



THE REPUBLIC OF KENYA

NATIONAL OCCUPATIONAL STANDARDS

FOR

PLUMBER

LEVEL 5



TVET CDACC

P.O. BOX 15745-00100

NAIROBI

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FOREWORD

The provision of quality education and training is fundamental to the Government's overall strategy for social economic development. Quality education and training will contribute to achievement of Kenya's development blue print and sustainable development goals.

Reforms in the education sector are necessary for the achievement of Kenya Vision 2030 and meeting the provisions of the Constitution of Kenya 2010. The education sector had to be aligned to the Constitution and this resulted in the formulation of the Policy Framework for Reforming Education and Training. A key feature of this policy is the radical change in the design and delivery of the TVET training. This policy document requires that training in TVET be competency based, curriculum development be industry led, certification be based on demonstration of competence and mode of delivery allows for multiple entry and exit in TVET programmes.

These reforms demand that industry takes a leading role in curriculum development to ensure the curriculum addresses its competence needs. It is against this background that these Occupational Standards were developed for the purpose of developing a competency-based curriculum for Plumbing Level 5. These Occupational Standards will also be the basis for assessment of an individual for competence certification.

It is my conviction that these Occupational Standards will play a great role towards development of competent human resource for the Construction sector's growth and sustainable development.

**PRINCIPAL SECRETARY, VOCATIONAL AND TECHNICAL TRAINING
MINISTRY OF EDUCATION**

PREFACE

Kenya Vision 2030 aims to transform the country into a newly industrializing, “middle income country providing a high-quality life to all its citizens by the year 2030”. Kenya intends to create a globally competitive and adaptive human resource base to meet the requirements of a rapidly industrializing economy through life-long education and training. TVET has a responsibility of facilitating the process of inculcating knowledge, skills and attitudes necessary for catapulting the nation to a globally competitive country, hence the paradigm shift to embrace Competency Based Education and Training (CBET).

The Technical and Vocational Education and Training Act No. 29 of 2013 on Reforming Education and Training in Kenya, emphasized the need to reform curriculum development, assessment and certification. This called for shift to CBET to address the mismatch between skills acquired through training and skills needed by industry as well as increase the global competitiveness of Kenyan labour force.

The TVET Curriculum Development, Assessment and Certification Council (TVET CDACC), in conjunction with Construction Sector Skills Advisory Committee (SSAC) have developed these Occupational Standards for a Plumber Level 5. These occupational standards will be the basis for development of competency-based curriculum for Plumbers. These Standards will also be the basis for assessment of an individual for competence certification.

The occupational standards are designed and organized with clear performance criteria for each element of a unit of competency. These standards also outline the required knowledge and skills as well as evidence guide.

I am grateful to Council Secretariat, Council Technical Committee, Construction SSAC and expert workers and all those who participated in the development of these occupational standards.

CHAIRPERSON, TVET CDACC

ACKNOWLEDGEMENT

These Occupational Standards were developed through combined effort of various stakeholders from private and public organizations. I am sincerely thankful to the management of these organizations for allowing their staff to participate in this course. I wish to acknowledge the invaluable contribution of industry players who provided inputs towards the development of these Standards.

I thank TVET Curriculum Development, Assessment and Certification Council (TVET CDACC) for providing guidance on the development of these Standards. My gratitude goes to the Construction Sector Skills Advisory Committee (SSAC) members for their contribution to the development of these Standards. I also thank all the individuals and organizations who participated in the validation of these Standards.

My gratitude also goes to CAP Youth Empowerment Institute and Kenya Youth Employment and Skills who cooperated with TVET CDACC in financing the development of these Standards.

I acknowledge any other institution which in one way or another contributed to the success of development of these Standards but has not been mentioned.

CHAIRPERSON

CONSTRUCTION SECTOR SKILLS ADVISORY COMMITTEE

ABBREVIATIONS AND ACRONYMS

BC	Basic Competency
CBET	Competency Based Education and Training
CC	Common Competency
CDACC	Curriculum Development Assessment and Certification Council
CR	Core Competency
CU	Curriculum
EMCA	Environmental Management and Coordination Act
MoE	Ministry of Education
NGO	Non-Governmental Organization
OS	Occupational Standards
OSHA	Occupation Safety and Health Act
PPE	Personal Protective Equipment
SSAC	Sector Skills Advisory Committee
TVET CDACC	Curriculum Development Assessment and Certification Council
TVET	Technical and Vocational Education and Training

KEY TO UNIT CODE

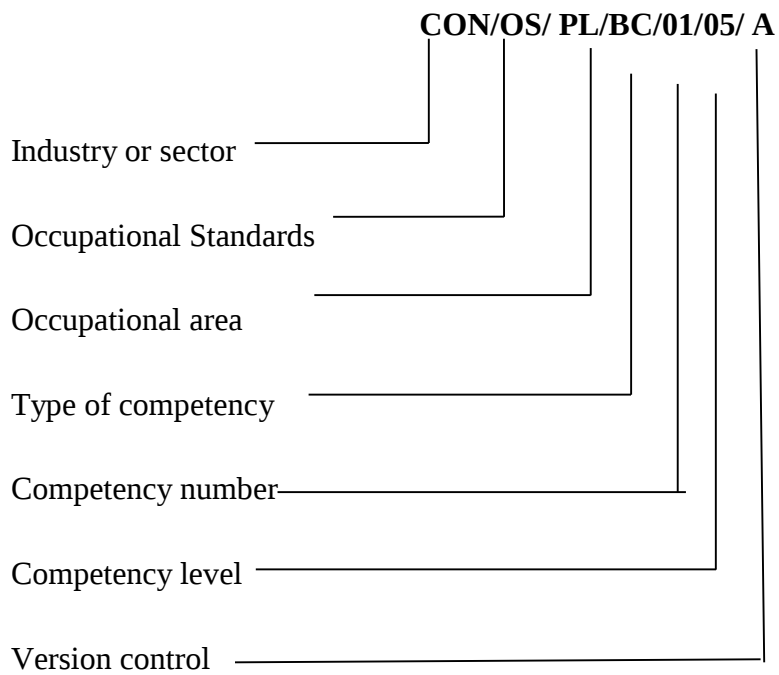


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OVERVIEW

Plumbing Level 5 qualification consists of competencies that an individual must achieve to enable him/her offer plumbing services comprising of installing water pipes and systems in buildings, rainwater harvesting Goods and disposal sanitary appliances, drainage systems, sanitary appliances, storage systems and auxilliary fittings and installing fire supply control system. It also entails maintaining plumbing systems.

The units of competency comprising this qualification include the following basic, common and core competencies:

Basic Units of Competency

Unit Code	Unit Title
CON/OS/PL/BC/01/5/A	Demonstrate communication skills
CON/OS/PL/BC/02/5/A	Demonstrate digital literacy
CON/OS/PL/BC/03/5/A	Demonstrate entrepreneurial skills
CON/OS/PL/BC/04/5/A	Demonstrate employability skills
CON/OS/PL/BC/05/5/A	Demonstrate environmental literacy
CON/OS/PL/BC/06/5/A	Demonstrate occupational safety and health practices

Common Units of Competency

Unit Code	Unit Title
CON/OS/PL/CM/01/5/A	Apply Basic Mathematics
CON/OS/PL/CM/02/5/A	Apply Technical Drawing
CON/OS/PL/CM/03/5/A	Apply Scientific principles

Core Units of Competency

Unit Code	Unit Title
CON/OS/PL/CR/01/5/A	Install Water Supply Systems
CON/OS/PL/CR/02/5/A	Install rainwater harvesting Goods and disposal
CON/OS/PL/CR/03/5/A	Install Drainage System
CON/OS/PL/CR/04/5/A	Install Sanitary Appliances
CON/OS/PL/CR/05/5/A	Install water Storage Systems and Auxiliary fittings
CON/OS/PL/CR/06/5/A	Maintain Plumbing Systems
CON/OS/PL/CR/07/5/A	Install fire supply control system

BASIC UNITS OF COMPETENCY

DEMONSTRATE COMMUNICATION SKILLS

UNIT CODE: CON/OS/PL/BC/01/5/A

UNIT DESCRIPTION

This unit covers the competencies required to demonstrate communication skills. It involves meeting communication needs of clients and colleagues, contributing to the development of communication strategies, conducting workplace interviews, facilitating group discussions and representing the organization.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
These describe the key outcomes which make up workplace function	These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Meet communication needs of clients and colleagues	1.1 Specific communication needs of clients and colleagues are identified and met based on workplace requirements 1.2 Different communication approaches are identified and applied according to clients' needs 1.3 Conflict is identified and addressed as per the standards of the organization
2. Contribute to the development of communication strategies	2.1 Strategies for internal and external dissemination of information are developed, promoted, implemented and reviewed as per organizations' strategic plan 2.2 Channels of communication are established and reviewed based on the workplace needs 2.3 Communication training needs are identified and provided according to SOPs 2.4 Work related network and relationship are maintained based on workplace requirements 2.5 Negotiation and conflict resolution strategies are maintained as per the workplace procedures

3. Conduct workplace interviews	3.1 Communication strategies are identified and employed in interview situations based on workplace requirements 3.2 Records of interviews are made and maintained in accordance with organizational procedures 3.3 Effective questioning, listening and nonverbal communication techniques are used based on needs
4. Facilitate group discussions	4.1 Mechanisms to enhance effective group interaction are identified and implemented according to workplace requirements 4.2 Strategies to encourage group participation are identified and used as per organizations' procedures 4.3 Meetings objectives and agenda are set and followed based on workplace requirements 4.4 Relevant information is provided and feedback obtained according to set protocols 4.5 Evaluation of group communication strategies is undertaken in accordance with workplace guidelines 4.6 Specific communication needs of individuals are identified and addressed as per individual needs
5. Represent the organization	5.1 Relevant presentation are researched and presented based on internal or external communication forums requirements Presentation is delivered in a clear and sequential manner as per the predetermined time 5.2 Presentation is made as per appropriate media 5.3 Difference views are respected based on workplace procedures 5.4 Written communication is done as per organizational standards 5.5 Inquiries are responded according to organizational standard

RANGE

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

Variable	Range
1. Communication strategies may include but not limited to:	1.1 Language switch 1.2 Comprehension check 1.3 Repetition 1.4 Asking confirmation 1.5 Paraphrase 1.6 Clarification request 1.7 Translation 1.8 Restructuring 1.9 Approximation 1.10 Generalization
2. Effective group interaction may include but not limited to:	2.1 Identifying and evaluating what is occurring within an interaction in a non-judgmental way 2.2 Using active listening 2.3 Making decision about appropriate words, behaviour 2.4 Putting together response which is culturally appropriate 2.5 Expressing an individual perspective 2.6 Expressing own philosophy, ideology and background and exploring impact with relevance to communication 2.7 Openness and flexibility in communication
3. Interview situations may include but not limited to:	3.1 Establishing rapport 3.2 Eliciting facts and information 3.3 Facilitating resolution of issues 3.4 Developing action plans 3.5 Diffusing potentially difficult situations

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Active listening
- Giving/receiving feedback
- Interpretation of information
- Role boundaries setting
- Negotiation
- Communication

Required Knowledge

The individual needs to demonstrate knowledge of:

- Communication process
- Dynamics of groups and different styles of group leadership
- Communication skills relevant to client groups
- Flexibility in communication

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1 Met communication needs of clients and colleagues 1.2 Contributed to the development of communication strategies 1.3 Conducted interviews 1.4 Facilitated group discussions 1.5 Represented the organization
2. Resource Implications	The following resources should be provided:

