apply manufacturer/component supplier information, workplace policies and procedures</li> <li>✓ numeracy skills to the level required to correctly calculate time, assess test results, apply accurate measurements, calculate material requirements and establish quality checks</li> <li>✓ problem-solving skills to the level required to plan and organise activities and establish safe and effective work processes which anticipate and/or resolve problems and downtime, and to systematically develop solutions to avoid or minimise reworking and avoid wastage</li> <li>✓ team skills to the level required to work effectively and cooperatively with others to optimize workflow and productivity.</li> </ul>

<b>UNIT TITLE</b> <b>Locate and clear blockages</b>					
<b>DESCRIPTOR</b>	This unit of competency specifies the outcomes required to locate and clear blockages to sanitary plumbing and drainage with the use of mechanically operated drain clearing machines and attachments, closed circuit television (CCTV) and manually operated drain cleaning tools and equipment where required.				
<b>CODE</b>		<b>LEVEL</b>	IV	<b>CREDIT</b>	09

<b>ELEMENTS OF COMPETENCIES</b>	<b>PERFORMANCE CRITERIA</b>
1. Prepare for work	1.1. Plans and specifications are obtained from job supervisor. 1.2. Work health and safety and environmental requirements associated with locating and clearing blockages are adhered to throughout the work. 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 1.5. Tools and equipment, including personal protective equipment, are selected and checked for serviceability. 1.6. Work area is prepared to support efficient locating and clearing of blockage 1.7. Plans and specifications are obtained from job supervisor.
2. Locate and clear blockage.	2.1 Section containing blockage is located and isolated and its material identified. 2.2 Blockage clearing equipment is selected according to the job. 2.3 Where necessary, mechanical drain clearing equipment is assembled and used according to manufacturer instructions. 2.4 Blockage is cleared without causing damage to pipework and fittings. 2.5 Pipework is tested to confirm blockage is cleared from pipe system. 2.6 Where required, authorities are advised of work completion. 2.7 Sustainability principles and concepts are applied throughout the locating and clearing process.
3. Clean up.	3.1 Work area is cleared and materials disposed of, reused or recycled according to legislation, regulation, codes of practice and job specification. 3.2 Tools and equipment are cleaned, checked, maintained and stored according to manufacturer recommendations and workplace procedures. 3.3 Information is accessed and documentation completed according to workplace requirements.

### **RANGE STATEMENT**

The range statement relates to the unit of competency as a whole and 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.

Work health and safety is to be according to commonwealth, state and territory legislation and regulations and may include:

- ✓ handling of materials
- ✓ hazard control
- ✓ hazardous materials and substances
- ✓ personal protective clothing and equipment prescribed under legislation, regulations and workplace policies and practices
- ✓ safe operating procedures, including recognising and preventing hazards associated with:
  - ✓ blockage clearance tools and equipment
  - ✓ dangerous materials
  - ✓ identifying and testing for electrical hazards
  - ✓ other machines
  - ✓ recently filled trenches
  - ✓ services
  - ✓ surrounding structure and facilities
  - ✓ traffic control
  - ✓ use of tools and equipment
  - ✓ workplace environment and safety
  - ✓ use of firefighting equipment
  - ✓ use of first aid equipment.

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

- ✓ hacksaw
- ✓ hand and power tools
- ✓ heating equipment
- ✓ manually operated drain cleaning, including plungers and rods
- ✓ measuring equipment
- ✓ mechanically operated drain clearing machines and attachments, including the use of a sanitary snake
- ✓ pipe cameras
- ✓ pipe locating equipment
- ✓ plungers
- ✓ rods.

**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)**

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 locate and clear blockages
- ✓ applying safety requirements throughout the work sequence, including electrical safety requirements and the use of personal protective clothing and equipment
- ✓ locating and clearing blockages from drainage pipework using both manual tools and mechanical equipment, ensuring:
  - ✓ correct identification of location and clearance process
  - ✓ correct selection and use of appropriate tools and equipment
  - ✓ compliance with regulations, standards and organisational quality procedures and processes
- ✓ communicating and working effectively and safely with others.

### 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
<p><b>Knowledge to be developed:</b></p> <ul style="list-style-type: none"><li>✓ characteristics of different pipes, fittings and fixture supports, including fixing and joining techniques</li><li>✓ correct materials handling processes</li><li>✓ effective isolation processes and procedures</li><li>✓ job safety analysis (JSA) and safe work method statements (SWMS)</li><li>✓ mechanical and hydraulic principles for clearing blockages</li><li>✓ processes of clearing blockages</li><li>✓ properties of water, including pressure and flow rates</li><li>✓ relevant statutory requirements</li><li>✓ SI system of measurements</li><li>✓ workplace and equipment safety requirements</li></ul>	<p><b>Skills to be developed:</b></p> <ul style="list-style-type: none"><li>✓ communication skills to access information, determine work requirements and follow instructions</li><li>✓ initiative and enterprise skills to identify and report to appropriate personnel any faults in tools, equipment or materials</li><li>✓ planning and organising skills to plan and sequence tasks with others</li><li>✓ teamwork skills to work with others to action tasks and relate to people from a range physical and mental abilities</li><li>✓ technical skills to locate and clear blockages, such as tree roots and other refuse, from sanitary plumbing, water and sewerage pipe installations and drainage and roof installations using: mechanically operated drain clearing machines and attachments and manually operated drain cleaning tools and equipment</li></ul>

<b>UNIT TITLE</b>		<b>Install below ground Industrial sewerage systems</b>			
<b>DESCRIPTOR</b>	This competency standard 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.				
<b>CODE</b>		<b>LEVEL</b>	IV	<b>CREDIT</b>	10

<b>ELEMENTS OF COMPETENCIES</b>	<b>PERFORMANCE CRITERIA</b>
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.

#### Regulations

- ✓ Follow relevant regulation

#### Sewerage 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.
- ✓ Gravity system
- ✓ Vacuum system

#### Materials required to install a drainage system:

- ✓ glues, and welds, construction materials for drain surfaces and slopes, and backfill materials.

#### What PPE may be required to install drainage systems:

- ✓ PPE may include hat, boots, overalls, gloves, goggles, respirator or face mask, face guard, hearing protection, sunscreen lotion and hard hat.

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

- ✓ Survey 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 this 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. Assessment is to comply with relevant regulatory requirements.

### 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. It is critical to ensure 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"> <li>✓ characteristics and application of different pipe fittings and fixture supports, including fixing and joining techniques</li> <li>✓ excavation processes and procedures</li> <li>✓ hazardous materials</li> <li>✓ levelling and alignment processes</li> <li>✓ materials relevant to sanitary drainage</li> <li>✓ principles of drainage design</li> <li>✓ process of installing and testing sanitary drains</li> <li>✓ sources of information and processes for calculating material requirements</li> <li>✓ standards applicable to the installation</li> <li>✓ water and air test systems and procedures</li> <li>✓ workplace and equipment safety requirements</li> </ul>	<p>Skills to be developed:</p> <ul style="list-style-type: none"> <li>✓ determine requirements</li> <li>✓ follow instructions</li> <li>✓ initiative and enterprise skills to identify and report to appropriate personnel of faults in tools, equipment or materials</li> <li>✓ numeracy skills to apply measurements and calculations</li> <li>✓ planning and organising skills to plan and sequence tasks with others and including set out work</li> <li>✓ technical skills to install and test below ground sanitary drains, transfer sewage from sanitary fixtures to a sewage authority's point, dewatering and make alterations to existing sanitary drainage</li> <li>✓ technology skills to: access and understand site-specific instructions in a variety of media</li> <li>✓ Perform paperwork after the work is completed.</li> </ul>



<b>UNIT TITLE</b>	<b>Install sewerage pump station and sea outfall</b>				
<b>DESCRIPTOR</b>	This unit covers the operation and monitoring of a complex compressor system and associated equipment.				
<b>CODE</b>		<b>LEVEL</b>	IV	<b>CREDIT</b>	10

<b>ELEMENTS OF COMPETENCIES</b>	<b>PERFORMANCE CRITERIA</b>
1. Prepare for work.	1.1. Identify work requirements 1.2. Identify and control hazards 1.3. Coordinate with appropriate personnel
2. Startup compressor systems / Equipment.	2.1 Perform pre-start-up checks 2.2 Check the status of the system/equipment prior to commencing start-up process 2.3 Check all required auxiliary systems, including oil and water, to confirm their operational condition 2.4 Startup individual items of equipment and the entire compressor system as required 2.5 Bring the system to required operating conditions.
3. Control and monitor the compressor system.	3.1. Initiate load-up through the selection of appropriate speed or cycle 3.2. Monitor and adjust downstream equipment as required 3.3. Monitor the operational condition and safety status of the unit/system and take appropriate action 3.4. Adjust operational speeds and operating cycles as required 3.5. Monitor or activate safety systems to ensure that any system shutdowns are controlled and conducted safely and effectively.
4. Shut down compressor systems/equipment.	4.1. Confirm shutdown cause with other personnel and plant operators before commencing to isolate or shut down the equipment/system 4.2. Implement control measures to minimise damage and hazards 4.3. Shut down system according to procedures 4.4. Inspect the system/equipment as required by procedures 4.5. Isolate and purge systems/equipment and prepare plant for maintenance as required.
5. Maintain plant effectiveness.	5.1. Frequently and critically monitor all plant throughout shift 5.2. Use measured/indicated data and smell, sight, sound and feel as appropriate to monitor plant 5.3. Identify critical equipment/processes and tune their performance 5.4. Identify issues likely to impact on plant performance and take appropriate action 5.5. Predict impact of a change in one unit/area on other plant units/areas and communicate this to relevant people 5.6. Test trips and alarms as required

