
Overview

This NOS is about diagnosing and rectifying faults occurring within light vehicle gearboxes, hubs and bearings, driveline shafts, clutches, differentials and final drive units.

Performance criteria

You must be able to:

P1 use suitable personal and vehicle protective equipment when using **diagnostic methods** and carrying out rectification activities

P2 support the identification of **faults**, by reviewing vehicle:

P2.1 technical data

P2.2 diagnostic test procedures

P3 prepare the vehicle systems and work area for safe working procedures as appropriate to the vehicle

P4 prepare, check and use all the required **equipment** following manufacturers' instructions

P5 use **diagnostic methods** which are relevant to the symptoms presented

P6 collect diagnostic information in a logical and systematic way relevant to the **diagnostic methods** used

P7 collect sufficient diagnostic information to enable an accurate diagnosis of transmission and driveline system **faults**

P8 identify and record any system deviation from acceptable limits accurately

P9 accurately ensure your assessment of dismantled sub-assemblies, components and units identifies their condition and suitability for repair or replacement

P10 inform the relevant person(s) promptly where repairs are uneconomic or unsatisfactory to perform

P11 carry out all diagnostic and rectification activities following:

P11.1 manufacturers' instructions

P11.2 recognised repair methods

P11.3 your workplace procedures

P11.4 health, safety and environmental requirements

P12 work in a way which minimises the risk of:

P12.1 damage to other vehicle systems

P12.2 damage to other components and units

P12.3 contact with leakages

P12.4 contact with hazardous substances

P13 ensure all repaired and replacement components and units conform to the vehicle operating specification and any legal requirements

P14 adjust components and units correctly, when necessary, to ensure that they operate to meet system requirements

P15 record and report any additional **faults** you notice during the course of work promptly

P16 use testing methods which are suitable for assessing the performance of the system rectified

P17 ensure the **transmission and driveline system** rectified performs to the vehicle

operating specification and any legal requirements prior to return to the customer
P18 ensure your records are accurate, complete and passed to the relevant person(s)
within the agreed timescale and in the format required
P19 complete all system diagnostic activities within the agreed timescale
P20 report any anticipated delays in completion to the relevant person(s) promptly

Knowledge and understanding

You need to know and understand:

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*Legislative and organisational requirements and procedures**

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K1 the legislation and workplace procedures relevant to

K1.1 health and safety

K1.2 the environment (including waste disposal)

K1.3 appropriate personal and vehicle protective equipment

K2 legal requirements relating to the vehicle (including road safety requirements)

K3 your workplace procedures for:

K3.1 recording fault location and correction activities

K3.2 reporting the results of tests

K3.3 the referral of problems

K3.4 reporting delays to the completion of work

K4 the importance of working to recognised diagnostic procedures and processes and obtaining the correct information for diagnostic activities to proceed

K5 the importance of, documenting diagnostic and rectification information

K6 the importance of working to agreed timescales and keeping others informed of progress

K7 the relationship between time, costs and profitability

K8 the importance of reporting anticipated delays to the relevant person(s) promptly

Electrical and electronic principles

K9 electrical and electronic principles associated with **transmission and driveline systems**, including types of sensors and actuators, their application and operation

K10 how electrical and electronic **transmission and driveline systems** operate, including electrical component function, electrical inputs, outputs, voltages and oscilloscope patterns, digital and fibre optics principles

K11 the interaction between electrical, electronic and mechanical components within vehicle **transmission and driveline systems**

K12 how transmission and driveline electrical systems interlink and interact, including multiplexing

K13 electrical symbols, units and terms

K14 electrical safety procedures

K15 the hazards associated with working on or near high energy electrical vehicle components

Use of diagnostic and rectification equipment

K16 how to prepare and check the accuracy of **diagnostic testing equipment** *

K17 how to use diagnostic and rectification *equipment for transmission and driveline mechanical, electrical, hydraulic/pneumatic and fluid systems, specialist repair tools and general workshop **equipment**

Vehicle system faults, their diagnosis and correction

K18 how transmission and driveline mechanical, electrical, electronic, hydraulic/pneumatic and fluid systems are constructed and operate

K19 how transmission and driveline mechanical, electrical, electronic, hydraulic/pneumatic and fluid systems are dismantled, reassembled and adjusted to manufacturers' specification

K20 the types and causes of transmission and driveline mechanical, electrical, electronic, hydraulic/pneumatic and fluid system, component and unit **faults** and failures

K21 transmission and driveline mechanical, electrical, hydraulic/pneumatic and fluid component and unit replacement procedures, the circumstances which will necessitate replacement and other possible courses of action

K22 how to find, interpret and use sources of information on transmission and driveline electrical operating specifications, diagnostic test procedures, repair procedures and legal requirements

K23 vehicle operating specifications for limits, fits and tolerances relating to transmission and driveline mechanical, electrical, electronic, hydraulic/pneumatic and fluid systems for the vehicle(s) on which you work

K24 how to select the most appropriate **diagnostic testing** method for the symptoms presented

K25 how to carry out systematic **diagnostic testing** of transmission and driveline mechanical, electrical, electronic, hydraulic/pneumatic and fluid systems using a prescribed process or format

K26 how to assess the condition evident within transmission and driveline mechanical, electrical, electronic, hydraulic/pneumatic and fluid components and units

K27 how to interpret test results and vehicle data in order to identify the location and cause of vehicle system **faults**

K28 how to carry out the rectification activities in order to correct **faults** in the transmission and driveline mechanical, electrical, electronic, hydraulic/pneumatic and fluid systems

K29 the relationship between test methodology and the **faults** repaired – the use of appropriate testing methods

K30 how to make cost effective recommendations for rectification

Scope/range

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****1. Transmission and driveline system*s are:**

- 1.1. gearbox
- 1.2. hubs and bearings
- 1.3. final drive assembly
- 1.4. driveline components
- 1.5. clutch

2. Diagnostic methods are:

- 2.1. measurement
- 2.2. functional testing
- 2.3. electrical and electronic systems testing

3. Diagnostic testing is defined as:

- 3.1. verify the fault
- 3.2. collect further information
- 3.3. evaluate the evidence
- 3.4. carry out further tests in a logical sequence
- 3.5. rectify the problem
- 3.6. check all systems

4. Equipment is:

- 4.1. diagnostic and rectification equipment for transmission mechanical systems
- 4.2. diagnostic and rectification equipment for transmission electrical systems
- 4.3. diagnostic and rectification equipment for transmission hydraulic/pneumatic and fluid systems
- 4.4. specialist repair tools
- 4.5. general workshop equipment

5. Faults are:

- 5.1. mechanical
- 5.2. electrical and electronic
- 5.3. hydraulic/pneumatic and fluid

Glossary

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

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Agreed timescales:

Examples include: manufacturers' recommended work times, job times set by your company or a job time agreed with a specific customer.

Transmission and driveline system fault:

These are faults that require a multistage inspection and a series of test results to identify the cause.

Diagnostic information:

This relates to mechanical condition, including wear, run out, pressures, 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.

Functional testing:

Examples include performance testing and road testing where relevant.

Hydraulic/pneumatic and fluid systems:

Examples include oil coolers, oil pumps and torque converters.

Transmission area:

Clutch assemblies, clutch operating systems, manual and automatic gear boxes (including electronic control), drivelines, hubs and final drive assemblies.

Recommendations:

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

*Rectification activities** are defined as:

A suitable repair or replacement that rectifies the fault(s) identified from the diagnostic activities carried out.

Vehicles:

These can be any of the following – light vehicles. Additionally, these vehicles may be SI, CI, Hybrid or Alternative fuel vehicles.

Alternative fuel:

This is defined as any type of fuel that may be used to power an internal combustion engine, examples would include LPG, bio ethanol etc.

IMILV13

Diagnose and rectify light vehicle transmission and driveline system faults



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