	2.1 Access to relevant workplace or appropriately simulated environment where assessment can take place 2.2 Materials relevant to the proposed activity or tasks
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1 Observation 3.2 Oral questioning 3.3 Written test 3.4 Portfolio of Evidence 3.5 Interview 3.6 Third party report
4. Context of Assessment	Competency may be assessed 4.1 On the job 4.2 Off the job 4.3 During industrial attachment
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

DEMONSTRATE DIGITAL LITERACY

UNIT CODE:CON/OS/PL/BC/02/5/A

UNIT DESCRIPTION

This unit covers the competencies required to demonstrate digital literacy. It involves identifying appropriate computer software and hardware, applying security measures to data, hardware, software in automated environment, applying computer software in solving tasks, applying internet and email in communication at workplace, applying desktop publishing in official assignment and preparing presentation packages.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
These describe the key outcomes which make up workplace function	These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Identify appropriate computer software and hardware	1.1 Concepts of ICT are determined in accordance with computer equipment 1.2 Classifications of computers are determined in accordance with manufacturers specification 1.3 <i>Appropriate computer software</i> is identified according to manufacturer's specification 1.4 <i>Appropriate computer hardware</i> is identified according to manufacturer's specification 1.5 Functions and commands of operating system are determined in accordance with manufacturer's specification
2. Apply security measures to data, hardware, software in	2.1 <i>Data security and privacy are classified</i> in accordance with the prevailing technology 2.2 <i>Security threats</i> are identified, <i>and control measures</i> are applied in accordance with laws governing protection of ICT

automated environment	2.3 Computer threats and crimes are detected in accordance with Information security management guidelines 2.4 Protection against computer crimes is undertaken in accordance with laws governing protection of ICT
3. Apply computer software in solving tasks	3.1 Word processing concepts are applied in resolving workplace tasks, report writing and documentation as per job requirements 3.2 Word processing utilities are applied in accordance with workplace procedures 3.3 Worksheet layout is prepared in accordance with work procedures 3.4 Worksheet is built and data manipulated in the worksheet in accordance with workplace procedures 3.5 Continuous data manipulated on worksheet is undertaken in accordance with work requirements 3.6 Database design and manipulation is undertaken in accordance with office procedures 3.7 Data sorting, indexing, storage, retrieval and security is provided in accordance with workplace procedures
4. Apply internet and email in communication at workplace	4.1 Electronic mail addresses are opened and applied in workplace communication in accordance with office policy 4.2 Office internet functions are defined and executed in accordance with office procedures 4.3 Network configuration is determined in accordance with office operations procedures 4.4 Official World Wide Web is installed and managed according to workplace procedures
5. Apply desktop publishing in official assignments	5.1 Desktop publishing functions and tools are identified in accordance with manufactures specifications 5.2 Desktop publishing tools are developed in accordance with work requirements 5.3 Desktop publishing tools are applied in accordance with workplace requirements 5.4 Typeset work is enhanced in accordance with workplace standards

6. Prepare presentation packages	6.1 Types of presentation packages are identified in accordance with office requirements 6.2 Slides are created and formulated in accordance with workplace procedures 6.3 Slides are edited and run-in accordance with work procedures 6.4 Slides and handouts are printed according to work requirements
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RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range
1. Appropriate computer hardware may include but not limited to:	• Computer case • Monitor • keyboard • mouse
2. Data security and privacy may include but not limited to:	• Confidentiality of data • Cloud computing • Integrity -but-curious data surfing
3. Security and control measures may include but not limited to:	• Counter measures against cyber terrorism • Risk reduction • Cyber threat issues • Risk management • Pass wording
4. Security threats may include but not limited to:	• Cyber terrorism • Hacking

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Analytical skills
- Interpretation
- Typing
- Communication
- Basic ICT skills

Required Knowledge

The individual needs to demonstrate knowledge of:

- Software concept
- Functions of computer software and hardware
- Data security and privacy
- Computer security threats and control measures
- Technology underlying cyber-attacks and networks
- Cyber terrorism
- Computer crimes
- Detection and protection of computer crimes
- Laws governing protection of ICT
- Microsoft suite

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Identified and controlled security threats 1.2 Detected and protected computer crimes 1.3 Applied word processing in office tasks
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	1.4 Designed, prepared work sheet and applied data to the cells in accordance to workplace procedures 1.5 Opened electronic mail for office communication as per workplace procedure 1.6 Installed internet and World Wide Web for office tasks in accordance with office procedures 1.7 Integrated emerging issues in computer ICT applications 1.8 Applied laws governing protection of ICT
2. Resource Implications	2.1 Tablets 2.2 Laptops 2.3 Desktop computers 2.4 Calculators 2.5 Internet 2.6 Smart phones 2.7 Operation Manuals
3. Methods of Assessment	Competency may be assessed through: 3.1 Written Test 3.2 Observation 3.3 Practical assignment 3.4 Interview/Oral Questioning
4. Context of Assessment	Competency may be assessed in: 4.1 Off the job 4.2 On the job setting 4.3 Industrial attachment
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

DEMONSTRATE ENTREPRENEURIAL SKILLS

UNIT CODE : CON/OS/PL/BC/03/5/A

UNIT DESCRIPTION

This unit covers the competencies required to demonstrate understanding of entrepreneurship. It involves demonstrating understanding of an entrepreneur, entrepreneurship, and self-employment, identifying entrepreneurship opportunities, creating entrepreneurial awareness, applying entrepreneurial motivation, developing business innovative strategies and developing business plan.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
1. Demonstrate understanding of an Entrepreneur	1.1 Entrepreneurs and Businesspersons are distinguished as per principles of entrepreneurship 1.2 Types of entrepreneurs are identified as per principles of entrepreneurship 1.3 Ways of becoming an Entrepreneur are identified as per principles of Entrepreneurship 1.4 Characteristics of Entrepreneurs are identified as per principles of Entrepreneurship 1.5 Factors affecting Entrepreneurship development are explored as per principles of Entrepreneurship
2. Demonstrate understanding of Entrepreneurship and self-employment	2.1 Entrepreneurship and self-employment are distinguished as per principles of entrepreneurship 2.2 Importance of self-employment is analysed based on business procedures and strategies 2.3 Requirements for entry into self-employment are identified according to business procedures and strategies

	2.4 Role of an Entrepreneur in business is determined according to business procedures and strategies 2.5 Contributions of Entrepreneurs to National development are identified as per business procedures and strategies 2.6 Entrepreneurship culture in Kenya is explored as per business procedures and strategies 2.7 Born or made Entrepreneurs are distinguished as per entrepreneurial traits
3. Identify Entrepreneurship opportunities	3.1 Sources of business ideas are identified as per business procedures and strategies 3.2 Business ideas and opportunities are generated as per business procedures and strategies 3.3 Business life cycle is analysed as per business procedures and strategies 3.4 Legal aspects of business are identified as per procedures and strategies 3.5 Product demand is assessed as per market strategies 3.6 Types of business environment are identified and evaluated as per business procedures 3.7 Factors to consider when evaluating business environment are explored based on business procedure and strategies 3.8 Technology in business is incorporated as per best practice
4. Create entrepreneurial awareness	4.1 Forms of businesses are explored as per business procedures and strategies 4.2 Sources of business finance are identified as per business procedures and strategies 4.3 Factors in selecting source of business finance are identified as per business procedures and strategies

	4.4 Governing policies on Small Scale Enterprises (SSEs) are determined as per business procedures and strategies 4.5 Problems of starting and operating SSEs are explored as per business procedures and strategies
5. Apply entrepreneurial motivation	5.1 Internal and external motivation factors are determined in accordance with motivational theories 5.2 Self-assessment is carried out as per entrepreneurial orientation 5.3 Effective communications are carried out in accordance with communication principles 5.4 Entrepreneurial motivation is applied as per motivational theories
6. Develop innovative business strategies	6.1 Business innovation strategies are determined in accordance with the organization strategies 6.2 Creativity in business development is demonstrated in accordance with business strategies 6.3 Innovative business strategies are developed as per business principles 6.4 Linkages with other entrepreneurs are created as per best practice 6.5 ICT is incorporated in business growth and development as per best practice
7. Develop Business Plan	7.1 Identified Business is described as per business procedures and strategies 7.2 Marketing plan is developed as per business plan format 7.3 Organizational/Management plan is prepared in accordance with business plan format 7.4 Production/operation plan in accordance with business plan format 7.5 Financial plan is prepared in accordance with the business plan format 7.6 Executive summary is prepared in accordance with business plan format

	7.7 Business plan is presented as per best practice
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RANGE

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

1. Variable	Range
2. Types of entrepreneurs may include but not limited to:	• Innovators • Imitators • Craft • Opportunistic • Speculators
3. Characteristics of Entrepreneurs may include but not limited to:	• Creative • Innovative • Planner • Risk taker • Networker • Confident • Flexible • Persistent • Patient • Independent • Future oriented • Goal oriented
4. Requirements for entry into self-employment may include but not limited to	• Technical skills • Management skills • Entrepreneurial skills • Resources • Infrastructure
5. Internal and external motivation may include but not limited to:	• Interest • Passion • Freedom • Prestige • Rewards

	• Punishment • Enabling environment • Government policies
6. Business environment may include but not limited to:	• External • Internal • Intermediate
7. Forms of businesses may include but not limited to:	• Sole proprietorship • Partnership • Limited companies • Cooperatives
8. Governing policies may include but not limited to:	• Increasing scope for finance • Promoting cooperation between entrepreneurs and private sector • Reducing regulatory burden on entrepreneurs • Developing IT tools for entrepreneurs
9. Innovative business strategies may include but not limited to:	• New products • New methods of production • New markets • New sources of supplies • Change in industrialization

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Analytical
- Management
- Problem-solving
- Root-cause analysis

- Communication

Required Knowledge

The individual needs to demonstrate knowledge of:

- Decision making
- Business communication
- Change management
- Competition
- Risk
- Net working
- Time management
- Leadership
- Factors affecting entrepreneurship development
- Principles of Entrepreneurship
- Features and benefits of common operational practices, e. g., continuous improvement (kaizen), waste elimination,
- Conflict resolution
- Health, safety and environment (HSE) principles and requirements
- Customer care strategies
- Basic financial management
- Business strategic planning
- Impact of change on individuals, groups and industries
- Government and regulatory processes
- Local and international market trends
- Product promotion strategies
- Market and feasibility studies
- Government and regulatory processes
- Local and international business environment
- Relevant developments in other industries
- Regional/ County business expansion strategies

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Distinguished entrepreneurs and business persons correctly 1.2 Identified ways of becoming an entrepreneur appropriately 1.3 Explored factors affecting entrepreneurship development appropriately 1.4 Analysed importance of self-employment accurately 1.5 Identified requirements for entry into self-employment correctly 1.6 Identified sources of business ideas correctly 1.7 Generated Business ideas and opportunities correctly 1.8 Analysed business life cycle accurately 1.9 Identified legal aspects of business correctly 1.10 Assessed product demand accurately 1.11 Determined Internal and external motivation factors appropriately 1.12 Carried out communications effectively 1.13 Identified sources of business finance correctly 1.14 Determined Governing policy on small scale enterprise appropriately 1.15 Explored problems of starting and operating SSEs effectively 1.16 Developed Marketing, Organizational/Management, Production/Operation and Financial plans correctly 1.17 Prepared executive summary correctly 1.18 Determined business innovative strategies appropriately 1.19 Presented business plan effectively
2. Resource Implications	2.1 The following resources should be provided: 2.2 Access to relevant workplace where assessment can take place