## 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. This unit of competency includes all such items of equipment and unit operations which form part of the compressor system. For your plant this may include (select relevant items):

- ✓ single/multi-stage rotary compressors (axial flow, centrifugal, turbine, screw)
- ✓ single/multi-stage reciprocating compressors
- ✓ turbo expanders/compressors
- ✓ advanced lube and seal oil systems
- ✓ intercoolers/heat exchangers
- ✓ scrubbers
- ✓ instrument/control systems
- ✓ programmable logic controllers (PLCs)
- ✓ process controllers

Typical problems for your plant may include:

- ✓ surging
- ✓ control of temperature and pressure
- ✓ variations in feed
- ✓ vibration

**Tools, equipment and materials required may include:**

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

- ✓ General hand tools
- ✓ Power tools
- ✓ Special tools for purpose

## **ASSESSMENT GUIDE**

### **Forms of assessment**

Assessment must be undertaken in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for the Competency Standard.

### **Critical aspects (for assessment)**

Competence must be demonstrated in the ability to recognize and analyse potential situations requiring action and then in implementing appropriate corrective action. The emphasis should

be on the ability to stay out of trouble rather than on recovery from a disaster. Consistent performance should be demonstrated and in particular look to see that early warning signs of equipment/processes needing attention or with potential problems are recognised. These aspects may be best assessed using a range of scenarios/case studies/what-ifs as the stimulus with a walk-through forming part of the response.

### Assessment conditions

The unit should be assessed holistically and the judgement of competence based on a holistic assessment of the evidence. The collection of performance evidence should occur over a range of situations which include typical disruptions to normal, smooth operations. Conditions for assessment must include access to all tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications associated with this unit.

### UNDERPINNING KNOWLEDGE AND SKILLS

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<p>Knowledge to be developed:</p> <ul style="list-style-type: none"> <li>✓ communication protocols,</li> <li>✓ routine problems, faults and their resolution</li> <li>✓ relevant alarms and actions</li> <li>✓ plant process idiosyncrasies</li> <li>✓ all items on a schematic of the plant item and the function of each</li> <li>✓ correct methods of starting, stopping, operating and controlling process</li> <li>✓ function and troubleshooting of major components and their problems</li> <li>✓ types and causes of problems within operator's scope of skill level and responsibility</li> <li>✓ physics and chemistry relevant to the process unit and the materials processed</li> <li>✓ process parameters and limits, eg temperature, pressure, flow, pH</li> <li>✓ principles of operation of plant/equipment</li> <li>✓ power and torque envelopes</li> <li>✓ compression flows and characteristics</li> <li>✓ liquid and product separation principles</li> <li>✓ product characteristics and tolerances</li> <li>✓ flow charts, flow, pressure, temperature, levels and rates and appropriate risk controls.</li> </ul>	<p>Skills to be developed:</p> <p>Competence includes:</p> <ul style="list-style-type: none"> <li>✓ efficient and effective operation of plant/equipment</li> <li>✓ hazard analysis</li> <li>✓ completing plant records</li> <li>✓ communication</li> <li>✓ problem solving</li> </ul> <p>Competence also includes the ability to isolate the causes of problems to an item of equipment within the compressor system and to distinguish between causes of problems/alarm/fault indications such as:</p> <ul style="list-style-type: none"> <li>✓ process gas variations</li> <li>✓ instrument failure/wrong reading</li> <li>✓ electrical failure</li> <li>✓ mechanical failure</li> <li>✓ operational problem.</li> </ul>

