

**REPUBLIC OF KENYA**

**COMPETENCY BASED CURRICULUM**

**FOR**

**PLUMBING LEVEL 3**



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 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 to 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 programs.

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 this Curriculum has been developed.

This Curriculum has been developed following the CBET framework policy; the CBETA standards and guidelines provided by the TVET Authority and the Kenya National Qualification Framework designed by the Kenya

It is my conviction that this Curriculum 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 a 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.

TVET Curriculum Development, Assessment and Certification Council (TVET CDACC) in conjunction with Construction Sector Skills Advisory Committee (SSAC), CAP Youth Empowerment Institute and Kenya Youth Employment and Skills have developed this Curriculum.

The Curriculum is designed and organized with an outline of learning outcomes; suggested delivery methods, training/learning resources and methods of assessing the trainee’s achievement. The Curriculum is competency-based and allows multiple entry and exit to the course.

I am grateful to the Council Members, Council Secretariat, Construction SSAC, expert workers and all those who participated in the development of this Curriculum.

**CHAIRPERSON, TVET CDACC**

# **ACKNOWLEDGMENT**

This Curriculum has been designed for competency-based training and has independent units of learning that allow the trainee flexibility in entry and exit. In developing the Curriculum, significant involvement and support was received from various organizations.

I appreciate CAP Youth Empowerment Institute, Kenya Youth Employment and Skills and Construction Sector Skills Advisory Committee (SSAC) who enabled the development of this Curriculum.

I recognize with appreciation the role of the SSAC in ensuring that competencies required by the industry are addressed in this Curriculum. I also thank all stakeholders in the Construction sector for their valuable input and all those who participated in the process of developing this Curriculum.

I am convinced that this Curriculum will go a long way in ensuring that workers in Construction sector will acquire competencies that will enable them perform their work more efficiently.

**COUNCIL SECRETARY/CEO**

**TVET CDACC**

# **ABBREVIATIONS AND ACRONYMS**

AIDS Acquired Immune Deficiency Syndrome

BC Basic Competency

CDACC Curriculum Development, Assessment and Certification Council

CC Common Competency

CR Core Competency

2D Two Dimensional

HIV Human Immuno-deficiency Virus

CBET Competency Based Education and Training

PL Plumbing

CON Construction

ICT Information Communication Technology

LCD Liquid Crystal Display

PPE Personal Protective Equipment

SSAC Sector Skills Advisory Committee

SWOT Strengths Weaknesses Opportunities and Threats

TVET Technical and Vocational Education and Training

# KEY TO UNIT CODE

**CON/CU/ PL/BC/01/3/ A**

Industry or sector

Curriculum

Occupational area

Type of competency

Competency number

Competency level

Version Control

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**COURSE OVERVIEW**

Description of the course

Plumbing Level 3 Qualification consists of competencies that an individual must achieve to enable him/her offer plumbing services comprising of mensuration calculation and interpretation of working drawings. It also entails installation of pipes, sanitary appliances and storage and pumping system in buildings, as well as maintaining building plumbing system.

Units of Learning

This course consists of Basic, Common and Core units of learning as indicated below:

**Basic Units of Learning**

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit Code** | **Unit Title** | **Duration in Hours** | **Credit Factor** |
| CON/CU/PL/BC/01/3/A | Communication Skills | 15 | 1.5 |
| CON/CU/PL/BC/02/3/A | Numeracy skills | 15 | 1.5 |
| CON/CU/PL/BC/03/3/A | Digital Literacy | 20 | 2 |
| CON/CU/PL/BC/04/3/A | Entrepreneurial Skills | 40 | 4 |
| CON/CU/PL/BC/05/3/A | Employability Skills | 20 | 2 |
| CON/CU/PL/BC/06/3/A | Environmental Literacy | 15 | 1.5 |
| CON/CU/PL/BC/07/3/A | Occupational Safety and  Health Practices | 15 | 1.5 |
| **Total** | | **140** | **14** |

**Common Units of Learning**

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit Code** | **Unit Title** | **Duration in Hours** | **Credit Factor** |
| CON/CU/PL/CC/01/3/A | Mensuration and Calculation | 50 | 5 |
| CON/CU/PL/CC/02/3/A | Interpretation of Architectural and Engineering Drawings | 50 | 5 |
| **Total** | | **100** | **10** |

**Core** **Units of Learning**

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit Code** | **Unit Title** | **Duration in Hours** | **Credit Factor** |
| CON/CU/PL/CR/01/3/A | Installation of Pipes in Buildings | 80 | 8 |
| CON/CU/PL/CR/02/3/A | Installation of Sanitary Appliances | 80 | 8 |
| CON/CU/PL/CR/03/3/A | Installation of Storage and  Pumping System | 80 | 8 |
| CON/CU/PL/CR/04/3/A | Maintenance of Plumbing  Systems | 80 | 8 |
| CON/CU/PL/CR/05/3/A | Industrial Attachment | 300 | 6 |
| **TOTAL** | | **620** | **62** |

The total duration of the course is **860** Hours.

**Entry Requirements**

An individual entering this course should have any of the following minimum requirements:

Kenya Certificate of Primary Education (KCPE)

OR

Any equivalent qualifications as determined by Kenya National Qualifications Authority (KNQA)

**Trainer qualification**

A trainer for this course should have a higher qualification than the level of this course

**Assessment**

The course will be assessed at two (2) levels: internally and externally. Internal assessment is continuous and is conducted by the trainer who is monitored by an accredited internal verifier while external assessment is the responsibility of TVET CDACC.

**Certification**

A candidate will be issued with a Certificate of Competency for each unit of competency. To attain the qualification National Certificate Level 3 in Plumbing, the candidate must demonstrate competence in all the units of competency as given in qualification pack. These certificates will be issued by TVET CDACC in conjunction with training provider.

# **BASIC UNITS OF COMPETENCY**

## **COMMUNICATION SKILLS**

**UNIT CODE:** CON/CU/PL/BC/01/3/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Communication Skills

**Duration of Unit:** 15 hours

**Unit Description**

This unit specifies the competencies required to demonstrate communication skills. It involves, obtaining and conveying workplace information, speaking English at a basic operational level, participating in workplace meetings and discussions, and completing relevant work-related documents.

**Summary of Learning Outcomes**

1. Obtain and convey workplace information
2. Speak English at a basic operational level
3. Participate in workplace meetings and discussions
4. Complete relevant work-related documents

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Obtain and convey workplace information | * Communication process * Modes of communication * Medium of communication * Effective communication * Barriers to communication * Flow of communication * Sources of information * Types of questions * Organizational policies * Workplace etiquette * Ethical work practices in handling communication | * Written tests * Oral questioning |
| 1. Speak English at a basic operational level | * English grammar   + Nouns, verbs, adjectives, adverbs, pronouns prepositions * English speaking   + Pronunciation   + Simple conversations * Taking verbal instructions * Reading and writing in English * Forms of expression in English | * Written tests * Oral * Role play |
| 1. Participate in workplace meetings and discussions | * Nature of workplace meetings * Meeting protocols * Workplace interactions | * Oral questioning * Written tests |
| 1. Complete relevant work-related documents | * Types and purposes of workplace documents and forms * Methods used in filling forms and documents * Recording workplace data * Process of distributing workplace forms and documents * Report writing * Types of workplace reports | * Written tests * Oral questioning |

**Suggested Methods of Instruction**

1. Discussion
2. Role play
3. Brainstorming
4. Viewing of related videos
5. Role play

**Recommended Resources**

* Desktop computers/laptops
* Projectors
* Report writing templates
* Pens
* Notebooks

## **NUMERACY SKILLS**

**UNIT CODE:** CON/CU/PL/BC/02/3/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Numeracy Skills

**Duration of Unit:** 15 hours

**Unit Description**

This unit covers the competencies required to identify and undertake simple numerical processes. The person who is competent in this unit shall be able to use / work with whole numbers and money up to one hundred thousand; Locate, compare and use highly familiar measurement; Use highly familiar maps and diagrams; Identify and use some common 2D shapes; and locate specific Information in highly familiar tables, graphs and charts for work.