	2.3 Appropriately simulated environment where assessment can take place
3. Methods of Assessment	3.1 Written tests 3.2 Oral questions 3.3 Third party report 3.4 Interviews 3.5 Portfolio
4. Context of Assessment	Competency may be assessed 4.1 On-the-job 4.2 Off-the –job 4.3 During Industrial attachment
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

DEMONSTRATE EMPLOYABILITY SKILLS

UNIT CODE: CON/OS/PL/BC/04/5/A

Unit Description

This unit covers competencies required to demonstrate employability skills. It involves conducting self-management, demonstrating interpersonal communication, critical safe work habits, leading small teams, planning and organizing work, maintaining professional growth and development, demonstrating workplace learning, problem solving skills and managing workplace ethics.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
These describe the key outcomes which make up workplace function.	These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Conduct self-management	1.1 Personal vision, mission and goals are formulated based on potential and in relation to organization objectives 1.2 Emotional intelligence is demonstrated as per workplace requirements. 1.3 Individual performance is evaluated and monitored according to the agreed targets. 1.4 Assertiveness is developed and maintained based on the requirements of the job. 1.5 Accountability and responsibility for own actions are demonstrated based on workplace instructions. 1.6 Self-esteem and a positive self-image are developed and maintained based on values. 1.7 Time management, attendance and punctuality are observed as per the organization policy. 1.8 Goals are managed as per the organization's objective

	1.9 Self-strengths and weaknesses are identified based on personal objectives
2. Demonstrate interpersonal communication	2.1 Writing skills are demonstrated as per communication policy 2.2 Negotiation and persuasion skills are demonstrated as per communication policy 2.3 Internal and external stakeholders' needs are identified and interpreted as per the communication policy 2.4 Communication networks are established based on workplace policy 2.5 Information is shared as per communication policy
3. Demonstrate critical safe work habits	3.1 Stress is managed in accordance with workplace policy. 3.2 Punctuality and time consciousness is demonstrated in line with workplace policy. 3.3 Personal objectives are integrated with organization goals based on organization's strategic plan. 3.4 Resources are utilized in accordance with workplace policy. 3.5 Work priorities are set in accordance to workplace goals and objectives. 3.6 Leisure time is recognized and utilized in line with personal objectives. 3.7 Drugs and substances of abuse are identified and avoided based on workplace policy. 3.8 HIV and AIDS prevention awareness is demonstrated in line with workplace policy. 3.9 Safety consciousness is demonstrated in the workplace based on organization safety policy. 3.10 Emerging issues are identified and dealt with in accordance with organization policy.
4. Lead small teams	4.1 Performance targets for the team are set based on organization's objectives 4.2 Duties are assigned in accordance with the organization policy. 4.3 Forms of communication in a team are established according to organization's policy.

	4.4 Team performance is evaluated based on set targets as per workplace policy. 4.5 Conflicts are resolved between team members in line with organization policy. 4.6 Gender related issues are identified and mainstreamed in accordance workplace policy. 4.7 Human rights and fundamental freedoms are identified and respected as Constitution of Kenya 2010. 4.8 Healthy relationships are developed and maintained in line with workplace.
5. Plan and organize work	5.1 Task requirements are identified as per the workplace objectives 5.2 Task is interpreted in accordance with safety (OHS), environmental requirements and quality requirements 5.3 Work activity is organized with other involved personnel as per the SOPs 5.4 Resources are mobilized, allocated and utilized to meet project goals and deliverables. 5.5 Work activities are monitored and evaluated in line with organization procedures. 5.6 Job planning is documented in accordance with workplace requirements. 5.7 Time is managed achieve workplace set goals and objectives.
6. Maintain professional growth and development	6.1 Personal training needs are identified and assessed in line with the requirements of the job. 6.2 Training and career opportunities are identified and utilized based on job requirements. 6.3 Resources for training are mobilized and allocated based organizations and individual skills needs. 6.4 Licensees and certifications relevant to job and career are obtained and renewed as per policy. 6.5 Work priorities and personal commitments are balanced and managed based on requirements of the job and personal objectives.

	6.6 Recognitions are sought as proof of career advancement in line with professional requirements.
7. Demonstrate workplace learning	7.1 Learning opportunities are sought and managed based on job requirement and organization policy. 7.2 Improvement in performance is demonstrated based on courses attended. 7.3 Application of learning is demonstrated in both technical and non-technical aspects based on requirements of the job 7.4 Time and effort is invested in learning new skills based on job requirements 7.5 Initiative is taken to create more effective and efficient processes and procedures in line with workplace policy. 7.6 New systems are developed and maintained in accordance with the requirements of the job. 7.7 Awareness of personal role in workplace innovation is demonstrated based on requirements of the job.
8. Demonstrate problem solving skills	8.1 Creative, innovative and practical solutions are developed based on the problem 8.2 Independence and initiative in identifying and solving problems is demonstrated based on requirements of the job. 8.3 Team problems are solved as per the workplace guidelines 8.4 Problem solving strategies are applied as per the workplace guidelines 8.5 Problems are analyzed and assumptions tested as per the context of data and circumstances
9. Demonstrate workplace ethics	9.1 Policies and guidelines are observed as per the workplace requirements 9.2 Self-worth and professionalism are exercised in line with personal goals and organizational policies 9.3 Code of conduct is observed as per the workplace requirements 9.4 Integrity is demonstrated as per legal requirement

RANGE

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

Range	Variable
1. Drug and substance abuse may include but not limited to:	• Commonly abused • Alcohol • Tobacco • Miraa • Over-the-counter drugs • Cocaine • Bhang • Glue
2. Feedback may include but not limited to:	• Verbal • Written • Informal • Formal
3. Relationships may include but not limited to:	• Man/Woman • Trainer/trainee • Employee/employer • Client/service provider • Husband/wife • Boy/girl • Parent/child • Sibling relationships
4. Forms of communication may include but not limited to:	• Written • Visual • Verbal • Non verbal • Formal and informal

5. Team may include but not limited to:	• Small work group • Staff in a section/department • Inter-agency group
6. Personal growth may include but not limited to:	• Growth in the job • Career mobility • Gains and exposure the job gives • Net workings • Benefits that accrue to the individual as a result of noteworthy performance
7 Personal objectives may include but not limited to:	• Long term • Short term • Broad • Specific
8 Trainings and career opportunities may include but not limited to	• Participation in training programs • Technical • Supervisory • Managerial • Continuing Education • Serving as Resource Persons in conferences and workshops
9 Resource may include but not limited to:	• Human • Financial • Hardware • Software
10 Innovation may include but not limited to:	• New ideas • Original ideas • Different ideas • Methods/procedures • Processes • New tools
11 Emerging issues may include but not limited to:	• Terrorism • Social media • National cohesion

	• Open offices
12 Range of media for learning may include but not limited to:	• Mentoring • peer support and networking • IT and courses

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Communication
- Critical thinking
- Observation
- Organizing
- Negotiation
- Monitoring
- Evaluation
- Record keeping
- Problem solving
- Decision Making
- Resource utilization
- Resource mobilization

Required Knowledge

The individual needs to demonstrate knowledge of:

- Work values and ethics
- Company policies
- Company operations, procedures and standards
- Occupational Health and safety procedures
- Fundamental rights at work

- Personal hygiene practices
- Workplace communication
- Concept of time
- Time management
- Decision making
- Types of resources
- Work planning
- Resources and allocating resources
- Organizing work
- Monitoring and evaluation
- Record keeping
- Workplace problems and how to deal with them
- Gender mainstreaming
- HIV and AIDS
- Drug and substance abuse
- Leadership
- Safe work habits
- Professional growth and development
- Technology in the workplace
- Emerging issues
- Social media
- Terrorism
- National cohesion

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1 Conducted self-management 1.2 Demonstrated interpersonal communication 1.3 Demonstrated critical safe work habits 1.4 Led small teams 1.5 Planned and organized work 1.6 Maintained professional growth and development 1.7 Demonstrated workplace learning
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	1.8 Demonstrated problem solving skills 1.9 Demonstrated workplace ethics
2. Resource Implications	The following resources should be provided: 2.1 Access to relevant workplace where assessment can take place 2.2 Appropriately simulated environment where assessment can take place
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1 Oral questioning 3.2 Portfolio of evidence 3.3 Third Party Reports 3.4 Written tests
4. Context of Assessment	Competency may be assessed 4.1 On-the-job 4.2 Off-the –job 4.3 During Industrial attachment
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

DEMONSTRATE ENVIRONMENTAL LITERACY

UNIT CODE: CON/OS/PL/BC/05/5/A

UNIT DESCRIPTION

This unit describes the competencies required to demonstrate understanding of environmental literacy. It involves controlling environmental hazard, controlling environmental pollution, complying with workplace sustainable resource use, evaluating current practices in relation to resource usage, identifying environmental legislations/conventions for environmental concerns, implementing specific environmental programs and monitoring activities on environmental protection/programs.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Control environmental hazard	1.1 <i>Storage methods</i> for environmentally <i>hazardous</i> materials are strictly followed according to environmental regulations and OSHS. 1.2 <i>Disposal methods</i> of hazardous wastes are followed always according to environmental regulations and OSHS. 1.3 <i>PPE</i> is used according to OSHS.
2. Control environmental Pollution control	2.1 Environmental pollution <i>control measures</i> are compiled following standard protocol. 2.2 Procedures for solid waste management are observed according to Environmental Management and Coordination Act 1999 2.3 Methods for minimizing <i>noise pollution</i> is complied with based on Noise and

	Excessive Vibration <i>Pollution and Control Regulations</i> , 2009
3. Demonstrate sustainable resource use	3.1 Methods for minimizing wastage are complied with. 3.2 Waste management procedures are employed following principles of 3Rs (Reduce, Reuse, Recycle) 3.3 Methods for economizing and reducing resource consumption are practiced as per the Environmental Management and Coordination Act 1999
4. Evaluate current practices in relation to resource usage	4.1 Information on resource efficiency systems and procedures are collected and provided to the work group where appropriate. 4.2 Current resource usage is measured and recorded by members of the work group. 4.3 Current purchasing strategies are analysed and recorded according to industry procedures. 4.4 Current work processes to access information and data is analysed following enterprise protocol.
5. Identify Environmental legislations/conventions for environmental concerns	5.1 Environmental legislations/conventions and local ordinances are identified according to the different environmental aspects/impact 5.2 Industrial standard/environmental practices are described according to the different environmental concerns
6. Implement specific environmental programs	6.1 Programs/Activities are identified according to organizations policies and guidelines. 6.2 Individual roles/responsibilities are determined and performed based on the activities identified. 6.3 Problems/constraints encountered are resolved in accordance with organizations' policies and guidelines 6.4 Stakeholders are consulted based on company guidelines

7. Monitor activities on Environmental protection/Programs	7.1 Activities are periodically monitored and evaluated according to the objectives of the environmental Program 7.2 Feedback from stakeholders is gathered and considered in proposing enhancements to the program based on consultations 7.3 Data gathered are analysed based on evaluation requirements 7.4 Recommendations are submitted based on the findings 7.5 Management support systems are set/established to sustain and enhance the program 7.6 Environmental incidents are monitored and reported to concerned/proper authorities
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RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range
1. PPE may include but not limited to:	• Mask • Gloves • Goggles • Safety hat • Overall • Hearing protector • Safety boots
2. Environmental pollution control measures may include but not limited to:	• Methods for minimizing or stopping spread and ingestion of airborne particles • Methods for minimizing or stopping spread and ingestion of gases and fumes • Methods for minimizing or stopping spread and ingestion of liquid wastes

