

Overview

This NOS is about diagnosing and rectifying faults occurring in the motorcycle combustion engine mechanical, electrical and hydraulic and fluid systems. This standard does not include gearbox, clutch and final drive which are covered in another standard.

In this standard, the term 'motorcycle' includes motorcycles, scooters, mopeds and motorcycle-derived vehicles with a third or fourth wheel (such as quad bikes) on which the rider sits.

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**Performance
criteria**

- You must be able to:
- P1 wear suitable personal protective equipment and use motorcycle coverings (where applicable) when using **diagnostic methods** and carrying out **rectification activities**
 - P2 ensure the motorcycle and the work area is safe prior to commencing with any diagnostic or rectification activity
 - P3 support the identification of **faults** by reviewing motorcycle:
 - P3.1 technical data
 - P3.2 diagnostic test procedures
 - P4 prepare, connect and test all the required **equipment** following manufacturer's instructions prior to use
 - P5 use **diagnostic methods** which are relevant to the symptoms presented
 - P6 collect sufficient diagnostic information in a systematic way to enable an accurate diagnosis of **engine system** faults
 - P7 correctly interpret test results from engine mechanical, electrical, electronic, hydraulic, fluid and lubrication systems
 - P8 identify and record any system deviation from acceptable limits accurately
 - P9 ensure your assessment of dismantled sub-assemblies, components and units identifies their condition and suitability for repair or replacement accurately
 - P10 inform the relevant person(s) promptly where repairs are uneconomic or unsatisfactory to perform
 - P11 use the **equipment** required, correctly and safely throughout all **diagnostic** and **rectification activities**
 - P12 carry out all **rectification activities** following:
 - P12.1 manufacturer's instructions
 - P12.2 your workplace procedures
 - P12.3 health and safety requirements
 - P13 work in a way which minimises the risk of:
 - P13.1 damage to other motorcycle systems
 - P13.2 damage to other components and units
 - P13.3 contact with leakages
 - P13.4 contact with hazardous substances

- P13.5 injury to self and others
- P14 ensure all repaired and replaced components and units conform to the motorcycle operating specification and any legal requirements
- P15 record and report any engine systems that do not conform to legal requirements
- P16 adjust components and units correctly to ensure that they operate to meet system requirements, when necessary
- P17 record and report any additional faults you notice during the course of work promptly
- P18 use **testing methods** which are suitable for assessing the performance of the system rectified
- P19 ensure the **engine system** rectified performs to the motorcycle operating specification and any legal requirements prior to return to the customer
- P20 ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required
- P21 complete all system diagnostic activities within the agreed timescale

Knowledge and understanding

You need to know and understand:

Legislative and organisational requirements and procedures

- K1 the health and safety legislation, environmental requirements and workplace procedures relevant to workshop practices and personal and motorcycle protection when diagnosing and rectifying combustion engine faults
- K2 legal requirements relating to the motorcycle (including road safety and environmental requirements)
- K3 your workplace procedures for:
 - K3.1 recording **diagnostic** and **rectification activities**
 - K3.2 the referral of problems
 - K3.3 reporting delays to the completion of work
- K4 the importance of documenting **diagnostic** and rectification information
- K5 the importance of working to agreed timescales and keeping others informed of progress
- K6 the relationship between time, costs and profitability
- K7 the importance of reporting anticipated delays to the relevant person(s) promptly

Electrical and electronic principles

- K8 electrical and electronic principles associated with combustion engine systems, including types of sensors and actuators, their application and operation
- K9 how electrical and electronic engine systems operate, including electrical component function, electrical inputs, outputs, voltages, oscilloscope patterns and digital principles
- K10 the interaction between electrical, electronic and mechanical components within motorcycle combustion engine systems
- K11 electrical symbols, units and terms
- K12 electrical safety procedures
- K13 the hazards associated with high voltage electrical systems and components

You need to know
and understand:

Use of diagnostic and rectification equipment

- K14 how to prepare and test the accuracy of diagnostic testing equipment
- K15 how to use diagnostic and rectification **equipment** for combustion engine mechanical, electrical, electronic, hydraulic and fluid systems; specialist engine repair tools and general workshop equipment

Combustion engine electrical faults, their diagnosis and correction

- K16 how combustion engine mechanical, electrical, electronic and hydraulic and fluid systems are constructed and operate, are dismantled and reassembled
- K17 how combustion engine components interlink, including multiplexing
- K18 the types and causes of combustion engine mechanical, electrical, electronic and hydraulic and fluid system, component and unit faults and failures
- K19 combustion engine mechanical, electrical, electronic and hydraulic and fluid component and unit replacement procedures, the circumstances which will necessitate replacement and other possible courses of action
- K20 how to find, interpret and use sources of information on combustion engine electrical and electronic operating specifications, diagnostic test procedures, repair procedures and legal requirements
- K21 motorcycle operating specifications for limits, fits and tolerances relating to combustion engine mechanical, electrical, electronic and hydraulic and fluid systems for the motorcycle(s) on which you work
- K22 how to select and carry out the correct diagnostic testing method
- K23 how to assess and interpret results of the condition of components
- K24 how to make cost effective recommendations for rectification
- K25 how to carry out the **rectification activities** listed in the Scoping Statement for this unit in order to correct faults in the combustion engine mechanical, electrical, electronic and hydraulic and fluid systems
- K26 the relationship between test methodology and the faults repaired – the use of appropriate testing methods

Scope/range

All of the items listed below form part of this National Occupational Standard.

- 1 **Faults occur** within the combustion engine:
 - 1.1. mechanical system
 - 1.2. electrical system
 - 1.3. electronic system
 - 1.4. hydraulic and fluid systems
- 2 **Diagnostic methods** are:
 - 2.1. sensory
 - 2.2. measurement
 - 2.3. functional testing
 - 2.4. electrical systems testing
 - 2.5. electronic systems testing
- 3 **Equipment** is:
 - 3.1. diagnostic and rectification equipment for combustion engine mechanical systems
 - 3.2. diagnostic and rectification equipment for combustion engine electrical systems
 - 3.3. diagnostic and rectification equipment for combustion engine electronic systems
 - 3.4. diagnostic and rectification equipment for combustion engine hydraulic and fluid systems
 - 3.5. specialist repair tools
 - 3.6. general workshop equipment
- 4 **Rectification activities** are:
 - 4.1. dismantling
 - 4.2. replacement of units and components
 - 4.3. adjustment of units and components
 - 4.4. repairs to wiring and connectors
 - 4.5. re-programming motorcycle systems
 - 4.6. reassembly
 - 4.7. functional testing

- 5 **Engine systems** are:
 - 5.1. mechanical
 - 5.2. starting
 - 5.3. charging
 - 5.4. ignition
 - 5.5. fuel
 - 5.6. engine management

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Additional information

Glossary

This section contains examples and explanations of some of the terms used but does not form part of the standard.

Agreed timescales

Examples include manufacturer's recommended work times, job times set by your company or a job time agreed with a specific customer

Diagnostic information

This relates to mechanical condition, including wear, run out, pressures and compressions, flow, leakage and electrical measurements such as voltage and pulse displays, electronic systems data, including fault codes, sensor measurements and control unit outputs and/or signals

Engine Area

Engine mechanical, cooling systems, electronic ignition, petrol fuel injection, lubrication, engine management systems, emissions control systems, starting and charging

Engine and component faults

These are faults that require a two or more-step diagnostic activity using a prescribed process or format to identify the cause

Functional diagnostic methods

Examples include intake system balance, exhaust and emissions, performance testing and road testing where relevant

Sensory diagnostic methods

These may include looking, listening, smelling and touching for heat.

Hydraulic and fluid systems

These are fuel, oil, lubrication and cooling

Recommendations

Examples include servicing, dismantling for further inspection and test, repair and replacement

Motorcycles

These include motorcycles, scooters, mopeds and motorcycle-derived three or four-wheel vehicles (such as quad bikes) on which the rider sits.

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Diagnose and rectify motorcycle combustion engine and component faults



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