



REPUBLIC OF KENYA

COMPETENCY BASED MODULAR CURRICULUM

FOR
AGRICULTURAL ENGINEERING
KNQF LEVEL 6

(CYCLE 3)

PROGRAMME ISCED CODE: 0716 554 A



TVET CDACC
P.O. BOX 15745-00100
NAIROBI

AGRICULTURAL REFRIGERATION AND AIR CONDITIONING SYSTEMS

UNIT CODE: 0716 551 25A

TVET CDACC UNIT CODE: ENG/CU/AGR/CR/03/6/MA

UNIT DURATION: 140 Hours

Relationship to Occupational Standards

This unit addresses the unit of competency: **Install agricultural refrigeration and air conditioning systems**

Unit Description

This unit specifies the competencies required by an Agricultural Engineering Technologist Level 6 to install agricultural refrigeration and air conditioning systems. It involves designing agricultural refrigeration and air conditioning system, installing agricultural refrigeration and air conditioning system and maintaining agricultural refrigeration and air conditioning systems.

Summary of Learning Outcomes

S/No.	Learning Outcomes	Duration (Hours)
1.	Design agricultural refrigeration and air conditioning system	40
2.	Install agricultural refrigeration and air conditioning system	80
3.	Maintain agricultural refrigeration and air conditioning system	20
TOTAL		140

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1 Design agricultural refrigeration and air conditioning system	1.1 Technical terminologies used in refrigeration and air conditioning 1.1.1 BTU 1.1.2 dBA 1.1.3 Capacity 1.1.4 Compressor 1.1.5 Condenser 1.1.6 Cassette	<ul style="list-style-type: none">PracticalProjectPortfolio of evidenceThird party reportWritten tests

Learning Outcome	Content	Suggested Assessment Methods
	<p>1.1.7 HVAC</p> <p>1.1.8 Refrigerant</p> <p>1.1.9 Load calculation</p> <p>1.1.10 Split system</p> <p>1.1.11 Zoning</p> <p>1.1.12 COP</p> <p>1.2 Types of agricultural refrigeration systems</p> <p>1.2.1 Vapor compression refrigeration</p> <p>1.2.2 Vapor absorption refrigeration</p> <p>1.2.3 Air refrigeration</p> <p>1.2.4 Steam jet refrigeration</p> <p>1.2.5 Non-conventional refrigeration</p> <p>1.3 Types of air conditioning systems</p> <p>1.3.1 Duct air conditioning</p> <p>1.3.2 Split system conditioning</p> <p>1.3.3 Multi split air conditioning</p> <p>1.4 Methods of refrigeration</p> <p>1.4.1 Ice refrigeration</p> <p>1.4.2 Dry ice refrigeration</p> <p>1.4.3 Steam jet refrigeration</p> <p>1.5 Use of software in design of HVAC systems e.g.</p> <p>1.5.1 HVAC software</p> <p>1.5.2 Microsoft Excel</p> <p>1.6 Procedure of designing HVAC systems</p>	<ul style="list-style-type: none"> • Oral questioning

Learning Outcome	Content	Suggested Assessment Methods
	1.7 Costs involved in designing refrigeration and air conditioning systems	
2 Install agricultural refrigeration and air conditioning system	<p>2.1 Relevant tools and equipment required to install a Refrigeration and Air Conditioning system</p> <ul style="list-style-type: none"> 2.1.1 Vacuum pump 2.1.2 Pressure gauges 2.1.3 Refrigerant bottles 2.1.4 Electric meter 2.1.5 Flare tool 2.1.6 Toolbox <p>2.2 Materials used and availability</p> <p>2.3 Air conditioning and refrigeration Assembly procedures</p> <p>2.4 Methods of testing the refrigerant</p> <ul style="list-style-type: none"> 2.4.1 Soap test 2.4.2 Ultraviolet dye <p>2.5 Corona suppression</p> <p>2.6 Methods of testing the air conditioners</p> <ul style="list-style-type: none"> 2.6.1 AC performance test chart 2.6.2 Air conditioner performance test <p>2.7 Use of multimeter</p>	<ul style="list-style-type: none"> • Practical • Project • Portfolio of evidence • Third party report • Written tests • Oral questioning
3 Maintain agricultural refrigeration and air	<p>3.1 Methods of maintaining agricultural refrigeration and air conditioning systems</p> <ul style="list-style-type: none"> 3.1.1 Corrective maintenance 3.1.2 Preventive maintenance 	<ul style="list-style-type: none"> • Practical • Project • Portfolio of evidence • Written tests

Learning Outcome	Content	Suggested Assessment Methods
conditioning system	3.1.3 Predictive maintenance 3.1.4 Conditional maintenance 3.2 Preparation of maintenance schedule of agricultural refrigeration and air conditioning systems	<ul style="list-style-type: none"> • Oral questioning

Suggested Methods of Delivery

- Demonstration
- Projects
- Group discussion
- Direct instructions

Recommended Resources for 25 Trainees

S/No.	Category/Item	Description/Specifications	Quantity	Recommended Ratio (Item: Trainee)
A	Learning Materials			
	Projector		1	1:25
	Soil survey and classification manual		1	1:25
	Scientific calculators		25	1:25
	Computer with internet		1	1:25
	Installation manuals latest version of HVAC Software		1	1:25
B	Learning Facilities & infrastructure			

	Classroom	40 M ²	1	1:25
C	Consumable materials			
	Stationery	Assorted	1 rim of printing papers 1 packet of pens 1packet of maker pens	1:25
D	Tools and Equipment			
1.	AC HVAC system		1	
2.	Air conditioning system		1	
3.	Pipes & Fittings			
4.	Toolbox		1	
5.	Testing kit		2	