3. Waste management procedures may include but not limited to:	• Sorting • Storing of items • Recycling of items • Disposal of items
4. Resources may include but not limited to:	• Electric • Water • Fuel • Telecommunications • Supplies • Materials
5. Workplace environmental hazards may include but not limited to:	• Biological hazards • Chemical and dust hazards • Physical hazards
6. Organizational systems and procedures may include but not limited to:	• Supply chain, procurement and purchasing • Quality assurance • Making recommendations and seeking approvals

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Observation
- Measuring
- Writing
- Communication
- Analytical
- Monitoring

- Evaluation

Required Knowledge

The individual needs to demonstrate knowledge of:

- Storage methods of environmentally hazardous materials
- Disposal methods of hazardous wastes
- Usage of PPE Environmental regulations
- OSHS
- Types of pollution
- Environmental pollution control measures
- Different solid wastes
- Solid waste management
- Different noise pollution
- Methods of minimizing noise pollution
- Solid Waste Act
- Methods of minimizing wastage
- Waste management procedures
- Economizing of resource consumption
- 3Rs principle
- Types of resources
- Techniques in measuring current usage of resources
- Calculating current usage of resources
- Types of workplace environmental hazards
- Environmental regulations
- Environmental regulations applying to the enterprise.
- Measurement and recording of current resource usage
- Analysis current work processes to access information and data Analysis of data and information
- Identification of areas for improvement
- Resource consuming processes
- Determination of quantity and nature of resource consumed
- Analysis of resource flow of different parts of the resource flow process
- Use/conversion of resources
- Causes of low efficiency of use
- Increasing the efficiency of resource use

- Inspection of resource use plans
- Regulations/licensing requirements
- Determine benefit/cost for alternative resource sources
- Benefit/costs for different alternatives
- Components of proposals
- Criteria on ranking proposals
- Regulatory requirements
- Proposals for improving resource efficiency
- Implementation of resource efficiency plans
- Procedures in monitor implementation
- Adjustments of implementation plan
- Inspection of new resource usage

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Controlled environmental hazard 1.2 Controlled environmental pollution 1.3 Demonstrated sustainable resource use 1.4 Evaluated current practices in relation to resource usage 1.5 Demonstrated knowledge of environmental legislations and local ordinances according to the different environmental issues /concerns. 1.6 Described industrial standard environmental practices according to the different environmental issues/concerns. 1.7 Resolved problems/ constraints encountered based on management standard procedures 1.8 Implemented and monitored environmental practices on a periodic basis as per company guidelines 1.9 Recommended solutions for the improvement of the Program
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	1.10 Monitored and reported to proper authorities any environmental incidents
2. Resource Implications	The following resources should be provided: 2.1 Workplace with storage facilities 2.2 Tools, materials and equipment relevant to the tasks (ex. Cleaning tools, cleaning materials, trash bags, etc.) 2.3 PPE 2.4 Manuals and references 2.5 Legislation, policies, procedures, protocols and local ordinances relating to environmental protection 2.6 Case studies/scenarios relating to environmental Protection
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1 Observation 3.2 Oral questioning 3.3 Written test 3.4 Interview/Third Party Reports 3.5 Portfolio of evidence
4. Context of Assessment	Competency may be assessed 4.1 On-the-job 4.2 Off-the –job 4.3 During Industrial attachment
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

DEMONSTRATE OCCUPATIONAL SAFETY AND HEALTH PRACTICES

UNIT CODE: CON/OS/PL/BC/06/5/A

UNIT DESCRIPTION

This unit specifies the competencies required to identify workplace hazards and risk, identify and implement appropriate control measures and implement OSH programs, procedures and policies/ guidelines

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
These describe the key outcomes which make up workplace function.	These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Identify workplace hazards and risk	1.1 <i>Hazards</i> in the workplace are identified <i>based their indicators</i> 1.2 Risks and hazards are evaluated based on legal requirements. 1.3 <i>OSH concerns</i> raised by workers are addressed as per legal requirements.
2. Control OSH hazards	2.1 Hazard prevention <i>and control measures</i> are implemented as per legal requirement. 2.2 Risk assessment is conducted and a risk matrix developed based on likely impact. 2.3 <i>Contingency measures</i> , including <i>emergency procedures</i> during workplace <i>incidents and emergencies</i> are recognized and established in accordance with organization procedures.
3. Implement OSH programs	3.1 Company OSH program are identified, evaluated and reviewed based on legal requirements.

	3.2 Company OSH programs are implemented as per legal requirements. 3.3 Workers are capacity built on OSH standards and procedures as per legal requirements 3.4 OSH-related records are maintained as per legal requirements.
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RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range
1. Hazards may include but are not limited to:	• Physical hazards • Biological hazards • Chemical hazards • Ergonomics • Psychological factors • Physiological factors • Safety hazards • Unsafe workers' act
2. Indicators may include but are not limited to:	• Increased of incidents of accidents, injuries • Increased occurrence of sickness or health complaints/ symptoms • Common complaints of workers related to OSH • High absenteeism for work-related reasons

3. Evaluation and/or work environment measurements may include but are not limited to:	• Health Audit • Safety Audit • Work Safety and Health Evaluation • Work Environment Measurements of Physical and Chemical Hazards
4. OSH issues and/or concerns may include but are not limited to:	• Workers' experience/observance on presence of work hazards • Unsafe/unhealthy administrative arrangements (prolonged work hours, no break time, constant overtime, scheduling of tasks) • Reasons for compliance/non-compliance to use of PPEs or other OSH procedures/policies/guidelines
5. Prevention and control measures may include but are not limited to:	• Eliminate the hazard • Isolate the hazard • Substitute the hazard with a safer alternative • Use administrative controls to reduce the risk • Use engineering controls to reduce the risk • Use personal protective equipment • Safety, Health and Work Environment Evaluation • Periodic and/or special medical examinations of workers
6. Safety gears /PPE (Personal Protective Equipment's) may include but are not limited to:	• Arm/Hand guard, gloves • Eye protection (goggles, shield) • Hearing protection (ear muffs, ear plugs) • Hair Net/cap/bonnet • Hard hat • Face protection (mask, shield) • Apron/Gown/coverall/jump suit • Anti-static suits • High-visibility reflective vest

7. Appropriate risk controls	• Eliminate the hazard altogether • Isolate the hazard from anyone who could be harmed • Substitute the hazard with a safer alternative • Use administrative controls to reduce the risk • Use engineering controls to reduce the risk • Use personal protective equipment
8. Contingency measures may include but are not limited to:	• Evacuation • Isolation • Decontamination • Emergency personnel
9. Emergency procedures may include but are not limited to:	• Fire drill • Earthquake drill • Basic life support/CPR • First aid • Spillage control • Decontamination of chemical and toxic • Disaster preparedness/management • Set of fire-extinguisher
10. Incidents and emergencies may include but are not limited to:	• Chemical spills • Equipment/vehicle accidents • Explosion • Fire • Gas leak • Injury to personnel • Structural collapse • Toxic and/or flammable vapors emission.
11. OSH-related Records may include but are not limited to:	• Medical/Health records • Incident/accident reports • Sickness notifications/sick leave application • OSH-related trainings obtained

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Communication
- Interpersonal
- Presentation
- Risk assessment
- Evaluation
- Critical thinking
- Problem solving
- Negotiation

Required Knowledge

The individual needs to demonstrate knowledge of:

- General OSH Principles
- Occupational hazards/risks recognition
- OSH organizations providing services on OSH evaluation and/or work environment measurements (WEM)
- National OSH regulations; company OSH policies and protocols
- Systematic gathering of OSH issues and concerns
- General OSH principles
- National OSH regulations
- Company OSH and recording protocols, procedures and policies/guidelines
- Training and/or counseling methodologies and strategies

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Identified hazards in the workplace based their indicators 1.2 Evaluated workplace hazards based on legal requirements. 1.3 Addressed OSH concerns raised by workers as per legal requirements. 1.4 Implemented hazard prevention and control measures as per legal requirement. 1.5 Conducted risk assessment as per legal requirement. 1.6 Developed risk matrix based on likely impact. 1.7 Recognized and established contingency measures in accordance with organization procedures. 1.8 Identified, evaluated and reviewed company OSH program based on legal requirements. 1.9 Implemented company OSH programs as per legal requirements. 1.10 Capacity built workers on OSH standards and procedures as per legal requirements 1.11 Maintained OSH-related records as per legal requirements.
2. Resource Implications	2.1 The following resources should be provided: 2.2 Access to relevant workplace where assessment can take place 2.3 Appropriately simulated environment where assessment can take place
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1 Observation 3.2 Oral questioning 3.3 Written test 3.4 Portfolio of Evidence 3.5 Interview 3.6 Third party report
4. Context of Assessment	Competency may be assessed 4.1 On-the-job

	4.2 Off-the –job 4.3 During Industrial attachment
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

COMMON UNITS OF COMPETENCY

APPLY BASIC MATHEMATICS

UNIT CODE:CON/OS/PL/CC/01/5/A

UNIT DESCRIPTION:

This unit describes the competencies required in applying basic: algebra, trigonometry statistics, indices and logarithms and ratio. It also involves performing geometrical calculations, business calculations, carrying out basic mensuration and plotting simple graphs.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. (<i>Bold and italicized terms are elaborated in the Range</i>)
1. Apply basic algebra	1.1 Calculations involving Indices are performed based on the concept 1.2 Linear equations are represented based on the concept 1.3 Scientific calculator is used in solving mathematical problems in line with manufacturer's manual 1.4 Simultaneous equations are performed based on mathematical rules 1.5 Simple algebraic equations are formed based on the concept 1.6 Simple algebraic equations are solved based on the concept
2. Apply basic trigonometry	2.1 Trigonometric ratios are derived based on trigonometric rules. 2.2 Calculations are performed based on trigonometric rules

ELEMENT These describe the key outcomes which make up workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. (<i>Bold and italicized terms are elaborated in the Range</i>)
3. Perform geometrical calculations	3.1 Areas of regular figures are calculated based on the given formulae 3.2 Areas of irregular figures are calculated based on concept 3.3 Apply Pythagoras' theorem based on the concept
4. Carry out basic mensuration	4.1 Various <i>units of measurements</i> are identified based on the course requirements 4.2 Units are converted based on best practices 4.3 Perimeter and areas of regular <i>figures</i> are obtained based on known formulae 4.4 Area of irregular figures are obtained based on best practice 4.5 Volume and Surface area of solids are obtained based on given formulae
5. Apply basic statistics	5.1 Grouped and ungrouped data is identified and interpreted based on given sample 5.2 Ungrouped data is organized based on the concept 5.3 Data is represented in frequency tables based on the concept 5.4 The median, mode and mean of grouped and ungrouped data is calculated based on the concept 5.5 Data is presented in a chart form based on the concept

ELEMENT These describe the key outcomes which make up workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. (<i>Bold and italicized terms are elaborated in the Range</i>)
6. Plot simple graphs	6.1 A graph is plotted for given set of data based on data 6.2 Information from a given graph is interpreted based on data
7. Apply Indices and Logarithms	7.1 Converted numbers from one base to another 7.2 Applied the laws of indices in solving exponential equations 7.3 Applied the laws of logarithms in solving logarithmic equations
8. Perform business calculations	8.1 Converted one currency to another 8.2 Calculated exchange rates 8.3 Calculated income 8.4 Calculated of taxes 8.5 Calculated average sales

ELEMENT These describe the key outcomes which make up workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. (<i>Bold and italicized terms are elaborated in the Range</i>)
9. Apply Ratios	9.1 Differentiated between rational and irrational numbers 9.2 Expressed ratios as percentages 9.3 Solved problems involving direct and inverse proportions

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range
1. Units of measurement may include but not limited to:	• Millimetres • Centimetres • Metres • Kilometres
2. Figures may include but not limited to:	• square • rectangle

	• triangle • polygons • circles
3. graph may include but not limited to:s	• linear graphs • bar graphs • pie chart • pictograph

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Logical thinking
- Problem solving
- interpersonal
- Drawing
- sketching
- measuring skills

Required knowledge

The individual needs to demonstrate knowledge of:

- Fundamental operations (addition, subtraction, division, multiplication)
- Calculating area and volume
- Types and purpose of measuring instruments
- Units of measurement and abbreviations
- Rounding techniques
- Types of fractions

- Types of angles
- Types of tables and graphs
- Presentation

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills, knowledge and range.

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1 Demonstrated ability to apply basic trigonometry appropriately 1.2 Carried out mensuration correctly 1.3 Applied basic algebra appropriately 1.4 Performed geometrical calculations correctly 1.5 Demonstrated knowledge of applied basic statistics appropriately 1.6 Plotted simple graphs correctly
2. Resource Implications	The following resources should be provided: 2.1 Access to relevant or appropriately simulated environment where assessment can take place 2.2 Measuring equipment 2.3 Materials relevant to the proposed activity or tasks
2. Methods of Assessment	Competency in this unit may be assessed through: 1.1 Written tests 1.2 Practical Tests 1.3 Oral Questioning
Context of Assessment	Competency may be assessed individually in the actual workplace or through accredited institution or during industrial Attachment
Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

APPLY TECHNICAL DRAWING

UNIT CODE: CON/OS/PL/CC/02/5/A

UNIT DESCRIPTION

This unit covers the competencies required to prepare and apply technical drawing. It involves competencies to select, use and maintain drawing equipment and materials. It also involves developing plane geometry drawings, solid geometry drawings, pictorial and orthographic drawings and apply computer aided design

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA <i>(Bold and italicised terms are elaborated in the Range)</i>
1. Select, use and maintain drawing equipment and materials	1.1 <i>Drawing equipment</i> are identified and gathered according to task requirements 1.2 <i>Drawing materials</i> are identified and gathered according to task requirements 1.3 Drawing equipment are used and maintained as per manufacturer's instructions 1.4 Drawing materials are used as per workplace procedures
2. Develop plane geometry drawings	2.1 Freehand sketching of different types of geometric forms and diagrams is conducted 2.2 Different types of lines used in drawing and their meanings are identified according to standard 2.3 drawing conventions 2.4 Different types of <i>geometric forms</i> are constructed according to <i>standard conventions</i> 2.5 Different types of angles are constructed, measured and bisected according to principles of trigonometry

ELEMENT	PERFORMANCE CRITERIA <i>(Bold and italicised terms are elaborated in the Range)</i>
3. Develop solid geometry drawings	3.1 Pattern drawings are interpreted according to standard conventions 3.2 solid geometry drawings are constructed according to given plane geometry
4. Develop orthographic and pictorial drawings	4.1 Symbols and abbreviations are identified and interpreted according to standard drawing conventions 4.2 First and third angle orthographic drawings are interpreted and developed in accordance with the standard conventions 4.3 Orthographic elevations are dimensioned in accordance with standard conventions 4.4 Isometric drawings are interpreted and developed in accordance with standard conventions 4.5 Oblique drawings are interpreted and developed in accordance to standard conventions
5. Apply computer Aided design	4.1 Plane geometry drawings are developed using CAD 4.2 Geometry drawings are developed using CAD 4.3 Orthographic drawings are developed using CAD

RANGE

Variable	Range
1. Drawing equipment may include but is not limited to:	• Drawing boards • T squares • Set squares

	• drawing sets
2. Drawing materials may include but is not limited to:	• Drawing paper • Pencils • Erasers • masking tapes • paper clips
3. Geometric forms may include but is not limited to:	• Circles • Triangles • rectangles • parallelogram • polygons • pyramids • conic sections • prisms
4. Standard conventions may include but is not limited to:	• Anatomy of engineering drawing (title block, coordinate grid system, revision block, notes and legends) • Drawing scale (paper size and drawing symbols) • International drawing standards

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required skills

The individual needs to demonstrate the following skills:

- Critical thinking
- Drawing
- Sketching
- Interpretation
- Communication
- Inter personal

Required knowledge

The individual needs to demonstrate knowledge of:

- Drawing equipment and materials
- Freehand sketching
- Lettering
- Geometrical constructions
- Types of drawings
- Types of lines
- Isometric drawing conventions, features, characteristics, components
- Orthographic drawing conventions, features, characteristics, components
- Sketches and drawings of simple patterns

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and understanding and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Selected, used and maintained drawing equipment and materials appropriately 1.2 Developed plain geometry drawings correctly 1.3 Developed solid geometry drawings correctly 1.4 Developed pictorial and orthographic drawings correctly
2. Resource Implications	The following resources should be provided: 2.1 Drawing room 2.2 Drawing equipment and materials 2.3 Computers with appropriate program
3. Methods of Assessment	Competency may be assessed through: 3.1 Practical tests 3.2 Oral Questioning
4. Context of Assessment	Competency may be assessed individually in the actual workplace or a simulated work place setting or during Industrial Attachment

5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.
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APPLY SCIENTIFIC PRINCIPLES

UNIT CODE: CON/OS/PL/CC/03/5/A

UNIT DESCRIPTION

This unit describes the competence in applying scientific principles. It involves applying principles of: units of measurements, force, work, energy and power, friction, heat, acoustics, pressure in fluids, mechanical properties of materials and electrical principles

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA (<i>Bold and italicized terms are elaborated in the Range</i>)
1 Apply principles of units of measurements	1.1 Units of measurements are identified based on task given 1.2 Units are converted based on standard conventions.
2 Apply principles of Force, work, energy and power	2.1 Force, work, energy and power are defined based on standard conventions 2.2 Forms of energy are described based on the state of the matter 2.3 Energy is converted according to scientific principles 2.4 Simple calculations on work, energy and power are solved based on the task requirements
3 Apply principles of Friction	3.1 Friction is defined and interpreted based on standard conventions 3.2 The advantages and disadvantages of friction are identified based on scientific principles 3.3 Simple problems on friction are solved based on task requirements
4 Apply principles of heat	4.1 Sources of heat are identified based on scientific principles 4.2 Effects of heat on matter is identified based on scientific principles 4.3 Methods of heat transfer are identified and interpreted based on scientific principles

ELEMENT	PERFORMANCE CRITERIA (<i>Bold and italicized terms are elaborated in the Range</i>)
5 Apply principles of pressure in fluids	5.1 Density and variation of pressure is defined based on scientific principles 5.2 Laws are identified based on scientific principles 5.3 Simple calculations on pressure in liquids are performed based on scientific principles
6 Apply principles of acoustics	6.1 Sources of sound are identified based on scientific principles 6.2 Effects of sound on surrounding areas is identified based on scientific principles 6.3 Methods of sound insulation are identified and interpreted based on scientific principles
7 Apply mechanical properties of materials	7.1 Mechanical properties are identified and interpreted based on type of material 7.2 Advantages and disadvantages of materials are identified based on use of materials 7.3 Materials are tested based on type of material.
8 Apply electrical principles	8.1 Electrical principles are identified based on scientific principles 8.2 Electrical standards are interpreted based on international standards 8.3 Occupational safety and health practises are identified based on statutory and sector regulations. 8.4 Simple electrical circuits are identified based on international standards.

RANGE

Variable	Range
1. Classification of matter may include but is not limited to:	• Solids • Liquids • Gases

2. Sources of heat may include but is not limited to:	• Solar • Biomass • Geothermal • Fuel • Electric
3. Sources of sound may include but is not limited to:	• Mechanical movements • Fluid flow • Vibrations
4. Methods of heat transfer may include but is not limited to:	• Conduction • Convection • Radiation
5. Laws may include but is not limited to:	• Law of floatation • Archimedes principles
6. Mechanical properties may include but is not limited to:	• Malleability • Strength • Hardness • Brittleness • Elasticity • Toughness • Ductility • Electrical conductivity
7. <i>Electrical principles</i>	• Voltage • Current • Power • Magnetism

REQUIRED KNOWLEDGE

- Construction materials
- Measurement
- Mechanical properties
- Friction

- Force, work, energy and power
- Principles of heat
- Pressure in fluids
- Basic electricity

SKILLS

- Solving problems
- Analytical
- Interpretation
- Interpersonal
- Computational skills
- Critical thinking

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Applied units of measurements appropriately 1.2 Applied Force, work, energy and power appropriately 1.3 Applied principles of Friction appropriately 1.4 Applied principles of heat appropriately 1.5 Applied principles of acoustics appropriately 1.6 Applied pressure in fluids appropriately 1.7 Applied mechanical properties of materials appropriately 1.8 Applied electrical principles appropriately
2. Resource Implications	The following resources should be provided: 2.1 Samples of construction materials 2.2 Material Testing Laboratories 2.3 Safety equipment 2.4 Computers 2.5 Calculators 2.6 Materials testing tools and equipment

3. Methods of Assessment	Competency may be assessed through: 3.1 Written text 3.2 Interview 3.3 Oral Questioning 3.4 Practical Tests
4. Context of Assessment	Competency may be assessed on the job, off the job or a combination of these r during Industrial Attachment. Off the job assessment must be undertaken in a closely simulated workplace environment.
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

CORE UNITS OF COMPETENCY

INSTALL WATER SUPPLY SYSTEMS

UNIT CODE: CON/OS/PL/CR/01/5/A

UNIT DESCRIPTION

This unit specifies the competencies required to install water supply systems. It involves preparing working drawings, identifying materials, quantifying and costing, identifying and using pipework tools and equipment, installing pipe works, designing simple pipework and install water distribution system. It applies in the construction industry.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace function .	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Prepare working drawings	1.1 Drawings are identified and selected based on the <i>working drawings</i> . 1.2 Scale of the drawing is read based on the drawing. 1.3 Measurements are converted based on best practice. 1.4 Symbols are identified based on standard practices. 1.5 Isometric pipework drawings are sketched based on best practice. 1.6 Simple working drawings are prepared based on specifications
2. Identify materials, quantify and cost	2.1 Materials are identified and selected based on working drawings and specifications 2.2 Materials are quantified and costed as per the market rate 2.3 Materials schedule are prepared based on best practice 2.4 Supplies are identified based on specifications

3. Identify and use pipework tools and equipment	3.1 Personal Protective Equipment is used in line with occupational safety and health requirements 3.2 Pipework tools and equipment are identified based on job requirements. 3.3 Pipework tools and equipment are used based on best practice and manufacturer's manual. 3.4 Pipework tools and equipment are cared for and maintained based on manufacturer's manual and workplace policy 3.5 Pipework tools and equipment are stored based on work place policy.
4. Install pipe works	4.1 Positions of pipes are set out and marked based on working drawings 4.2 Pipes are threaded based on standards and specifications. 4.3 Pipes are jointed in accordance with best practices and manufacturer's instructions. 4.4 Pipes are cut based on type of pipe, drawing specifications and job requirements 4.5 Flanged joints are prepared based on best practices 4.6 Pipes are bent based on type of pipe, drawing specifications and requirements of the job. 4.7 Pipes are fitted based on drawing specifications. 4.8 Housekeeping is conducted as per workplace procedures 4.9 Safety and health practices are observed based on OSH functionality tests are conducted based on best practices. 4.10 Faults in functionality and leakage are corrected based on best practice

5. Design simple pipework	5.1 Number and type of appliances are identified based on working drawings 5.2 Flow rates are calculated based on flow charts 5.3 Pipes are sized based on standards
6. Install Water distribution system	6.1 Water distribution systems is identified and interpreted based on the drawing 6.2 Positions of pipes are set out and marked based on working drawings 6.3 Water distribution materials and supplies are estimated based on the drawing. 6.4 Tools and equipment are identified according to job requirement. 6.5 Water distribution system is installed based on codes of practice 6.6 Housekeeping is conducted as per workplace procedures 6.7 Functionality tests are conducted based on best practices. 6.8 Faults in functionality and leakage are corrected based on best practice. 6.9 Safety and health practice are observed based on OSHA.

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variables	Range
1. Working <i>drawings</i> may include but not limited to:	• Pictorial • Line drawing • Freehand sketching

	• Scale drawings
2. Joints may include but not limited to:	• Threaded • Brazed • Soldered • Welded • Flanged
3. Appliances may include but not limited to:	: • Wash hand basin • Water closet • Bath tub • Urinal • Bidet • Kitchen sink • Jacuzzi • Shower head
4. Personal Protective Equipment may include but not	• • • • •
limited to:	•
5. Pipework tools and equipment may include but not limited to:	• • • • • • • •

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/ overall Safety
shoes / boots

Pipe wrench
Pipe cutter
Hacksaw
Pipe Threading Equipment
Tap and Punch
Files
Screwdrivers
Drill with various sizes of bits
Mallet
Ball hammer
Masonry chisel
PPR machine / Heat Fusion equipment

	• Pipe bender
6. Pipes may include but not limited to:	• PPR • PVC • CPVC • GI • UPVC • HDPE
7. Faults in pipe work	• Leakages • Air lock • Water hammer • blockages
may include but not limited to:	• Protecting existing works and sanitary appliances • Clearing work area • Cleaning work area • Keeping work area tidy
8. Housekeeping may include but not limited to:	• • • •
9. Sized may include but not limited to:	• 13mm • 19mm • 25mm • 32mm • 38mm

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Interpersonal skills
- Communication skills
- Sketching skills
- Interpretation skills
- Problem-solving skills

- Critical thinking skills
- Organizing skills
- Measuring skills

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- Numeracy skills
- Cutting skills
- Threading skills
- Bending and forming skills
- Interpersonal Relationship skills

Required Knowledge

The individual needs to demonstrate knowledge of:

- Interpretation of symbols
- Conversion of units
- Types of pipes
- Materials and supplies
- Piping tools and equipment's
- Jointing of pipes
- Bending methods
- Mensuration
- Piping systems
- Faults in pipe work
- Functionality tests
- Water sources
- Water treatment
- Costing
- Estimation

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Correctly identified and selected working drawings. 1.2 Correctly read and used drawing scales. 1.3 Identified symbols appropriately 1.4 Correctly sketched isometric pipework 1.5 Correctly Prepared Simple working 1.6 Identified and selected materials appropriately 1.7 Quantified and costed materials accurately 1.8 Correctly prepared material schedule 1.9 Correctly identified supplies 1.10 Appropriately used Personal Protective Equipment 1.11 Identified Pipework tools and equipment appropriately. 1.12 Correctly used Pipework tools and equipment. 1.13 Maintained pipework tools and equipment appropriately 1.14 Stored Pipework tools and equipment appropriately
2. Resource Implications	The following resources must be provided: 2.1 A functional workshop with plumbing tools, equipment, materials and supplies. 2.2 References and manuals including construction working drawings 2.3 Personal protective equipment
3. Methods of Assessment	Competency may be assessed through: 3.1 Observation 3.2 Oral Questioning 3.3 Written Tests 3.4 Third party report 3.5 Portfolio
4. Context of Assessment	Assessment may be done: 4.1 On-the-job, 4.2 Workshop simulation or 4.3 During Work placement.
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

INSTALL RAINWATER HARVESTING AND DISPOSAL

UNIT CODE: CON/OS/PL/CR/02/5/A

UNIT DESCRIPTION

This unit specifies the competencies required to harvest and dispose rain water. It involves preparing working drawings, quantifying and costing materials, using tools and equipment, installing rain water goods, testing rainwater goods and harvesting / disposing rainwater. It applies in the construction industry.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace function .	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Prepare working drawing	1.1 Drawings are identified and selected based on the job. 1.2 Scale of the drawing is determined based on the specifications. 1.3 Measurements are converted based on scale. 1.4 Symbols are identified based on standard practices. 1.5 Isometric pipework drawings are sketched based on drawings.

	1.6 Simple working drawings are produced based on specifications.
2. Quantify and cost materials	2.1 Materials are classified based on specifications 2.2 Materials are estimated and costed as per the market rate 2.3 Materials schedule are prepared based on best practice 2.4 Supplies are identified based on specification
3. Use tools and equipment	3.1 Personal Protective Equipment is used in line with occupational safety and health requirements 3.2 Rainwater goods tools and equipment are identified based on the requirements of the job. 3.3 Rainwater goods tools and equipment are used based on manufacturer's instructions. 3.4 Rainwater goods tools and equipment are cared for and maintained based on manufacturer's manual and workplace place policy. 3.5 Rainwater goods tools and equipment are stored based on manufacturer's instructions
4. Install rain water goods	4.1 Types of water harvesting methods are identified based on the local authority by- laws 4.2 Types of rain water disposal methods are identified based on the local authority by- laws 4.3 Rainwater goods are identified based on the drawing 4.4 Measurements are taken and marking out is done based on the drawing 4.5 Material is cut based on drawings. 4.6 Pieces are jointed based on specifications 4.7 Pieces are assembled based on working drawing

5. Test rainwater goods	5.1 Rain water goods are installed based on working drawings 5.2 Water test is conducted based on best practices. 5.3 Faults in structure and functionality of rainwater goods are corrected based on best practice 5.4 Housekeeping is conducted based on workplace procedures. 5.5 Safety and health practices are observed based on OSHA
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RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variables	Range
1. Personal Protective Equipment may include but not	limited to:
2. Rainwater goods tools and	

- equipment may
- include but not

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D
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coat / overall Safety

shoes / boots

Measuring tools

Forming tools

Cutting tools

Welding equipment

Soldering bit

	Folding tools
3. Rainwater goods may include but not limited to: 4.	- Down pipes - Gutters - Brackets - Hopper head - Rainwater shoe
5. Housekeeping may include but not limited to:	- Protecting existing works and sanitary appliances - Clearing work area - Cleaning work area - Keeping work area tidy

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Interpersonal skills
- Communication skills
- Sketching skills
- Interpretation skills
- Problem-solving skills
- Critical thinking skills
- Organizing skills
- Measuring skills
- Numeracy skills
- Cutting skills
- Threading skills
- Bending skills
- Interpersonal Relationship skills

Required Knowledge

The individual needs to demonstrate knowledge of:

- Interpretation of symbols

- Conversion of units
- Materials and supplies
- Rainwater goods tools and equipment's
- Methods of jointing
- Bending methods
- Mensuration
- Faults in rainwater goods

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Accurately identified and selected working drawings. 1.2 Accurately read and used drawing Scales 1.3 Converted measurements accurately 1.4 Appropriately identified symbols. 1.5 Prepared simple working drawings correctly 1.6 Classified materials accurately 1.7 Estimated and costed materials appropriately 1.8 Prepared Materials schedule correctly 1.9 Identified Supplies correctly 1.10 used Personal Protective Equipment appropriately 1.11 Identified Rainwater goods tools and equipment appropriately. 1.12 Used rainwater goods tools and equipment correctly 1.13 Maintained rainwater goods tools and equipment correctly. 1.14 Stored tools and equipment correctly. 1.15 Identified rainwater goods Correctly 1.16 Measurements and marking-out is done accurately 1.17 Materials cut correctly. 1.18 Pieces jointed correctly 1.19 Pieces assembled correctly 1.20 Installed Rain water goods correctly 1.21 Water test conducted appropriately 1.22 Housekeeping conducted appropriately 1.23 Safety and health practices observed correctly
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	1.24 Types of water harvesting methods identified correctly 1.25 Types of storm water disposal methods identified appropriately
2. Resource Implications	The following resources must be provided: 2.1 A functional workshop with plumbing tools, equipment, materials and supplies. 2.2 References and manuals including construction working drawings 2.3 Personal protective equipment
3. Methods of Assessment	Competency may be assessed through: 3.1 Practical Test 3.2 Oral Questioning 3.3 Written Test 3.4 Third party report 3.5 Portfolio
4. Context of Assessment	Assessment may be done: 4.1 On-the-job, 4.2 Workshop simulation or 4.3 During Work placement.
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended

INSTALL DRAINAGE SYSTEMS

UNIT CODE: CON/OS/PL/CR/03/5/A

UNIT DESCRIPTION

This unit specifies the competencies required to install drainage systems. It involves preparing working drawings, quantifying and cost drainage materials, using drainage tools and equipment setting out drainage systems, install above ground drainage system identifying drainage materials and installing below ground drainage system and testing. It applies in the construction industry.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace function .	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Preparing working drawing	1.1 Drawings are identified and selected based on the job. 1.2 Scale of the drawing is determined based on the specifications. 1.3 Measurements are converted based on scale. 1.4 Symbols are identified based on standard practices. 1.5 Isometric pipework drawings are sketched based on drawings. 1.6 Simple working drawings are produced based on specifications.
2. Quantify and cost drainage materials	2.1 <i>Drainage materials and supplies</i> are identified based on the drawings and specifications. 2.2 Materials are estimated based on drawings and specifications 2.3 Materials cost estimates are calculated from the market rates 2.4 A schedule of materials is developed based on the drawing.

3. Use drainage tools and equipment	3.1 Personal Protective Equipment is used in line with occupational safety and health requirements 3.2 Drainage tools and equipment are identified based on the requirements of the job. 3.3 Drainage tools and equipment are used based on manufacturer's instructions. 3.4 Drainage tools and equipment are cared for and maintained based on manufacturer's manual and workplace policy. 3.5 Drainage tools and equipment are stored based on work place policies.
4. Set out Drainage systems	4.1 Measurements are transferred to the ground based on working drawings 4.2 Joint positions are identified based on the working drawings and standards 4.3 Invert levels are taken based on the gradient.
5. Install above ground drainage system	5.1 Soil and waste water is identified based on the working drawings. 5.2 Setting out is carried out based on the working drawing. 5.3 Pipes are laid based on the levels. 5.4 Housekeeping is conducted based on workplace procedure 5.5 Safety and health practise are observed based on OSHA. 5.6 Functionality tests are conducted based on best practices 5.7 Faults in the system are corrected based on best practice.
6. Install below ground drainage system	6.1 Excavation is carried out based on the layout. 6.2 Pipeline base is stabilized based on drawings. 6.3 Pipes are laid based on the levels 6.4 Pipe work is protected based on specifications 6.5 Inspection chambers, man holes and traps are constructed according to specifications. 6.6 Housekeeping is conducted based on workplace procedure

	6.7 Functionality tests are conducted based on best practices 6.8 Faults in drainage system are corrected based on best practice. 6.9 Backfilling and making-good is carried out based on best practice. 6.10 Safety and health practices is observed according to OSHA and NEMA. 6.11 Above ground signage is placed based on best practice.
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RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variables	Range
1. Drainage materials and Supplies may include but not limited to	• Various types and sizes of fittings • Caulking materials • Various types of pipe supports • Clay pipes • UPVC • Cast iron • Concrete
2. Personal Protective Equipment may include but not limited to	• Helmet • Gloves • Dustcoat / overall • Safety shoes / boots
3. Drainage tools and equipment may include but not limited to	• Measuring tools • Levelling equipment's • Mason trowels • Mason square • Spirit level

