REPUBLIC OF KENYA

NATIONAL OCCUPATIONAL STANDARDS

FOR

AGRICULTURAL ENGINEER CRAFTSPERSON

LEVEL 5

PROGRAMME ISCED CODE: 0716 454 A

TVET CDACC
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APPLY TECHNICAL DRAWINGS

UNIT CODE: 0716 441 13A

TVET CDACC CODE: ENG/OS/AGR/CC/05/5/MA

UNIT DESCRIPTION

This unit covers the competencies required to apply technical drawings. It involves competencies to select, use and maintain drawing equipment and materials. It also involves producing plain geometry drawings, solid geometry drawings, pictorial and orthographic drawings of components

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. ***(Bold and italicized terms are elaborated in the Range)***
1. Use and maintain drawing equipment and materials	1.1 **Drawing equipment** are identified and gathered according to task requirements 1.2 **Drawing materials** 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 1.5 Symbols and abbreviations are identified and their meaning interpreted according to standard drawing conventions
2. Produce plain geometry drawings	2.1 Different **types of lines** used in drawing and their meanings are identified according to standard drawing conventions 2.2 Different types of ***geometric forms*** are constructed according to standard drawing conventions 2.3 Different **types of angles** are constructed according to principles of trigonometry

	2.4 Different types of angles are measured using appropriate measuring tools 2.5 Angles are bisected according to standard drawing conventions 2.6 Sketches and drawings of patterns are interpreted according to standard conventions 2.7 Patterns are developed in accordance with standard conventions
3. Produce pictorial and orthographic drawings of components	3.1 Different **symbols and abbreviations** are identified, and their meaning interpreted according to standard drawing conventions 3.2 **Isometric sketches and drawings** of components are interpreted and produced in accordance with the standard conventions of isometric drawings 3.3 First and third angle orthographic sketches and drawings of components are interpreted and produced in accordance with the standard conventions of orthographic drawings 3.4 Freehand sketching of different types of geometric forms, tools, equipment, diagrams and components is conducted
4. Produce solid geometry	4.1 Drawings of patterns are interpreted according to standard conventions 4.2 Patterns are developed in accordance with standard conventions
5. Read and interpret electrical drawings	5.1 Electrical symbols and abbreviations are identified and their meaning interpreted according to BS 3939 5.2 Electrical schematic diagrams are interpreted as the design 5.3 Electrical ***drawings*** are produced in accordance with BS 3939 5.4 Hydraulic schematic diagrams are read and interpreted as per design

6. Produce assembly drawings	6.1 Orthographic views are exploded according to standard conventions of **orthographic drawings.** 6.2 **Pictorial views** are exploded according to standard conventions of orthographic drawings. 6.3 Part lists are identified according to part to be produced 6.4 **Sectional views** are produced according to standard conventions of drawing. 6.5 Produced drawing is hatched according to standard conventions of drawings.

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
- Drawing
- Interpretation
- Drawing equipment handling
- Analysis and synthesis
- 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

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. Drawing equipment m**ay** include but is not limited to:	● Drawing boards ● T-square ● Set squares ● Drawing set ● Computers with CAD packages
2. Drawing materials may include but is not limited to:	● Drawing papers ● Pencils ● Erasers ● Masking tapes ● Paper clips
3. Environmental legislations may include but is not limited to:	● EMCA 1999 ● OSHA 2007
4. Personal protective equipment may include but is not limited to:	● Dust coats ● Closed leather shoes ● Goggles for CAD
5. Types lines may include but is not limited to:	● Boarder lines ● Faint continuous lines ● Broken lines ● Chain lines ● Centre lines ● Cutting lines
6. Geometric forms may include but is not limited to:	● Circles ● Triangles ● Rectangles ● Parallelogram

	• Polygons • Pyramids • Conic sections • Prisms • Loci
7. Types of angles may include but is not limited to:	• 30 degrees • 45 degrees • 60 degrees • 90 degrees • 180 degrees
8. Standard drawing 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
9. Symbols and abbreviations may include but is not limited to:	• First angle • Third angle • E.g. of abbreviations Scale- 1:2 Diameter – D20 • Radius -R20
10. Isometric sketches and drawings may include but is not limited to:	• Use of 30 degrees
11. Electrical drawings may include but not limited to:	• Block • Schematic • Circuit • Line • Wring diagrams

12. Orthographic drawings may include but is not limited to:	• Front view • End view • Plan view
13. Pictorial views may include but is not limited to:	• Front view • End view • Plan view
14. Sectional views may include but is not limited to:	• Cutting lines • Assembled view
15. CAD packages may include but is not limited to:	• Modifying tools • 2D • Roster tool • Layout space • Drawing tool
16. CAD software may include but are not limited to:	PC computer with the following software • AutoCAD • Inventor • Solid works • Fusion 360 • Solid edge

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
- Interpretation
- Analysis and synthesis
- Communication
- Inter personal
- Technical drawing

- Presentation
- Creativity and innovative

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 Used and maintained drawing equipment as per manufacturer's instructions 1.2 Used drawing materials as per workplace procedures 1.3 Disposed waste materials in accordance with workplace procedures and environmental legislations 1.4 Used Personal Protective Equipment according to occupational safety and health regulations 1.5 Interpreted Electrical schematic diagrams as per the design requirements 1.6 Produced Electrical drawings in accordance with BS 3939 1.7 Read and interpreted Hydraulic schematic diagrams as per design

	1.8 Interpreted circuit, assembly and lay out diagrams as per the design 1.9 Conducted Freehand sketching of different types of geometric forms, tools, equipment, diagrams and components as per standard conventions 1.10 Produced Sectional views according to standard conventions of drawing. 1.11 Applied CAD packages in production of agricultural mechatronics machinery and equipment parts drawings in according to drawing conventions
2. Resource implications	The following resources should be provided: 2.1 Appropriately simulated environment where assessment can take place. 2.2 Access to relevant work environments where assessment can take place. 2.3 Resources relevant to the proposed activities or task.
3. Methods of assessment	mpetency may be assessed through: 3.1 Practical tests 3.2 Observation
4. Context of assessment	Competency may be assessed individually in the actual workplace or a simulated work place setting
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.