UNIT TITLE	Operate and maintain Sewerage Treatment Plant (STP)				
DESCRIPTOR	This unit of competency sets out the knowledge and skills required to operate and maintain Sewerage Treatment Plant.				
CODE		LEVEL	IV	CREDIT	09

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Operate system according to procedure	1.1 Receive and give shift handover 1.2 Communicate with personnel to identify and coordinate work requirements

	<ul style="list-style-type: none"> <li>1.3 Identify, control and report process system hazards</li> <li>1.4 Check for recent work undertaken on stations and address outstanding and incomplete work</li> <li>1.5 Check operational status of process system</li> <li>1.6 Perform routine checks and complete logs and paperwork, taking action on unexpected readings</li> <li>1.7 Adjust process system according to agreed operational parameters</li> </ul>
2. Identify and respond to abnormal situations during operation	<ul style="list-style-type: none"> <li>2.1 Monitor station frequently and critically throughout shift using own senses, and measured and indicated data</li> <li>2.2 Monitor field data and instrumentation to ensure that product remains on specification</li> <li>2.3 Identify impacts of changes upstream and downstream</li> <li>2.4 Identify actual and developing situations that may require action</li> <li>2.5 Take action to remedy abnormal situations according to operating procedures</li> <li>2.6 Complete required documents outlining abnormal situation management and corrective action taken</li> </ul>
3. Shut down and prepare system for maintenance	<ul style="list-style-type: none"> <li>3.1 Prepare process system to be shut down according to operating procedures</li> <li>3.2 Complete pre-shutdown checks according to operating procedures</li> <li>3.3 Shut down process system according to operating procedures</li> <li>3.4 Identify, control and report shutdown hazards</li> <li>3.5 Monitor shutdown and identify abnormal situations that may require action</li> <li>3.6 Take action to remedy abnormal situations according to operating procedures</li> <li>3.7 Shut down and changeover duty and standby equipment according to operating procedures</li> <li>3.8 Isolate process system from energy sources</li> </ul>
4. Prepare and start system	<ul style="list-style-type: none"> <li>4.1 De-isolate and prepare process system to be returned to standby or service</li> <li>4.2 Complete pre-start checks according to operating procedures</li> <li>4.3 Startup process system according to operating procedures</li> <li>4.4 Identify, control and report startup hazards</li> <li>4.5 Monitor startup and identify abnormal situations that may require action</li> <li>4.6 Take action to remedy abnormal situations according to operating procedures</li> </ul>
5. Clean up	<ul style="list-style-type: none"> <li>5.1 Work area is cleared and materials disposed of, reused or recycled according to legislation, regulation, codes of practice and job specification</li> <li>5.2 Tools and equipment are cleaned, checked, maintained and stored according to manufacturer recommendations and workplace procedures</li> <li>5.3 Information is accessed and documentation completed according to workplace requirements</li> </ul>

## 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. Bold italicised wording, if used in the performance criteria, is detailed below. 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.

System may include:

- ✓ Sewerage Treatment Plant, and its components
  - Pumps
  - Blowers

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

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

- ✓ General hand tools
- ✓ Power tools
- ✓ Special tools for purpose

## 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)**

The candidate should have knowledge of:

- ✓ all items on a schematic of pump stations and sea outfall stations, including:
  - pumps, motors, blowers operating principles including lubrication, cooling, power supply
  - interactions between equipment and processes
  - operating parameters and integrity limits, and product specifications and tolerances including temperature, pressure and flow
  - procedures for starting, stopping, operating, controlling and isolating system
  - emergency shutdown procedures
  - functions of major components and troubleshooting techniques
  - basic science of upstream and downstream processes
- ✓ Sewerage system hazards including possible causes, potential consequences, appropriate risk controls and reporting and escalation procedure

### **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 operations at workplace conditions, materials, activities, responsibilities and procedures.