**Summary of Learning Outcomes**

1. Use whole numbers for work
2. Locate, compare and use highly familiar measurement for work
3. Use highly familiar maps and diagrams for work
4. Identify and use some common 2D shapes for work
5. Locate specific Information in highly familiar tables, graphs and charts for work

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Use whole numbers for work | * Whole numbers * Use of Zeros * Use of halves * Sizes * Grouping of numbers * Addition and subtraction of whole numbers * Numerical information, * Symbols | * Written tests * Assignments * Supervised exercises |
| 1. Locate, compare and use highly familiar measurement for work | * Measurements * Units of measurements and their use * Digital time am and pm * Calendars | * Written tests * Assignments * Supervised exercises |
| 1. Use highly familiar maps and diagrams for work | * + Use of Maps and * Diagrams simple * symbols and pictorial   + Giving simple oral directions to locate objects | * Oral * Assignments * Supervised exercises |
| 1. Identify and use some common 2D shapes for work | * + Two dimensional shapes   + Describe common objects in terms of size and shape   + Compare objects   + Group common objects based on shape, size, color and features | * Written tests * Assignments * Supervised exercises |
| 1. Locate specific Information in highly familiar tables, graphs and charts for work | * + Simple tables   + Features of simple graphs and charts   + Numerical information in tables, graphs & charts | * Oral * Assignments * Supervised exercises |

**Suggested Methods of Instructions**

* Instructor led facilitation of theory.
* Practical demonstration of tasks by trainer
* Role play
* Discussion
* Demonstration by trainees and comments and corrections by trainers

**Recommended Resources**

* Common 2D shapes objects
* Calculator
* Basic measuring instruments
* Mathematical tables

## **DIGITAL LITERACY**

**UNIT CODE:** CON/CU/PL/BC/03/3/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Digital Literacy

**Duration of Unit:** 20 hours

**Unit Description**

This unit covers the competencies required to demonstrate digital literacy in a working environment. It entails identifying computer software and hardware, applying security measures to data, hardware, software, applying computer software in solving tasks and applying internet and email in communication at workplace.

**Summary of Learning Outcomes**

1. Identify computer hardware and software
2. Apply security measures to data, hardware and software
3. Apply computer software in solving tasks
4. Apply internet and email in communication at workplace

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Identify computer hardware and software | * Definition of a computer * Functions of a computer * Components of a computer * Classification of computers * Computer software | * Written tests * Practice assignments |
| 1. Apply security measures to data, hardware and software | * Data security and control * Security threats and control measures * Types of computer crimes * Detection and protection against computer crimes | * Written tests * Oral presentation |
| 1. Apply computer software in solving tasks | * Operating systems * Word processing * Spread sheets * Data base | * Oral questioning * Practical |
| 1. Apply internet and email in communication at workplace | * Computer networks * Uses of internet * Electronic mail (e-mail) concept | * Oral questioning * Oral presentation * Written test |

**Suggested Methods of Instruction**

1. Instructor led facilitation of theory
2. Demonstration by trainer
3. Assignments
4. Viewing of related videos
5. Group discussions

**Recommended Resources**

* Desk top computers
* Laptop computers
* Other digital devices
* Printers
* Storage devices
* Internet access
* Computer software

## **ENTREPRENEURIAL SKILLS**

**UNIT CODE:** CON/CU/PL/BC/04/3/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Entrepreneurial Skills

**Duration of unit:** 40 hours

**Unit description**

This unit describes the competencies required to demonstrate entrepreneurial competencies. It involves, developing entrepreneurial culture, identifying entrepreneurial opportunities, starting, operating and growing a small business.

**Summary of Learning Outcomes**

1. Develop entrepreneurial culture
2. Identify entrepreneurial opportunities
3. Start a small business
4. Operate a small business
5. Grow a small business

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Develop entrepreneurial culture | * Definition of entrepreneur * Importance of entrepreneurship * Common terminologies in entrepreneurship * Entrepreneurship and employment creation * Formal and informal employment * Habits that promote entrepreneurial development * Cultural factors that inhibit entrepreneurship | * Individual/group assignments * Written tests * Oral |
| 1. Identify entrepreneurial opportunities | * Types, characteristics, qualities & role of entrepreneurs * SWOT analysis * Generating Business ideas * Business opportunities * Evaluation of business opportunities | * Individual/group assignments * Written tests * Oral questioning * Oral presentation |
| 1. Start a small business | * Factors to consider when starting a small business * Legal requirement for starting a small business * Procedure of starting a small business * The dos and don’ts of starting a small business * Challenges faced when starting a small business and mitigating factors * Launch of a small business | * Oral questioning * Individual/group assignments * Written tests |
| 1. Operate a small business | * Organizational structure of a small business * Managing small business finances * Book keeping * Business support services * Marketing for small businesses * Basic IT application in small business | * Individual/group assignments * Written tests |
| 1. Grow a small business | * Methods of growing/expanding a small business * Resources for growing small business * Small business growth plan * ICT and business growth | * Individual/group assignments * Written tests |

