

**REPUBLIC OF KENYA**

**NATIONAL OCCUPATIONAL STANDARD**

**FOR**

**FARM MACHINERY AND EQUIPMENT OPERATOR**

**LEVEL 4**

**PROGRAMME CODE: 0716 354A**

# ACKNOWLEDGEMENT

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…………………. acknowledge all other institutions which in one way or another contributed to the development of these Standards.

# ACRONYMS

|  |  |
| --- | --- |
| ISCED | International Standard Classification of Education |
| OBD | On Board Display |
| OSHA | Occupational Safety and Health Act |

# KEY TO UNIT CODE

Sector / Industry

Sub Sector

Occupational Area

Version Control

Unit of Competence Number

ISCED level, Programme Orientation and Level of Completion

xx

x

xxx

x

x

x

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# OVERVIEW

Farm Machinery and Equipment operation Level 4 qualification consists of competencies required by an individual to operate farm tractor, operate farm machinery and equipment and operate computerized agricultural equipment

Units of competency comprising Farm Machinery and Equipment Operation Level 4 qualification include the following.

# Core Units of Competency

|  |  |
| --- | --- |
| **UNIT CODE** | **UNIT TITLE** |
| 0716 351 01A | Operate farm tractor |
| 0716 351 02A | Operate farm machinery and equipment |
| 0716 351 03A | Operate computerized agricultural equipment |

## 

## OPERATE FARM TRACTOR

**UNIT CODE: 0716 351 01A**

**UNIT DESCRIPTION**

This unit specifies the competencies required by a Farm Machinery and Equipment Operator Level 4 to operate farm tractor. It involves inspecting farm tractor systems, driving farm tractor, servicing farm tractor systems, maintaining and repairing farm tractor systems.

**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. Determine force, work, energy and power | * 1. ***Personal protective equipment*** is worn based on OSHA   2. Define force, work, energy and power is determined as per work place procedures.   3. Forms of energy is identified as per work place procedure.   4. Simple calculations on force, work, energy and power is identified as per work place procedure. |
| 1. Perform bench work | * 1. Personal protective equipment is worn based on OSHA   2. Bench work tools and equipment are identified as per work place procedure.   3. benchwork tools and equipment are maintained as per work place procedure. |
| 1. Analyse physical properties of engineering materials | * 1. Personal protective equipment is worn based on OSHA   2. Engineering materials are identified as per physical properties.   3. Engineering materials are tested as per work requirements. |
| 1. Carry out mechanical machining operations | * 1. Personal protective equipment is worn based on OSHA   2. Mechanical machines were identified as per the work carried out   3. Mechanical machine operations were Performed as per work requirements.   4. Recycling and reusing waste materials in machine operations is identified as per work place requirement.   5. Mechanical machines are maintained as per manufacturers specifications and manuals |
| 1. Apply geometry and measurements | * 1. Obtain perimeter and areas of regular figures as per geometric rules.   2. Volumes and surface area of Solids are Obtained using geometric rules   3. Engineering problems are solved using Pythagoras theorem as per work requirements |
| 1. Inspect farm tractor systems | * 1. ***Personal protective equipment*** is worn based on OSHA   2. ***Farm Tractor system*** is identified according to manufacturer’s manual   3. ***Farm tractor inspection tools and equipment*** are assembled as per work requirements   4. Farm tractor system inspection procedure is carried out as per operator’s manual   5. Farm tractor system inspection report is prepared as per work requirements. |
| 1. Drive farm tractor | * 1. Personal protective equipment is worn based on OSHA   2. Farm tractor starting procedure is carried out as per operator’s manual   3. Farm tractor is driven as per operator’s manual |
| 1. Operate Farm tractor system | * 1. Personal protective equipment is worn based on OSHA   2. Tractor system parts and components are identified as per operator’s manual.   3. Farm tractor system and equipment inspection procedure is carried out as per operator’s manual.   4. Farm tractor equipment attachment/mounting procedure is carried out as per operator’s manual   5. Farm tractor is operated as per operator’s manual |
| 1. Service farm tractor systems | * 1. Personal protective equipment is worn based on OSHA   2. Service schedule is prepared as per maintenance and service manual   3. Pre-start checks are carried out as per operator’s manual   4. Routine scheduled service is carried out as per farm tractor service manual.   5. A farm tractor system service report is prepared as per work requirements |
| 1. Maintain and repair farm tractor systems | * 1. Personal protective equipment is worn based on OSHA   2. Farm Tractor system maintenance and repair tools and equipment are assembled as per work requirements   3. Farm tractor system faults are diagnosed as per manufacturer’s manual   4. Farm tractor systems are maintained and repaired as per manufacturer’s manual |

**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. ***Personal protective equipment*** includes but not limited to: | * Gloves * Helmet * Face shields * Safety goggles * Safety boots * Overalls * Dust coat * Ear muffs * Face masks |
| 1. ***Tractor system*** includes but not limited to: | * Cooling * Fuel * Lubrication * Ignition * Transmission * Electrical * Hydraulic |
| 1. ***Farm tractor inspection tools and equipment*** includes but not limited to: | * Toolbox * Pressure gauge * Multimeter * Greasing gun * Onboard display tester * Torque wrench |
| 1. ***Tractor system maintenance and repair tools and equipment*** includes but not limited to: | * Jack * Toolbox * Torque wrench * Pullers * Filler gauge * Ring squeezer |

**REQUIRED KNOWLEDGE AND SKILLS**

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

**Required knowledge**

The individual needs to demonstrate knowledge of:

* Different land surface condition
* Machinery shutting down procedure
* Different farm tools and materials
* Waste management and disposal methods
* Occupational safety and health procedures

The **Required Skills**

The individual needs to demonstrate the following skills:

* Logical thinking
* Problem solving
* Communication
* Analytical
* Record keeping

**EVIDENCE GUIDE**

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

|  |  |
| --- | --- |
| 1. Critical aspects of competency | Assessment requires evidence that the candidate:   1. Worn personal protective equipment based on OSHA 2. Inspected farm tractor systems according to manufacturer’s manual 3. Prepared farm tractor system inspection report as per work requirements 4. Serviced farm tractor systems according to service and maintenance manual. 5. Diagnosed farm tractor system faults as per manufacturer’s manual 6. Repaired farm tractor systems as per manufacturer’s manual |
| 1. Resource implications | The following resources should be provided:   1. Appropriately simulated environment where assessment can take place 2. Access to relevant work environment 3. Resources relevant to the proposed activity or tasks |
| 1. Methods of assessment | Competency in this unit may be assessed through:   1. Practical 2. Project 3. Portfolio of evidence 4. Third party report 5. Written tests 6. Oral assessments |
| 1. Context of assessment | Competency in this unit may be assessed in;   1. Workplace or simulated workplace. |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector and workplace job role is recommended. |

## OPERATE FARM MACHINERY AND EQUIPMENT

**UNIT CODE:** **0716 351 02A**

**UNIT DESCRIPTION**

This unit specifies the competencies required by a Farm Machinery and Equipment Operator Level 4 to operate farm machinery and equipment. It involves operating tillage, planting, crop protection and harvesting equipment and machinery.

**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. Operate tillage equipment and machinery | 1. Personal protective equipment is worn based on OSHA 2. ***Farm tillage equipment and machinery*** are assembled as per work requirement. 3. Farm tillage equipment and machinery are adjusted as per work requirement 4. Farm tillage equipment and machinery are operated as per work requirement 5. Farm tillage equipment and machinery are maintained as per operator’s manuals. |
| 1. Operate planting equipment and machinery | 1. Personal protective equipment is worn based on OSHA 2. ***Planting equipment and machinery*** are assembled as per work requirement. 3. Planting equipment and machinery are calibrated as per operator’s manual. 4. Planting equipment and machinery are operated as per work requirement. 5. Planting equipment and machinery are maintained as per operator’s manuals |
| 1. Operate crop protection equipment and machinery | 1. Personal protective equipment is worn based on OSHA 2. ***Crop protection equipment and machinery*** are assembled as per work requirement. 3. Crop protection equipment and machinery are calibrated as per operator’s manual. 4. Crop protection equipment and machinery are operated as per work requirement. 5. Crop protection equipment and machinery are maintained as per operator’s manuals |
| 1. Operate crop harvesting equipment and machinery | 1. Personal protective equipment is worn based on OSHA 2. ***Crop harvesting equipment and machinery*** are assembled as per work requirement. 3. Crop harvesting equipment and machinery are calibrated as per operator’s manual. 4. Crop harvesting equipment and machinery are operated as per work requirement. 5. Crop harvesting equipment and machinery are maintained as per operator’s manuals |

**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. ***Farm tillage equipment and machinery*** include but not limited to: | * Disc plough * Mouldboard plough * Subsoiler * Chisel plough * Cultivators * Rotavator * Power plough * Disc harrow |
| 1. ***Planting Equipment and Machinery*** include but not limited to: | * Broadcaster * Seed Drills * Row crop planter * Pneumatic planter * Potato planter * Drones |
| 1. ***Crop protection machinery and equipment*** include but not limited to: | * Knapsack sprayer * Boom sprayer * Dusters * Aerial sprayers * Motorised sprayers |
| 1. ***Harvesting machinery and equipment*** include but not limited to: | * Mowers * Balers * Conditioners * Forage harvesters * Combine harvesters |

**REQUIRED KNOWLEDGE AND SKILLS**

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

**Required knowledge**

The individual needs to demonstrate knowledge of:

* Field assessment procedures
* Different land condition
* Procedure of checking and adjusting agricultural machinery, tools and equipment
* Different agricultural machinery, tools and equipment
* Calibration of agricultural machines
* Service and maintenance of agricultural machinery, tools and equipment
* Occupational safety and health procedures

**Required Skills**

The individual needs to demonstrate the following skills:

* Logical thinking
* Problem solving
* Communication
* Analytical

**EVIDENCE GUIDE**

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

|  |  |
| --- | --- |
| 1. Critical aspects of competency | Assessment requires evidence that the candidate:   1. Worn personal protective equipment based on OSHA 2. Operated farm tillage equipment and machinery as per work requirement 3. Maintained tillage equipment and machinery as per manufacturer’s manual 4. Calibrated planting equipment and machinery as per manufacturer’s manual. 5. Operated and utilized planting equipment and machinery as per work requirement. 6. Maintained planting equipment and machinery as per manufacturer’s manual 7. Calibrated crop protection equipment and machinery as per manufacturer’s manual. 8. Operated and utilized crop protection equipment and machinery as per work requirement. 9. Maintained crop protection equipment and machinery are as per manufacturer’s manual 10. Calibrated harvesting equipment and machinery are as per manufacturer’s manual. 11. Operated and utilized harvesting equipment and machinery as per work requirement. 12. Maintained harvesting equipment and machinery as per manufacturer’s manual |
| 1. Resource implications | The following resources should be provided:   1. Appropriately simulated environment where assessment can take place 2. Access to relevant work environment 3. Resources relevant to the proposed activity or tasks |
| 1. Methods of assessment | Competency in this unit may be assessed through:   1. Practical 2. Project 3. Portfolio of evidence 4. Third party report 5. Written tests 6. Oral assessments |
| 1. Context of assessment | Competency in this unit may be assessed in;   1. Workplace or simulated workplace. |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector and workplace job role is recommended. |

## OPERATE COMPUTERIZED AGRICULTURAL EQUIPMENT

**UNIT CODE:** **0716 351 03A**

**UNIT DESCRIPTION**

This unit specifies the competencies required by a Farm Machinery and Equipment Operator Level 4 to utilize computerized agricultural equipment. It involves activating, navigating and operating computerized agricultural equipment.

**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. Operate computer devices | * 1. Procedure for turning/off a computer is performed as per user manual.   2. Computer devices types are identified as per work place procedure.   3. Computer systems and components are identified as per work place requirements. |
| 1. Activate computerized agricultural equipment | * 1. Personal protective equipment is worn based on OSHA   2. **Computerized agricultural equipment components** are assembled as per operator’s manual.   3. Computerized agricultural equipment is activated as per operator’s manual. |
| 1. Navigate computerized agricultural equipment | * 1. Personal protective equipment is worn based on OSHA   2. Computerized agricultural equipment menu is accessed as per operator’s manual.   3. Computerized agricultural equipment is customized as per work requirement. |
| 1. Operate computerized agricultural equipment | * 1. Personal protective equipment is worn based on OSHA   2. ***Computerized agricultural equipment functions*** are selected as per work requirement.   3. Computerized agricultural equipment is operated as per operator’s manual. |

**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. **Computerized agricultural equipment components** include but not limited to: | * OBD * Display interfaces * Control systems * Joystick * Sensors * GPS receivers * Actuators of robotic arms * Communication modules |
| 1. ***Computerized agricultural equipment functions*** include but not limited to: | * Mowers * Balers * Conditioners * Forage harvesters * Combine |

**REQUIRED KNOWLEDGE AND SKILLS**

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

**Required knowledge**

The individual needs to demonstrate knowledge of:

* Data analysis and presentation
* Computer application packages
* Field assessment procedures
* Different land condition
* Different farm tools and materials
* Soil and water conservation
* Occupational safety and health procedures

**Required skills**

The individual needs to demonstrate the following skills:

* Record keeping
* Planning
* Digital literacy
* Measuring
* Decision making
* Communication skills

**EVIDENCE GUIDE**

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

|  |  |
| --- | --- |
| 1. Critical aspects of competency | Assessment requires evidence that the candidate:   1. Determined work, energy and power as per work requirement 2. Solved problems on simple machines as per work procedure 3. Solved problems on levers as per work procedures 4. Determined bending moments based on loading 5. Applied forces and bending moments in engineering systems 6. Calculated flow rate in pipes as per required discharge 7. Determined losses in pipes as per flow rate measurement |
| 1. Resource implications | The following resources should be provided:   1. Appropriately simulated environment where assessment can take place 2. Access to relevant workplace 3. Materials relevant to the proposed activity or tasks |
| 1. Methods of assessment | Competency in this unit may be assessed through:   1. Practical 2. Project 3. Portfolio of evidence 4. Third party report 5. Written tests 6. Oral assessments |
| 1. Context of assessment | Competency in this unit may be assessed in;   1. A workplace or simulated workplace. |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector and workplace job role is recommended. |