## UNDERPINNING KNOWLEDGE AND SKILLS

UNDERPINNING KNOWLEDGE

UNDERPINNING SKILLS

<p>Knowledge to be developed:</p> <ul style="list-style-type: none"> <li>✓ legislative requirements, codes and standards for the design of sewerage pumping station systems including environmental protection and occupational health and safety</li> <li>✓ output quality specification requirements</li> <li>✓ risk analysis procedures</li> <li>✓ investigation procedures and methodologies</li> <li>✓ documentation and information management requirements</li> </ul>	<p>Skills to be developed:</p> <ul style="list-style-type: none"> <li>✓ communication skills to follow instructions, report hazards, use and interpret non-verbal communication, such as hand signals.</li> <li>✓ initiative and enterprise skills to: <ul style="list-style-type: none"> <li>▪ evaluate own actions and make judgements about performance and necessary improvements</li> <li>▪ identify and report to appropriate personnel any faults in tools, equipment or materials</li> </ul> </li> <li>✓ literacy skills to complete workplace documentation</li> <li>✓ planning and organising skills to plan and set out work</li> <li>✓ self-management skills to recognize procedures and to respond to change</li> <li>✓ technology skills to access and understand site-specific instructions in a variety of media and use mobile communication technology</li> </ul>
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<b>UNIT TITLE</b>		<b>Apply accident-emergency procedures</b>			
<b>DESCRIPTOR</b>	This unit involves the skills and knowledge required to apply accident emergency procedures, including responding to an incident, controlling and assisting at an accident or emergency site, finalizing accident-emergency processes, and completing records, reports and other required documentation.				
<b>CODE</b>		<b>LEVEL</b>	IV	<b>CREDIT</b>	06

<b>ELEMENTS OF COMPETENCIES</b>	<b>PERFORMANCE CRITERIA</b>
1. Respond to the incident	1.1. Response to the incident or accident is in accordance with workplace emergency procedures and relevant regulatory requirements 1.2. Details of the cause(s) and effects of the incident are identified and reported 1.3. Assistance requirements for accidents and emergencies are clarified and reported immediately to the appropriate parties 1.4. Requests for assistance are made to relevant personnel and emergency services
2. Control and assist at accident or emergency site	2.1 Site is controlled and protected until the arrival of authorized personnel 2.2 Assistance is provided to injured persons, within the limitations of duty of care and workplace procedures 2.3 Relevant authorities at the site are cooperated with and assisted within workplace policies
3. Finalize accident - emergency process and complete records	3.1 Relevant information is exchanged in accordance with state/territory law and workplace procedures 3.2 Documentation and reports are completed and processed in accordance with workplace and relevant regulatory 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.

Work may be conducted:

- ✓ in a range of work environments
- ✓ by day or night

Work may be conducted in:

- ✓ limited or restricted spaces
- ✓ exposed conditions
- ✓ controlled or open environments
- ✓ even or uneven surfaces
- ✓ wet or dry surfaces

Workplace hazards may include but are not restricted to:

- ✓ moving heavy loads in an unsafe work environment
- ✓ unsecured machinery, components or repaired equipment
- ✓ slippery floors
- ✓ flammable liquids, vapours and fuel
- ✓ poor housekeeping procedures
- ✓ non-compliance with safe working procedures
- ✓ electrical wiring and systems, including exposed electrical circuits
- ✓ working at heights and in confined spaces
- ✓ toxic gases and substances
- ✓ chemicals and other harmful substances
- ✓ damaged goods, pallets and containers
- ✓ dangerous/hazardous goods

## 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, the Range Statement and the Assessment Guidelines for the Competency standard.

### Critical aspects (for assessment)

The evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements include the following:

- ✓ the underpinning knowledge and skills
- ✓ relevant legislation and workplace procedures
- ✓ other relevant aspects of the range statement

### Assessment conditions

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

## UNDERPINNING KNOWLEDGE AND SKILLS

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
Knowledge to be developed: <ul style="list-style-type: none"> <li>✓ Relevant regulatory and code requirements applicable in accident/emergency situations</li> <li>✓ Relevant OH&amp;S and environmental protection policies and procedures</li> <li>✓ Workplace procedures for accident-emergency response</li> <li>✓ Workplace emergency, fire and accident procedures</li> <li>✓ Site layout</li> <li>✓ Focus of operation of work systems, equipment or management, site and organisational operating and emergency procedures</li> <li>✓ Typical problems that can occur during a safety incident, accident or emergency and related action that can be taken</li> </ul>	Skills to be developed <ul style="list-style-type: none"> <li>✓ Communicate effectively with others when responding to an accident or an emergency</li> <li>✓ Interpret and follow operational instructions and prioritize work</li> <li>✓ Promptly report and/or rectify any identified problems, faults or malfunctions</li> <li>✓ Implement contingency plans for unplanned events that may occur when responding to an accident or an emergency</li> <li>✓ Apply precautions and required action to minimise, control or eliminate hazards</li> <li>✓ Monitor work activities in terms of planned schedule</li> <li>✓ Modify activities depending on differing operational contingencies, risk situations and environments</li> <li>✓ Work systematically with required attention to detail without injury to self or others, or damage to goods or equipment</li> </ul>