**Suggested Methods of Instruction**

1. Instructor led facilitation of theory
2. Demonstration by trainer
3. assignments
4. Role play
5. Case study

**Recommended Resources**

* Case studies for small businesses
* Business plan template
* Laptop/ desktop computer
* Internet
* Telephone
* Writing materials

## **EMPLOYABILITY SKILLS**

**UNIT CODE:** CON/CU/PL/BC/05/3/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Demonstrate Employability Skills

**Duration of Unit:** 20 hours

**Unit Description**

This unit covers competencies required to demonstrate employability skills. It involves conducting self-management, demonstrating critical safe work habits, demonstrating workplace learning and workplace ethics.

**Summary of Learning Outcomes**

1. Conduct self-management
2. Demonstrate critical safe work habits
3. Demonstrate workplace learning
4. Demonstrate workplace ethics

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Conduct self-management | 1. Self-awareness 2. Formulating personal vision, mission and goals 3. Strategies for overcoming life challenges 4. Emotional intelligence 5. Assertiveness 6. Developing and maintaining high self-esteem 7. Developing and maintaining positive self-image 8. Accountability and responsibility 9. Good work habits 10. Self-awareness 11. Financial literacy 12. Healthy lifestyle practices | 1. Written tests 2. Oral questioning 3. Portfolio of evidence 4. Third party report |
| 1. Demonstrate critical safe work habits | 1. Stress and stress management 2. Punctuality and time consciousness 3. Interpersonal communication 4. Sharing information 5. Resources utilization 6. HIV and AIDS 7. Drug and substance abuse 8. Handling emerging issues | 1. Written tests 2. Oral questioning 3. Portfolio of evidence 4. Third party report |
| 1. Demonstrate workplace learning | 1. Personal training needs identification and assessment 2. Cultural aspects of work 3. Application of learning 4. Safe use of technology 5. Identifying opportunities 6. Workplace innovation 7. Handling emerging issues 8. Future trends and concerns in learning | 1. Written tests 2. Oral questioning 3. Portfolio of evidence 4. Third party report |
| 1. Demonstrate workplace ethics | 1. Meaning of ethics 2. Ethical perspectives 3. Values and beliefs 4. Organization code of ethics 5. Common ethical dilemmas 6. Organization culture 7. Corruption, bribery and conflict of interest 8. Privacy and data protection 9. Harassment and mutual respect 10. Financial responsibility/accountability 11. Etiquette 12. Emerging issues in ethics | 1. Written tests 2. Oral questioning 3. Portfolio of evidence 4. Third party report |

**Suggested Methods of Instruction**

* Simulation/Role play
* Group Discussion
* Presentations
* Q&A
* Case studies
* Assignments

**Recommended Resources**

1. Computers
2. Stationery
3. Charts
4. Video clips
5. Audio tapes
6. Radio sets
7. TV sets
8. LCD projectors

## **ENVIRONMENTAL LITERACY**

**UNIT CODE**: CON/CU/PL/BC/06/3/A

**Relationship to Occupational Standards**:

This unit addresses the Unit of Competency: Demonstrate Environmental Literacy

**Duration of Unit:** 15 hours

**Unit Description**

This unit specifies the competencies required to demonstrate environmental literacy. It involves controlling environmental hazard ,controlling environmental pollution and demonstrating sustainable resource use.

**Summary of Learning Outcomes**

1. Control environmental hazard
2. Control environmental Pollution
3. Demonstrate sustainable resource use

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Control environmental hazard | * Environmental Management and Coordination Act 1999 * Solid Waste Act * Storage of environmentally hazardous materials * Disposal of hazardous wastes * Types and uses of PPEs in line with environmental regulations * Occupational Safety and Health Act 2007 | * Written tests * Oral questions * Observation of work procedures |
| 1. Control environmental pollution | * Types of pollution * Environmental pollution control and management * Procedures for waste management | * Written tests * Oral questions * Observation of work procedures |
| 1. Demonstrate sustainable use of resource | * Types of resources * Sustainable resource use and management * Principles of 3Rs (Reduce, Reuse, Recycle) | * Written tests * Oral questions * Observation of work procedures |

**Suggested Methods of Instruction**

* Instructor led facilitation theory
* Discussion
* Demonstration by trainer
* Assignments
* Field trip

**Recommended Resources**

1. Standard operating and/or other workplace procedures manuals
2. Specific job procedures manuals
3. Solid Waste Act
4. Environmental Management and Coordination Act 1999
5. Machine/equipment manufacturer’s specifications and instructions
6. Personal Protective Equipment (PPE)

## **OCCUPATIONAL SAFETY AND HEALTH PRACTICES**

**UNIT CODE:** CON/CU/PL/BC/07/3/A

**Relationship to Occupational Standards**

This unit addresses the unit of competency: Demonstrate safety and health practices

**Duration of Unit:** 15 hours

**Unit Description**

This unit specifies the competencies required to practice and promote safety and health at work. It entails preparing to practice safety and health at work and complying and promoting compliance of workers to organization’s occupational safety and health instructions and requirements.

**Summary of Learning Outcomes**

1. Prepare to apply workplace safety and health practices
2. Compliance with occupational safety and health Act

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Prepare to apply workplace safety and health practices | * Awareness of legislation that outlines the minimum standards for occupational safety and health requirements/ regulations * Benefits of implementing an occupational safety and health program * Safety requirements/ regulations of own work and of other workers * Workplace standards and procedures for incidents and emergencies * Prevention and Control Measures for accidents, injuries and sickness | * Oral tests * Written questions * Observation of work procedures |
| 2. Compliance with occupational safety and health Act | * Safety instructions and safety signs * Safe handling of tools, equipment and materials * Use of safe guards and safety devices * Reporting of hazards, incidents, injuries and sickness in the workplace | * Written tests * Oral questions * Observation of work procedures |

**Suggested Methods of Instruction**

* Assigments
* Discussion
* Q&A
* Role play
* Viewing of related videos

**Recommended Resources**

* Occupational safety and health standards
* Standard operating and/or other workplace procedures manuals
* Specific job procedures manuals
* Client/supplier instructions
* Organizational or external personnel
* Machine/equipment manufacturer’s specifications and instructions
* Quality standards

# **COMMON UNITS OF COMPETENCY**

## **MENSURATION AND CALCULATION**

**UNIT CODE:** CON/CU/PL/CC/01/3/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Measure and calculate objects’ parameters.

**Duration of Unit**: 50 Hours

**Unit Description**

This unit of competency covers the competencies required to measure and calculate various parameters of an object. It entails distinguishing objects to be measured and calculated, use and care for measuring and calculation instruments and calculating parameters of a given object. It applies in the construction sector.

Summary of Learning Outcomes

1. Distinguish objects to be measured and calculated

2. Use and care for measuring and calculation instruments

3. Calculate parameters of a given object.

Learning Outcomes, Content and Suggested Assessment Methods

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested**  **Assessment**  **Methods** |
| 1. Distinguish objects to be measured and calculated | * Geometrical shapes * Types of geometrical objects * Dimensions * Measurement’s specifications * Sources of measurement specification | * Written tests * Observation * Oral questioning * Third party report |
| 2. Use and care for measuring and calculation instruments | * Measurement tools * Types * Use * Care and maintenance practices * Calculation tools * Types * Use * Care and maintenance practices | * Observation * Written tests * Oral questioning * Interviewing * Third party report |
| 3. Calculate parameters of a given object | * Fundamental operations * Linear measurements | * Observation * Written tests * Oral |
|  | * Taking measurements * Reading’s measurements * Dimensions * Ratio and proportions * Algebraic equations * Systems of measurements and * calculations * Numerical computation * Documentation of measurements and calculations * Material estimation and costing | * Oral Questioning * Interviewing * Third party report |

**Suggested Methods of Instruction**

* Demonstration
* Practice by the trainee
* Field trips
* Discussions
* Discussion

**List of Recommended Resources**

**Tools and Equipment**

* Micrometer gauge (In-out, depth)
* Vernier calipers (out, inside)
* Straight edge
* Try-square
* Protractor
* Steel rule
* Gauges
* Tape measure
* Pair of compasses
* Pair of dividers
* Calculator
* T-Square
* SMP table

**Supplies**

* Stationery
* A work station (desk)
* Display board

## **INTERPRETATION OF ARCHITECTURAL AND ENGINEERING DRAWINGS**

**UNIT CODE**: CON/CU/PL/CM/02/3

**Relationship to Occupational Standards**

This unit addresses the unit of competency: Interpret Architectural and Engineering Drawings

**Duration of Unit:** 50 Hours

**Unit Description**

This unit deals with competencies required to interpret architectural and engineering drawings. It entails using drawing instruments, supplies and materials, differentiating parts of a drawing, applying isometric drawings and different types of scales.

**Summary of Learning Outcomes**

1. Use drawing instruments, supplies and materials
2. Differentiate parts of a drawing
3. Apply isometric drawings
4. Apply different types of scales

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested**  **Assessment**  **Methods** |
| 1. Use drawing instruments, supplies and materials | * Types of drawing instruments * Drawing supplies and materials * Maintenance of drawing instruments * Disposal of waste supplies and materials | * Written tests * Observation * Oral questioning * Third party report * Interviewing |
| 2. Differentiate parts of a drawing | * Types of drawings * Symbols in a drawing | * Observation * Written tests * Oral questioning * Interviewing * Third party report |
| 3. Apply isometric drawings | * Types of isometric drawings * Use of isometric drawing | * Observation * Written tests * Oral questioning * Interviewing |
| 4. Apply different types of scales | * Interpretation of scales * Sketching of detailed drawings * Measurement transfer to the ground | * Observation * Written tests * Oral questioning * Interviewing * Third party report |

**Suggested Methods of Instruction**

* Demonstration
* Practice by the trainee
* Field trips
* Discussions
* Discussion

**Recommended Resources**

**Tools and Equipment**

* Calculator
* T-Square
* Steel rule
* Lettering stencil
* Scale rule
* Drawing boards
* T-Square
* Set square
* Blue print machine

**Supplies**

* Drawing papers
* Drawing pencils
* Drawing sets
* Masking tape
* Construction drawing

# **CORE UNITS OF COMPETENCY**

## **INSTALLATION OF PIPES IN BUILDINGS**

**UNIT CODE:** CON/CU/MA/CR/01/3**/**/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Install pipes in buildings.

**Duration of Unit:** 80 Hours

**Unit Description**

This unit specifies the competencies required to install pipes in buildings. It involves interpreting drawings, using tools and equipment, quantifying materials requirement, fitting-up domestic pipework as well as testing functionality of pipework. It applies in the construction industry.

**Summary of Learning Outcomes**

1. Interpret drawings
2. Use piping tools and equipment
3. Quantify materials requirements
4. Fit-up domestic pipe work
5. Test functionality of pipe work

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested**  **Assessment**  **Methods** |
| 1. Interpret working drawing | * Architectural and engineering drawings * Scales * Conversion of measurements * Piping symbols * Reference points | * Written tests * Observation * Oral questioning * Third party report * Interviewing |
| 2. Quantify piping materials requirements | * Piping tools and equipment safety, care and maintenance of piping tools and equipment * Use of piping tools and equipment * Storage piping tools and equipment * PPEs and their application | * Observation * Written tests * Oral questioning * Interviewing * Third party report |
| 3. Use piping tools and equipment | * Piping tools and equipment safety, care and maintenance of piping tools and equipment * Use of piping tools and equipment * Storage piping tools and equipment * PPEs and their application | * Written tests * Observation * Oral questioning * Third party report |
| 4. Fit-up domestic pipe work | * Types of Pipes * PVC * GI * PPR * Traps and valves * Piping systems * Pipe jointing and connections * Clenching materials * Adhesives * Pipe fitting * Pipe bending * Water heating systems | * Observation * Written tests * Oral questioning * Interviewing * Third party report |
| 5. Test functionality of pipe work | * Testing of piping systems * Pressure test * Smoke test * Water test * Air test * Repairing piping faults | * Observation * Written tests * Oral questioning |

**Suggested Methods of Instructions**

* Demonstration by trainer
* Practice by the trainee
* Field trips
* Discussions
* Direct instruction

**Recommended Resources**

* Functional Workshop with the following:

**Tools and Equipment**

* Plumb bob
* Measuring tools (Tape measure, infra-red light, rule etc.)
* Power tools
* PPE’s
* Sieve
* Brush
* Mason’s Square
* Die stock
* Threading machine
* PPR fusion machine
* Pipe wrench
* Bench vice
* Pipe stand vice
* Pipe bending machine
* Blow lamp
* Welding machine
* Reamers
* Files
* Pipe and tube cutters
* Pipe inspection equipment
* Pipe extractors
* Mason's hammer
* Chisel
* Trowels (Brick, pointing, window, corner and finishing trowels)
* Spirit level
* Bolster
* Cold chisel
* Hawk (Hand board)
* Sandpaper/Sponge
* Jointing knife/rod
* Stepping ladder
* Mason's line

**Supplies and Materials**

* Adhesive
* Pipes
* Pipe fittings

## **INSTALLATION OF SANITARY APPLIANCES**

**UNIT CODE:** CON/CU/PL/CR/02/3/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Install sanitary appliances.

**Duration of Unit:** 80 Hours

**Unit Description**

This unit specifies the competencies required to install sanitary appliances. It involves interpreting drawings, quantifying appliances and supplies, fixing sanitary appliances as well as testing working sanitary appliances. It applies in the construction industry

**Summary of Learning Outcomes**

1. Interpret working drawings
2. Interpret manufacturers drawings
3. Quantify appliances and supplies
4. Fix sanitary appliances
5. Test and commission working of sanitary appliances

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested**  **Assessment**  **Methods** |
| 1. Interpret drawing | * Architectural and engineering drawings * Scales * Conversion of measurements * Piping symbols * Reference points | * Observation * Written tests * Oral questioning * Interviewing * Third party reports |
| 1. Quantify appliances and supplies | * Calculation and estimation of quantities * Extraction of quantities from drawings | * Observation * Written tests * Oral questioning * Interviewing * Third party report |
| 1. Fix sanitary appliances | * Piping tools and equipment Safety, care and maintenance of piping tools and equipment * Sanitary appliances * Positioning and fixing of sanitary appliances * Support and mounting of sanitary appliances * Storage piping tools and equipment * PPEs and their application | * Observation * Written tests * Oral questioning * Interviewing * Third party reports |
| 1. Test and commission working of sanitary appliances | * Testing of piping systems * Repairing piping faults | * Observation * Written tests * Oral questioning * Interviewing * Third party reports |

**Suggested Methods of Instruction:**

* Demonstration by trainer
* Practice by the trainee
* Field trips
* Discussions
* Direct instruction

**Recommended Resources**

* Functional Plumbing Workshop with the following:

**Tools and Equipment**

* Spirit level
* Bolster
* Cold chisel
* Sandpaper/Sponge
* Jointing knife/rod
* Stepping ladder
* Mason's line
* Plumb bob
* Measuring tools (Tape measure,  Power tools
* PPE’s
* Brush
* Straight edge
* Mason’s Square
* Die stock
* Treading machine
* PPR-fusion machine
* Pipe wrench
* Bench vice
* Pipe stem
* Pipe vice
* Pipe bending machine
* Blow lamp
* Welding machine
* Reamers
* Files
* Pipe and tube cutters
* Pipe inspection equipment
* Pipe extractors
* Mason's hammer
* Chisel
* Trowels (Brick, pointing, window, corner and finishing trowels)

**Supplies and Materials**

* Adhesives
* Cement
* Sand
* Pipes
* Pipe fittings
* Clauking material

## **INSTALLATION OF STORAGE AND PUMPING SYSTEM**

**UNIT CODE:** CON/CU/PL/CR/03/3/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Install storage and pumping systems.

**Duration of Unit:** 80 Hours

**Unit Description**

This unit specifies the competencies required to install storage and pumping systems. It involves interpretation of drawings quantifying storage and ancillary appliance, and testing and commissioning storage and ancillary appliances, it applies in the construction industry.

**Summary of Learning Outcomes**

1. Interpret working Drawings drawing
2. Interpret water storage appliance manufacturers drawings
3. Interpret pumps manufacturing drawing
4. Quantify storage and ancillary appliances
5. Install storage systems and ancillary appliances
6. Test and commission storage and ancillary appliances

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested**  **Assessment**  **Methods** |
| 1. Interpret drawings | * Architectural and engineering drawings * Scales * Conversion of measurements * Piping symbols * Reference points | * Observation * Written tests * Oral Questioning |
| 1. Quantify storage and ancillary   appliances | * Calculation and estimation of quantities * Extraction of quantities from drawings | * Observation * Written tests * Oral Questioning |
| 1. Install storage systems and ancillary appliances | * Plumbing tools and equipment safety, care and maintenance of plumbing tools and equipment Storage of plumbing tools and equipment * Preparation for installation of storage systems * Positioning of storage tanks * Positioning of ancillary appliances * Support for storage and aucillary appliances Mounting storage and ancilliary appliances Pipes and their applications | * Observation * Written tests * Oral Questioning |
| 1. Test storage | * Testing storage and ancilliary appliances * Repairing storage and ancilliary faults | * Observation * Written tests * Oral Questioning |

**Suggested Methods of Instructions:**

* Demonstration by trainer
* Practice by the trainee
* Field trips
* Discussions
* Direct instruction

**Recommended Resources**

* Functional Plumbing workshop with the following:

**Tools and Equipment**

* Spirit level
* Brick bat gauge
* Bolster
* Cold chisel
* Hawk (Hand board)
* Sandpaper/Sponge
* Jointing knife/rod
* Stepping ladder
* Mason's line
* Plumb bob
* Measuring tools (Tape measure,
* Power tools
* PPE’s
* Spade
* Sieve
* Brush
* Straight edge
* Sputter dash
* Vibrator
* Mixer
* Tampering
* Wheelbarrow
* Club hammer
* Mason's hammer
* Chisel
* Trowels (Brick, pointing, window, corner and finishing trowels)
* Mason’s Square

**Supplies and Materials**

* Cement
* Sand
* Pipes and pipe fittings
* Adhesives
* Claucking materials
* Storage tanks
* Pumps and other auxiliary items

## **MAINTENANCE OF PLUMBING SYSTEMS**

**UNIT CODE:** CON/CU/PL/CR/04/3/A

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Maintain plumbing systems.

**Duration of Unit:** 80 Hours

**Unit Description**

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

**Summary of Learning Outcomes**

1. Troubleshoot plumbing systems faults
2. Quantify requirements for repair
3. Fix plumbing system faults
4. Test functionality of plumbing system

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested**  **Assessment**  **Methods** |
| 1. Troubleshoot plumbing  systems faults | * Common faults in plumbing works * Causes of faults in plumbing works * Solving plumbing works faults | * Observation * Written tests * Oral questioning * Interviewing * Third party reports |
| 2. Quantify requirements  for repair | * Calculation and estimation of quantities * Extraction of quantities from drawing | * Observation * Written tests * Oral questioning * Interviewing * Third party reports |
| 3. Fix plumbing system faults | * Plumbing tools and equipment * Safety, care and maintenance of plumbing tools and equipment * Preparation for plumbing maintenance * and repairs * Dis-assembling plumbing works * Plumbing parts repair/replacement * Storage plumbing tools and equipment * PPEs and their application | * Observation * Written tests * Oral questioning * Interviewing * Third party reports |
| 4. Test functionality of plumbing system | * Testing plumbing systems functionality * Reinstating plumbing systems | * Observation * Written tests * Oral questioning * Interviewing * Third party reports |

**Suggested Methods of instructions:**

* Demonstration by trainer
* Practice by the trainee
* Field trips
* Discussions
* Direct instruction

**Recommended Resources**

Functional Plumbing Workshop with the following:

* Club hammer
* Mason's hammer
* Chisel
* Brick bat gauge
* Bolster
* Cold chisel
* Hawk (Hand board)
* Sandpaper/Sponge
* Jointing knife/rod
* Stepping ladder
* Mason's line
* Plumb bob
* Measuring tools (Tape measure,
* Power tools
* PPE’s
* Spade
* Tamper rod
* Wheelbarrow
* Mason’s Square

**Supplies and Materials**

* Cement
* Sand
* Water
* Pipes and pipefitting
* Adhesives