	• Boning rods • Floats • Mallet • Ball hammer • Masonry chisel
4. Functionality tests may include but not limited to	• Smoke test • Water test • Air test • Pressure test • Dye test
5. Faults in drainage system may include but not limited to	• Leakages • Air lock • Water hammer • Blockages
6. Housekeeping may include but not limited to	• Protecting existing works • Clearing work area • Cleaning work area • Keeping work area tidy

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Interpersonal skills
- Communication skills
- Sketching skills
- Interpretation skills
- Problem-solving skills
- Critical thinking skills
- Joining and jointing skills
- Organizing skills
- Measuring skills
- Numeracy skills
- Cutting skills

- Threading skills
- Bending skills
- Interpersonal Relationship skills

Required Knowledge

The individual needs to demonstrate knowledge of:

- Interpretation of symbols
- Conversion of units
- Levelling
- Drainage materials and supplies
- Drainage tools and equipment
- Types of pipes
- Materials and supplies
- Joining and jointing
- Mensuration
- Drainage systems
- Faults in drainage system
- Functionality tests

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Identified and selected Drawings correctly 1.2 Read and used Scales of the drawings accurately 1.3 Converted measurements appropriately 1.4 Identified symbols accurately. 1.5 Sketched isometric drawings accurately 1.6 Identified Drainage materials correctly 1.7 Identified supplies correctly. 1.8 Quantified and costed materials accurately 1.9 Developed schedule of materials correctly 1.10 Identified soil and waste water correctly 1.11 carried setting out correctly
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	1.12 laid Pipes correctly 1.13 conducted Housekeeping appropriately 1.14 Observed safety and health practise correctly 1.15 Conducted tests appropriately 1.16 corrected Faults in the system appropriately 1.17 Carried out excavation works correctly 1.18 Stabilized pipeline base correctly. 1.19 protected Pipe work correctly 1.20 Constructed inspection chambers and man-holes appropriately 1.21 Conducted housekeeping correctly
2. Resource Implications	The following resources must be provided: 2.1 A functional workshop with plumbing tools, equipment, materials and supplies. 2.2 References and manuals including construction working drawings 2.3 Personal protective equipment
3. Methods of Assessment	Competency may be assessed through: 3.1 Practical Tests 3.2 Oral Questioning 3.3 Written Tests 3.4 Third party report 3.5 Portfolio
4. Context of Assessment	Assessment may be done: 4.1 On-the-job, 4.2 Off-the-job or 4.3 During Work placement.
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended

INSTALL SANITARY APPLIANCES

UNIT CODE: CON/OS/PL/CR/04/5/A

UNIT DESCRIPTION

This unit specifies the competencies required to install sanitary appliances. It involves preparing simple working drawings, quantifying and cost sanitary appliances, fixing sanitary appliances and testing and commissioning working of sanitary appliances. It applies in the construction industry

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace function .	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Prepare working drawing	1.1 Drawings are identified and selected based on the job. 1.2 Scale of the drawing is determined based on the <i>specifications</i> . 1.3 Measurements are converted based on scale. 1.4 Symbols are identified based on best practices. 1.5 Sanitary appliances are identified based on the drawing 1.6 Simple working drawings are Prepared based on specifications 1.7 Isometric working drawings are drawn based on best practices. 1.8 Manufacturers drawing of sanitary appliances are interpreted as presented. 1.9 Assembling of sanitary appliances is identified and interpreted as per manufacturers' drawing.
2. Quantify and cost sanitary appliances	3.1 <i>Materials</i> and <i>Supplies</i> required for fixing are identified based on requirements of the job. 3.2 Schedule of sanitary appliances is prepared based on the drawing. 3.3 Materials and supplies required are measured and estimated based on working drawings and specifications

	3.4 Sanitary appliances are costed based on best practice
3. Fix sanitary appliances	3.1 Tools and equipment needed for fixing appliances are identified based on the type of sanitary appliance. 3.2 Appliance positioning is determined based on working drawings. 3.3 Tools and equipment are used based on best practices. 3.4 Support for sanitary appliances are put in place based on manufacturers' instructions. 3.5 Sanitary appliances are mounted based on best practices. 3.6 Parameter checks are done in accordance to industry standards. 3.7 Housekeeping is conducted based on best practice. 3.8 Personal Protective Equipment is used in line with occupational safety and health regulations. 3.9 Safety and health practices are observed based on OSHA.
4. Test and commission working of sanitary appliances	4.1 Functionality of the appliance is tested based on best practices. 4.2 Faults in appliance functionality are corrected based on best practices 4.3 The works are commissioned in accordance to job requirements

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variables	Range
Materials may include but not limited to:	• Screws • Adhesives • Cement • Sand • Pipes • Traps • Gutters • Electric cables • Caulking material
Tools and equipment may include but not limited to:	• Pipe wrench • Pipe cutter • Hacksaw • Pipe Threading Equipment • Vices • Tap and Punch • Files • Screwdrivers • Drill with various sizes of bits • Mallet • Ball hammer • Masonry chisel

	• PPR machine / Heat Fusion equipment • Pipe bender • Trowel
Personal Protective Equipment may include but not limited to:	• Helmet • Gloves • Dustcover / overall • Safety shoes / boots
Specifications may include but not limited to:	• manufacturer's specifications • engineer's specifications • client's specifications
	• to: installation faults • manufacturer's faults •
Faults may include but not limited to:	• Levelness • Plumpness • Accuracy of measurements • Positioning
Parameter checks may include but not limited to:	• Protecting existing works and sanitary appliances • Clearing work area • to: Cleaning work area • • Keeping work area tidy
Housekeeping may include but not limited to:	• • • •

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Drawing and interpretation skills

- Problem-solving skills

- Critical-thinking skills
- Organizing skills
- Measuring skills
- Numeracy skills
- Cutting skills
- Threading skills
- Bending skills
- Joining and jointing skills

Required Knowledge

The individual needs to demonstrate knowledge of:

- Interpretation of symbols
- Conversion of units
- Measurement
- Types of drawings
- Types of scales
- Joining and jointing
- Bending methods
- Mensuration
- Materials and supplies
- Types of caulking materials
- Types of valves
- Types of sanitary appliances
- Types of traps
- Testing methods.
- Faults.
- Special appliances
- New technologies

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range

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1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Prepared working Drawings correctly 1.2 Read and used drawing scales correctly 1.3 converted measurements accurately 1.4 Identified Symbols correctly 1.5 Identified Sanitary appliances correctly 1.6 Prepared Simple working drawings accurately 1.7 Drew Isometric working drawings correctly 1.8 Interpreted Manufacturers drawing correctly 1.9 Assembled sanitary appliances accordingly 1.10 Identified Materials required for fixing correctly. 1.11 Identified Supplies required for fixing correctly 1.12 Prepared Schedule of sanitary appliances accurately 1.13 Measured and estimated materials and supplies required accurately 1.14 Costed Sanitary appliances accurately 1.15 Tested appliances correctly 1.16 Corrected faults in appliances appropriately
2. Resource Implications	The following resources must be provided: 2.1 A functional workshop with basic tools, equipment and sanitary appliances. 2.2 Reference and appliance manuals 2.3 Personal protective equipment
3. Methods of Assessment	Competency may be assessed through: 3.1 Practical Test 3.2 Written test 3.3 Third party report 3.4 Portfolio
4. Context of Assessment	4.1 On-the-job 4.2 Off-the-job 4.3 Work placement
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended

INSTALL WATER STORAGE SYSTEMS AND AUXILIARY FITTINGS

UNIT CODE: CON/OS/PL/CR/05/5/A

UNIT DESCRIPTION

This unit specifies the competencies required to install water storage systems and auxiliary fittings. It involves preparing working drawings, quantifying and costing materials, installing storage systems and auxiliary fittings, and testing and commissioning auxiliary fittings. It applies in the construction industry.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
These describe the key outcomes which make up workplace function .	These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Prepare water storage drawings	1.1 Drawings are identified and selected based on the job.

	1.2 Scale of the drawing is determined based on the specifications. 1.3 Measurements are converted based on scale. 1.4 Symbols are identified based on best standard practices. 1.5 Simple working drawings are Prepared based on specifications 1.6 Isometric working drawings are drawn based on best practices.
2. Quantify and cost materials	2.1 Materials required for installing storage and auxiliary fittings are identified based on requirements of the job. 2.2 Supplies required for installation of storage and auxiliary fittings are identified based on requirements of the job. 2.3 Types of storage and types of pumps required are enumerated based on the drawing. 2.4 Materials and supplies required are measured and counted based on working drawings and specifications 2.5 schedules of storage and pumps are prepared based on working drawings
3. Install storage systems and auxiliary fittings	3.1 Tools and equipment needed for fixing storage and ancillary fittings are identified based on the job requirements. 3.2 Tools and equipment are used based manufacturer's manuals. 3.3 Location of Storage and auxiliary fitting is determined based on drawings. 3.4 Support for Storage and auxiliary fitting are put in place based manufacturers' manual. 3.5 Storage and ancillary fittings are mounted based job requirements and manufacturer's installation manual. 3.6 Personal Protective Equipment is used in line with occupational safety and health regulations. 3.7 Housekeeping is conducted on work area based on work place procedure 3.8 Safety and health practices are observed based on OSHA.

4. Test and commission storage and auxiliary Fittings	4.1 Functionality of the Storage and auxiliary fittings are tested based on manufacturer's manual and requirements. 4.2 Faults in Storage and auxiliary fittings are corrected based on best practice. 4.3 Commission the storage system as per the client's/ contract requirements.
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RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variables	Range
1. Auxiliary fittings may include but not limited to:	• Various type of Valves • Various types of pumps • Various types of taps • Strainers • Solar collectors • Flanges • Washing machines connections • Water purifiers

	• Pump controllers
2. Tools and equipment may include but not limited to:	• Pipe wrench • Pipe cutter • Hacksaw • Pipe Threading Equipment • Vice - Bench • Tap and Punch • Files • Screwdrivers • Drill with various sizes of bits • Mallet • Ball hammer • Masonry chisel • PPR machine / Heat Fusion equipment • Pipe bender • Sealant gun • Water pump pliers
3. Supplies may include but not limited to:	• Fittings • Gaskets and O-rings • Caulking agents • Sealant and glue • Water proofing agents
4. Type of storage may include but not limited to:	• Plastic tanks (PE) • Steel tanks • Concrete tanks • Masonry tanks • Rubber tanks • Aluminium Alloy • Fibre Reinforced Plastics (FRP) • Insulated tanks • Septic tank systems

5. Types of Pumps may include but not limited to:	• Sump pumps • Submersible pumps • Centrifugal pumps • Booster pumps • Various types of controllers • Reciprocating pump
6. Location may include but not limited to:	• Underground • on-ground • above ground (elevated)
7. Support may include but not limited to:	• Steel Pipes • Concrete • Timber • Masonry • Compact Earth
8. Faults may include but not limited to:	• Low and high pressure • Air locks • Leaks • Clogged system • Control valve problems • Pump faults

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Drawing and interpretation skills
- Problem-solving skills
- Critical thinking skills
- Communication skills
- Interpersonal relationship skills
- Organizing skills
- Measuring skills

- Numeracy skills
- Cutting skills
- Threading skills
- Bending skills

Required Knowledge

The individual needs to demonstrate knowledge of:

- Drawing and drawing interpretation
- Mensuration
- Basic fluid mechanics
- Storage systems
- Pumping systems
- Support system for elevated storage
- Plumbing ancillary systems
- Solar water heating systems
- Septic storage systems

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1 Prepared working drawings correctly 1.2 Read scale of the drawing accurately 1.3 converted measurements correctly 1.4 Identified symbols correctly 1.5 Prepared Simple working drawings accurately 1.6 Drew isometric working drawings accurately 1.7 Identified materials required for installing storage and auxiliary fittings correctly. 1.8 Identified supplies required for installation of storage and auxiliary fittings correctly 1.9 Enumerated types of storage and types of pumps accurately. 1.10 Quantified materials and supplies required correctly 1.11 Costed materials and supplies accurately 1.12 prepared schedules of storage and pumps correctly 1.13 Identified tools and equipment needed for fixing storage and ancillary fittings appropriately
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	1.14 Used tools and equipment accurately 1.15 Determined positioning of Storage and ancillary fitting correctly. 1.16 Placed support for Storage and auxiliary fitting correctly. 1.17 Mounted storage and auxiliary fitting accurately. 1.18 used personal Protective Equipment correctly 1.19 Conducted Housekeeping correctly 1.20 Observed safety and health practices correctly
2. Resource implications	The following resources must be provided: 2.1 A functional workshop with basic tools, equipment and sanitary appliances. 2.2 Reference and appliance manuals 2.3 Personal protective equipment
3. Methods of Assessment	Competency may be assessed through: 3.1 Practical Test 3.2 Written test 3.3 Third party report 3.4 Portfolio
4. Context of Assessment	4.1 On-the-job 4.2 Off-the-job 4.3 Work placement
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended

MAINTAIN PLUMBING SYSTEMS

UNIT CODE: CON/OS/PL/CR/06/5/A

UNIT DESCRIPTION

This unit specifies the competencies required to maintain plumbing systems. It involves detecting faults in plumbing systems, quantifying requirements for repair, fixing plumbing system faults and testing plumbing system. It applies in the construction industry.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
These describe the key outcomes which make up workplace function.	These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Detect plumbing systems faults	1.1 Faults in plumbing systems are detected based on functionality 1.2 Possible causes of the plumbing faults are classified based on routine maintenance reports, design purpose, manufacturer's manual and best practice. 1.3 Solution for the fault is identified based on best practice.
2. Quantify and cost requirements for repair	2.1 <i>Appliances and fittings</i> that need replacement are identified based on the requirements of the job. 2.2 <i>Materials</i> required for plumbing fault repair are identified based on requirements of the job. 2.3 Supplies required for plumbing fault repair are identified based on requirements of the job. 2.4 Materials and supplies required are quantified and costed based on specifications
3. Fix plumbing system faults	3.1 Notice for maintenance operation are issued as per standard operating procedure. 3.2 Affected areas are closed/isolated based on best practice 3.3 <i>Tools and equipment</i> are identified and used based on job requirements.

	3.4 Fault is repaired based on standard operating procedures 3.5 Housekeeping is observed as per best practice 3.6 Safety and health practices are observed based on OSHA.
4. Test plumbing system	4.1 Plumbing system is tested based on specifications 4.2 Make good repaired work area based on best practices 4.3 Normal supply is reinstated where necessary as per the design

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variables	Range
1. Appliances and fittings may include but not limited to:	• Wash hand basin • Water closet • Bath tub • Urinal • Bidet • Kitchen sink • Jacuzzi • Shower head • Solar water heaters • Rain water harvester • Cisterns • Pumps • Instant Showers • Water Filters <i>maintenance</i>
2. Materials may include but not limited to:	• Screws • Adhesives • Cement • Sand

	• Pipes • Traps • Electric cables • Caulking material • Fittings
3. Tools and equipment may include but not limited to:	• Pipe wrench • Pipe cutter • Hacksaw • Pipe Threading Equipment • Bench Vice • Taps • Punch • Files • Screwdrivers • Drill with various sizes of bits • Portable drill • Mallet • Ball pein hammer • Mason chisel • PPR machine / Heat Fusion equipment • Pipe bender • Trowel • De-clogging wire / de-clogging machine • Toilet pump

Required Skills

The individual needs to demonstrate the following skills:

- Analytical skills
- Drawing skills
- Problem-solving skills
- Critical thinking skills
- Organizing skills
- Measuring skills
- Numeracy skills
- Cutting skills
- Threading skills

- Bending skills

Required Knowledge

The individual needs to demonstrate knowledge of:

- Trouble shooting process
- Preventive maintenance of all systems
- Corrective maintenance of all systems
- Plumbing systems
- Types of fitting and appliances
- Maintenance of each type of fitting and appliance

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	1.1 Assessment requires evidence that the candidate: 1.2 Detected faults in plumbing systems correctly 1.3 Classified Possible causes of the plumbing faults correctly 1.4 Identified Solution for the fault correctly 1.5 Identified Materials required for plumbing fault repair appropriately. 1.6 Identified Supplies required for plumbing fault repair appropriately. 1.7 Quantified and costed materials and supplies accurately. 1.8 Identified appliances and fittings that need replacement correctly 1.9 Issued notice for maintenance operation correctly 1.10 Closed/isolated affected areas appropriately 1.11 Identified tools and equipment correctly 1.12 Correctly repaired Faults 1.13 Observed Safety and health practices correctly 1.14 Tested plumbing system accurately 1.15 Repaired area made good appropriately 1.16 Reinstated water normal supply correctly 1.17 Conducted housekeeping correctly
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2. Resource Implications	The following resources must be provided: 2.1 A functional workshop with basic tools, equipment and sanitary appliances. 2.2 Reference and maintenance manuals 2.3 Personal protective equipment
3. Methods of Assessment	Competency may be assessed through: 3.1 Practical Tests 3.2 Oral Questioning 3.3 Written test 3.4 Third party report 3.5 Portfolio
4. Context of Assessment	4.1 On-the-job 4.2 Off-the-job 4.3 Work placement
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended

INSTALL FIRE CONTROL SYSTEMS

UNIT CODE: CON/OS/PL/CR/07/5/A

UNIT DESCRIPTION

This unit specifies the competencies required to install fire control systems. It involves preparing working drawings, selecting tools and equipment for installation, quantify and cost materials and supplies, install sprinkler systems, install hose reel systems, install wet and dry risers and maintain and service fire suppression systems. It applies in the construction industry.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
These describe the key outcomes which make up workplace function.	These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1 Prepare working drawing	1.1 Drawings are identified and selected based on the job. 1.2 Scale of the drawing is determined based on the specifications. 1.3 Measurements are converted based on scale. 1.4 Symbols are identified based on best practices. 1.5 Fire control piping appliances are identified based on the drawings 1.6 Manufacturers drawing and specifications are interpreted. 1.7 working drawings are prepared based on specifications 1.8 Isometric working drawings are drawn based on best practices.
2 Select tools and equipment	2.1 <i>Personal Protective Equipment</i> is used in line with occupational safety and health requirements 2.2 <i>Fire control tools and equipment</i> are identified based on the requirements of the job. 2.3 Fire control tools and equipment are used based on manufacturer's manuals.

	2.4 Fire control tools and equipment are cared for and maintained based on manufacturer's manual and workplace policy. 2.5 Fire control tools and equipment are stored based on work place policies.
3 Quantify and cost materials and supplies	3.1 Materials and supplies for fire control systems are identified based on the drawings and specifications. 3.2 Fittings for fire control systems are identified based on the standards. 3.3 Fire control materials are quantified and costed based on best practice 3.4 A schedule of fire control materials is developed based on the drawing and specifications.
4 Install sprinkler systems	4.1 Positions of fire control pipes are set out and marked based on working drawings. 4.2 Pipes are jointed in accordance with specifications. 4.3 Pipes are cut based on type of pipe, drawing specifications and job requirements 4.4 Pipes are fitted based on drawing specifications and requirements of the job. 4.5 Spools are calculated based on standards and job requirements 4.6 Sprinkler heads are fitted according to specifications 4.7 Sprinkler system is connected to water storage tank 4.8 Housekeeping is conducted as per workplace procedures. 4.9 Safety and health practices are observed based on OSHA. 4.10 Tests are conducted based on specifications. 4.11 Faults are corrected based on best practice.
5 Install hose reel systems	5.1 Positions of fire control pipes are set out and marked based on working drawings. 5.2 Pipes are jointed in accordance with specifications. 5.3 Pipes are cut based on type of pipe, drawing specifications and job requirements 5.4 Pipes are fitted based on drawing specifications and requirements of the job.

	5.5 Spools are calculated based on standards and job requirements 5.6 Hose reels are fitted according to specifications 5.7 Hose reel system is connected to water storage tank 5.8 Housekeeping is conducted as per workplace procedures. 5.9 Safety and health practices are observed based on OSHA. 5.10 Tests are conducted based on specifications. 5.11 Faults are corrected based on best practice.
6 Install wet and dry risers	6.1 Positions of fire control pipes are set out and marked based on working drawings. 6.2 Pipes are jointed in accordance with specifications. 6.3 Pipes are cut based on type of pipe, drawing specifications and job requirements 6.4 Pipes are fitted based on drawing specifications and requirements of the job. 6.5 Spools are calculated based on standards and job requirements 6.6 Fire Hydrants are fitted as per specifications 6.7 Housekeeping is conducted as per workplace procedures. 6.8 Safety and health practices are observed based on OSHA. 6.9 Tests are conducted based on specifications. 6.10 Faults are corrected based on best practice.
7 Maintain and service fire suppression systems	7.1 Types of maintenance are classified based on standards 7.2 Regular checks are conducted based on best practice 7.3 Regular servicing and cleaning are conducted in based on standards 7.4 Faults are rectified based on best practice

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variables	Range
1. Materials and supplies may include but not limited to:	• Screws • Adhesives • Cement • Sand • Pipes • Traps • Electric cables • Caulking material • Fittings • Valves
2. Personal Protective Equipment may include but not limited to:	• Helmet • Gloves • Dustcoat / overall • Dust mask • Safety shoes / boots
3. Fire control Tools and equipment may include	• Pipe wrench • Pipe cutter • Hacksaw • Pipe Threading Equipment • Bench Vice

but not limited to:	• Taps • Punch • Files • Screwdrivers • Drill with various sizes of bits • Portable drill • Mallet • PPR machine • Ball pein hammer • Mason chisel • PPR machine / Heat Fusion equipment • Pipe bender • Trowel • De-clogging wire / de-clogging machine
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Required Skills

The individual needs to demonstrate the following skills:

- Analytical skills
- Drawing skills
- Problem-solving skills
- Critical thinking skills
- Organizing skills
- Measuring skills
- Numeracy skills
- Cutting skills
- Threading skills
- Bending skills

Required Knowledge

The individual needs to demonstrate knowledge of:

- Trouble shooting process
- Preventive maintenance of all systems
- Corrective maintenance of all systems
- Plumbing systems
- Types of fitting and appliances
- Maintenance of each type of fitting and appliance

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Prepared working drawings correctly 1.2 Read and used scale of the drawing accurately 1.3 Converted measurements accurately 1.4 Identified symbols correctly. 1.5 Prepared Simple working drawings correctly 1.6 Drew isometric working drawings correctly 1.7 Used personal protective equipment correctly 1.8 Identified fire control tools and equipment correctly 1.9 Used fire control tools and equipment appropriately 1.10 Maintained fire control tools and equipment correctly 1.11 Stored fire control tools and equipment correctly 1.12 Identified fire installing materials correctly 1.13 Identified Fire control installing fittings correctly
2. Resource Implications	The following resources must be provided: 2.4 A functional workshop with basic tools, equipment and sanitary appliances. 2.5 Reference and maintenance manuals 2.6 Personal protective equipment
3. Methods of Assessment	Competency may be assessed through: 3.6 Practical Tests 3.7 Written test 3.8 Third party report 3.9 Portfolio
4. Context of Assessment	4.1 On-the-job 4.2 Off-the-job 4.3 Work placement
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended