

**REPUBLIC OF KENYA**

**NATIONAL OCCUPATIONAL STANDARD**

**FOR**

**MOTOR VEHICLE MECHANIC**

**KNQF LEVEL 3**

**ISCED CODE: 0716254A**

# 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 blueprint, Vision 2030 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 of Kenya 2010 and this resulted in the formulation of the Policy Framework for Reforming Education and Training (Sessional Paper No. 4 of 2016). 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 institutions be competency based, curriculum development be industry led, certification be based on demonstration of competence and mode of delivery to allow for multiple entry and exit in TVET programmes. These reforms demand that industry takes a leading role in occupational standards development to ensure it addresses competence needs.

It is against this background that these Occupational Standards have been developed for a competency-based Automotive Engineering standard. 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 key role towards development of competent human resource for the engineering sector’s growth and development.

# 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 (TVET) Act No. 29 of 2013 and Sessional Paper No. 4 of 2016 on Reforming Education and Training in Kenya, emphasized the need to reform curriculum development, assessment and certification. This called for a shift to CBET in order 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.

Incumbent Automotive engineering industry experts in conjunction with expert subject trainers and other related stakeholders have developed these Occupational Standards for Motor vehicle Mechanic Level 3. These standards will be the basis for development of competency-based curriculum for Motor vehicle Mechanic Level 3

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 everyone who participated in the development of these Occupational Standards.

**KEY TO UNIT CODE**



**ACRONYMNS**

PCV-Positive crankcase ventilation

GDI-Gasoline direct injection

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# OVERVIEW

The Motor Vehicle Mechanic Level 3 qualification consists of competencies that a person must achieve to enable him/her to service and maintain motor vehicles. It includes Applying digital literacy, applying workplace essential skills, maintaining vehicle engine, maintaining vehicle braking system and maintaining vehicle suspension system.

The units of competency comprising Motor Vehicle mechanic certificate Level 3 qualifications include the following competencies

**SUMMARY OF UNITS OF COMPETENCY**

|  |  |
| --- | --- |
| 0716 251 03A | Maintain Vehicle Petrol Engine |
| 0716 251 04A | Maintain Vehicle Braking System |

# MAINTAIN VEHICLE PETROL ENGINE

**UNIT CODE: 0716 251 01A**

**UNIT DESCRIPTION**

This unit specifies competencies required to maintain vehicle engine. It involves performing Servicing vehicle engine, Overhauling Vehicle Engine, Servicing vehicle engine lubrication system and Performing House keeping

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace functions | **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. Service vehicle Petrol engine | 1. ***PPEs*** are adorned as per workshop procedures. 2. Work area is organised and safety measures undertaken before use as per workplace procedure 3. ***Tools, equipment and materials*** are selected as per work requirements 4. Engine inspection is carried out as per manufacturers specifications 5. Engine components are replaced/repaired according to manufacturer’s manual |
| 1. Overhaul Petrol Vehicle Engine | * 1. Work area is organised and safety measures undertaken before use as per workplace procedure.   2. ***Tools, equipment and materials*** are selected as per work requirements.   3. ***Engine components*** are dismantled according to manufacturer’s manual   4. Engine componentsare cleaned as perstandard operating procedure.   5. Engine parts are inspected according to manufacturer’s specification   6. Engine parts are serviced/Replaced according to manufacturer’s specification   7. Vehicle engine parts are reassembled according to manufacturer’s manual   8. ***Re-installation******checks*** are performed according to manufacturer’s specification |
| 1. Service vehicle Petrol engine lubrication system | 1. Work area is organised and safety measures undertaken before use as per workplace procedure. 2. ***Engine lubrication Tools, equipment*** and materials are selected as per work requirements. 3. Engine lubrication system is diagnosed as per Manufacturer’s specification 4. Engine lubrication components are inspected according to manufacturer’s manual 5. ***Engine lubrication Components*** are serviced according *to*manufacturer’s specifications***.*** 6. Engine lubrication Componentsare fitted back according tomanufacturer’s specifications 7. Engine lubrication system*is tested according to*manufacturer’s specifications |
| 1. Service Vehicle Petrol Fuel System | 1. Work area is organised and safety measures undertaken before use as per workplace procedure 2. Tools, equipment and materials are assembled as per work requirements 3. ***Vehicle Petrol Fuel*** ***system*** diagnosis is carried out as per Manufacturer’s specification 4. Vehicle Fuel system components are inspected according to manufacturer’s manual 5. Vehicle Fuel system components areserviced/Replaced according tomanufacturer’s specifications***.*** 6. Vehicle Fuel system istested according tomanufacturer’s specifications |
| 1. Perform House keeping | * 1. Engine waste is segregated and disposed as per workshop procedures   2. Tools and equipment are cleaned as per workshop procedures   3. Tools and equipment are stored as per workshop procedures   4. Housekeeping is carried out as per workplace requirements |

**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. PPEs may include but are not limited to: | * Safety Boot * Dust Coat/Overall * Gloves * Face shield |
| 1. Tools, equipment and materials may include but are not limited to: | * Spanners * Torque wrench * Straight edge * Valve compressor * Pliers * Telescopic dial gauge * Filler gauge * Vernier callipers * Diagnostic scope * Dial gauge indicator * Compression tester * Ring squeezer * Oil * Funnels and draining pans * Cleaning materials * Plastigauge * Engineers blue |
| 1. Petrol Engine components may include but are not limited to: | * Oil seals and oil filters * Piston and piston rings * Top covers * Valves, push rods and valve lifters * Camshaft * Gasket * Crankshaft * Drive pulleys * Oil sump and oil pump * Timing gears * Timing belt * Cylinder head * Cylinder block |
| 1. Re-installation checks | * Engine ignition timing * Camshaft timing * Injector pump timing * Tappet clearance |
| 1. Petrol Engine lubrication tools, equipment and materials | * Drain pan * Feeler gauge * Oil funnels * Grease gun * Oil pump * Silicon * Oil * Grease * Rags |
| 1. Petrol Engine lubrication components | * Oil sump * Oil filters * Oil pump * Lubrication sensors * Oil galleries * PCV valves |
|  |  |

**REQUIRED KNOWLEDGE AND SKILLS**

***The individual needs to demonstrate knowledge of:***

* Kenyan legislation and workplace procedures relevant to:
* Health and safety
* Environment
* Personal protective equipment
* Waste management
* Engine Manufacturers Manual
* Workplace procedures for vehicle engine overhaul.
* Working to agreed time frame and keeping others informed of progress
* The relationship between time, costs and profitability
* Interpretation and use of technical information for engine service activities

**Required Skills**

*The individual needs to demonstrate the following skills*:

* Communication (verbal and written)
* Time management
* Problem solving
* Decision making
* Planning
* First aid
* Vehicle engine service
* Vehicle engine overhaul
* Vehicle engine lubrication system service
* House keeping
* Interpreting technical information

**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 learner:   1. Adorned Personal Protective Equipment as per workshop procedures 2. Inspected Engine components as per work requirements 3. Selected Engine Tools, Equipment and materials as per work requirements 4. Serviced/Replaced Engine components as per work requirements 5. Dismantled Engine components as per work requirements 6. Assembled engine components as per work requirements 7. Performed reinstallation checks as per work requirements 8. Diagnosed Lubrications system as per workshop procedures 9. Serviced lubrication system as per work requirements 10. Performed housekeeping as per workshop procedures |
| 1. Resource Implications | The following resources should be provided:   1. Access to relevant workplace where assessment can take place 2. Appropriately simulated environment where assessment can take place 3. Resources relevant to the proposed assessment 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 |
| 1. Context of Assessment | Competency may be assessed in a workplace or in a simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended |

# MAINTAIN VEHICLE BRAKING SYSTEM

**UNIT CODE: 0716 251 04A**

**UNIT DESCRIPTION**

This unit specifies competencies required to Maintain Vehicle Braking system. It involves Assessing vehicle braking system, servicing vehicle braking system and performing house keeping

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace functions | **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. Assess vehicle braking system | 1. Work area is organised and safety measures undertaken before use as per workplace procedure 2. ***Tools, equipment and materials*** are selected as per work requirements 3. ***Vehicle braking system*** is assessed according to manufacturer’s specifications |
| 1. Service Vehicle braking system | 1. Work area is organised and safety measures undertaken before use as per workplace procedure 2. Tools, equipment and materials are selected as per work requirements 3. **Vehicle braking system component*s*** are inspected according to manufacturer’s manual 4. Vehicle braking system Components*are* serviced/ Replaced according tomanufacturer’s specifications***.*** 5. Vehicle Braking system is bled according to manufacturer’s manual 6. Vehicle brakingsystemis tested according *to*manufacturer’s specifications |
| 1. Carry out vehicle Braking system diagnosis | * 1. Work area is organised and safety measures undertaken before use as per workplace procedure   2. Tools, equipment and materials are assembled as per work requirements   3. Diagnostic trouble codes are interpreted as per manufacturer’s specifications   4. Faulty sensors, actuators and circuits are replaced/serviced as per manufacturer’s specifications |
| 1. Perform House keeping | * 1. Brake waste is segregated and disposed as per workshop procedures   2. Tools and equipment are cleaned as per workshop procedures   3. Tools and equipment are stored as per workshop procedures   4. Housekeeping is carried out as per workplace requirements |

**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. Tools, equipment and materials may include but are not limited to: | * Spanners * Wheel chokes * Brake bleeder kit * Jack and jack stand * Brake pad spreader * Brake Fluid * Cloth * Detergent |
| 1. Vehicle braking system may include but are not limited to: | * Drum brakes * Disc brakes * Anti-lock braking system |
| 1. Vehicle braking system component*s* may include but are not limited to: | * Brake pedal * Brake booster * Master cylinder * Brake line * Wheel cylinder * Brake shoe * Brake pads * Compressor * Brake actuators * Brake sensors |

**REQUIRED KNOWLEDGE AND SKILLS**

***The individual needs to demonstrate knowledge of:***

* Kenyan legislation and workplace procedures relevant to:
* Health and safety
* Environment
* Personal and vehicle protective equipment
* Waste disposal
* Legal requirements relating to the vehicles warranty and insurance policies
* Workplace procedures for:
* Reporting the results of tests
* Reporting anticipated delays
* Working to agreed time frame and keeping others informed of progress
* The relationship between time, costs and profitability
* Interpretation and use of technical information for braking system service activities
* Importance of using the correct technical information

**Required Skills**

*The individual needs to demonstrate the following skills*:

* Communication (verbal and written)
* Time management
* Problem solving
* Decision making
* Planning
* First aid
* Vehicle braking system Assessment
* Vehicle braking system service
* House keeping
* Interpreting technical information

**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 learner:   * 1. Undertook safety measures as per workplace procedure   2. Assessed Vehicle braking system according to manufacturer’s specifications   3. Inspected vehicle braking system components according to manufacturer’s manual   4. Serviced/replaced vehicle braking system components according to manufacturer’s specifications.   5. Adjusted brake components as per workshop procedures   6. Tested vehicle braking system according to manufacturer’s manual   7. Performed Housekeeping as per workplace requirements |
| 1. Resource implications | The following resources should be provided:   1. Access to relevant workplace where assessment can take place 2. Appropriately simulated environment where assessment can take place 3. Resources relevant to the proposed assessment 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 |
| 1. Context of Assessment | Competency may be assessed in a workplace or in a simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended |