VEHICLE TECHNICIAN ACCREDITATION ASSESSMENT NATIONAL OCCUPATIONAL STANDARDS

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Contents

Introduction

The Vehicle Technician Accredited Assessment has been developed in collaboration with the Driver and Vehicle Standards Agency (DVSA) to assess whether a technician has the required Level 3 Motor Vehicle knowledge and skills needed to be an MOT Tester.
The Vehicle Technician Accredited Assessment acts as an equivalent accreditation for technicians who wish to gain the DVSA Certificate of Competence for MOT Testers, but have no formal Level 3 Motor Vehicle qualification. All of the content within the assessments has been mapped to the Level 3 Light Vehicle National Occupational Standards which are included in this document.

Aims

The Vehicle Technician Accredited Assessment aims to:

- Ensure technicians have a knowledge and skill level that meets the Level 3 Light Vehicle National Occupational Standards.

Content Overview

The emphasis of the Vehicle Technician Accredited Assessment is to assess that a technician has the required level of practical skills and knowledge that is needed in order to meet the pre-requisites for MOT testing.

Modules within the Vehicle Technician Accredited Assessment cover:

- Brakes
- Suspension
- Steering
- Wheels and Tyres
- Emissions
- Electrics

IMILV01 - Carry out Routine Light Vehicle Maintenance

Overview

This standard is about conducting routine maintenance, adjustment and replacement activities as part of the periodic servicing of light vehicles.

Performance criteria

You must be able to:
P1 use suitable personal and vehicle protective equipment throughout all vehicle maintenance activities
P2 prepare the vehicle systems and work area for safe working procedures as appropriate to the vehicle
P3 work in a way which minimises the risk of damage to the vehicle and its systems and the surrounding area
P4 use suitable sources of technical information to support all your vehicle maintenance activities
P5 adhere to the correct specifications and tolerances for the vehicle when making assessments of system and component performance
P6 where the customer's vehicle falls outside the manufacturer's original specification, record details accurately and use these details as the basis for your assessment of system and component performance
P7 examine the vehicle's systems and components following:
P7.1 the manufacturer's approved methods
P7.2recognised repair methods
P7.3 your workplace procedures
P7.4 health, safety and environmental requirements
P8 ensure your examination methods identify accurately any vehicle system and component problems falling outside the maintenance schedule specified
P9 carry out adjustments, replacement of vehicle components and replenishment of consumable materials following the manufacturer's current specification for:
P9.1 the particular maintenance interval
P9.2 working methods and procedures
P9.3 use of equipment
P9.4 the tolerances for the vehicle
P10 record the details accurately and take action which complies with the customer's instructions where system adjustments cannot be made within the manufacturer's specification
P11 use suitable testing methods to evaluate the performance of all replaced and adjusted components and systems
P12 promptly report any problems or issues relating to the vehicle's condition or conformity to the relevant person(s)
P13 ensure your maintenance records are accurate, complete and passed to the relevant person(s) within the agreed timescale in the format required
P14 complete all vehicle maintenance activities within the agreed timescale
P15 promptly report any anticipated delays in completion to the relevant person(s)

Legislative and organisational requirements and procedures

Knowledge and understanding

You need to know and understand:
K1 the manufacturer's and warranty requirements relating to routine maintenance activities for vehicle systems and components
K2 the legal requirements relating to the vehicle maintenance activities for vehicle systems and components
K3 the legislation and workplace procedures relevant to:
K3.1 health and safety
K3.2 the environment (including waste disposal)
K3.3 appropriate personal and vehicle protection
K4 your workplace procedures for:
K4.1 recording vehicle maintenance work and any variations from the original vehicle specification
K4.2 the referral of problems
K4.3 reporting delays to the completion of work
K5 the importance of recording vehicle maintenance information
K6 the importance of working to agreed timescales and keeping others informed of progress
K7 the relationship between time and costs
K8 the importance of promptly reporting anticipated delays to the relevant person(s)

Use of technical information

You need to know and understand:
K9 how to find, interpret and use sources of technical information for scheduled maintenance activities, including on-board vehicle displays
K10 the importance of using the correct sources of technical information
K11 the purpose of and how to use identification codes

Vehicle system operation

K12 how power unit systems work (including hybrid vehicles and alternative fuel vehicles)
K13 how transmission systems work (including hybrid / alternative fuel and electric vehicles)
K14 how chassis systems work (including regenerative braking systems and other energy recuperation systems used on hybrid / electric and alternative fuel vehicles)
K15 how electrical – including Advanced Driver Assistance – systems work (including hybrid / alternative fuel and electric vehicles)
K16 the operating specifications and tolerances for the type(s) of vehicles on which you are working (including hybrid / alternative fuel and electric vehicles)
K17 the hazards associated with working on or near high energy electrical vehicle components

Routine maintenance requirements

K18 how to conduct scheduled, routine light vehicle maintenance activities using prescribed examination methods and assessments against vehicle specifications to identify damage, corrosion, inadequate fluid levels, leaks, wear, security problems and general condition and serviceability
K19 how to check and make adjustments to clearances, settings, alignment, pressures, tension, speeds and levels relevant to the engine area, transmission area, chassis area, electrical area and body
K20 how to replenish and replace routine service components and materials
K21 how to recognise and report cosmetic damage to vehicle units and components outside normal service items
K22 how to identify codes and grades of lubricants
K23 the consequence of using incorrect lubricants, fluids and components
K24 how to work safely avoiding damage to the vehicle and its systems (including special precautions that may be required when working on hybrid/electric and alternative fuel vehicles)
K25 how to recognise the consequences of adjustments on other systems (for example, tyre pressure adjustment) may affect Advanced Driver Assistance Systems (ADAS)
K26 the implications of signing workplace documentation and vehicle records

Scope/range

1. Sources of technical information are:
1.1. vehicle technical data
1.2. schedules of inspection
1.3. regulations
2. Examination methods are:
2.1. sensory
2.2. functional
2.3. measurements

3. Assessments are for:
3.1. malfunction
3.2. damage
3.3. fluid levels
3.4. leaks
3.5. wear
3.6. security
3.7. condition and serviceability
3.8. conformity
3.9. necessity for adjustment(s) and calibration(s)

Additional Information

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

Adjustments
Examples include adjustments to clearances, settings, alignment pressures, tensions, speeds and levels, ignition, fuel and emissions, brakes, transmission, lights, tyres, steering and body fittings.

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

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.

Ancillary equipment
Examples include tyre pressure monitoring, ADAS, cameras and radar units or navigation.

Components
Examples include filters, drive belts, wiper blades, brake linings and pads, lubricants and fluids.

Conformity
Examples include conformity to manufacturer's specifications, UK and European legal requirements where applicable.

Maintenance records
Examples include records of vehicle inspection, manufacturers', fleet, company or customer job cards.

Major service
As defined by manufacturers' specifications appropriate to the vehicle being working upon.

Routine vehicle maintenance
Examples include conducting scheduled maintenance, adjustments, replacements and replenishment of, or to, components and systems in accordance with manufacturer's instructions for the period and/or mileage interval.

Systems testing equipment
Examples include test instruments, emission test equipment, wheel alignment equipment, tyre tread depth gauges.

Vehicle technical data
Examples include hard copy manuals, data on computer and data obtained from on- board diagnostic displays.

Vehicles
These can be any of the following types of light vehicle: SI, CI, Hybrid, Electric or Alternative fuel vehicles.

IMILV03 - Remove and Replace Light Vehicle Electrical Units and Components

Overview

This standard is about removing and replacing units and components previously identified as faulty or damaged or where the customer has requested replacements. It is also about evaluating the performance of replaced units and components.
The units and components concerned are not those replaced as part of normal routine vehicle maintenance.

Performance criteria

You must be able to:
P1 use suitable personal and vehicle protective equipment throughout all removal and replacement activities
P2 support your removal and replacement activities by reviewing:
P2.1 vehicle technical data
P2.2 removal and replacement procedures
P2.3 legal requirements
P3 prepare, check and use all the equipment required following manufacturers' instructions
P4 prepare the vehicle systems and work area for safe working procedures, as appropriate to the vehicle
P5 carry out all removal and replacement activities following;
P5.1 manufacturers' instructions
P5.2 your workplace procedures
P5.3 health, safety and environmental requirements
P6 work in a way which minimises the risk of:
P6.1 damage to other vehicle systems
P6.2 damage to other vehicle units and components
P6.3 contact with leakage
P6.4 contact with hazardous substances
P7 ensure replacement electrical auxiliary units and components conform to the vehicle operating specification and any legal requirements

P8 promptly record and report any additional faults you notice during the course of your work
P9 use suitable testing methods to evaluate the performance of the reassembled system accurately
P10 ensure the reassembled system performs to the vehicle operating specification and meets any legal requirements prior to return to the customer
P11 ensure your records are accurate, complete and passed to the relevant person(s) within the agreed timescale and in the format required
P12 complete all removal and replacement activities within the agreed timescale
P13 promptly report any expected delays in completion to the relevant person(s)

Legislative and organisational requirements and procedures

Knowledge and understanding

You need to know and understand:
K1 the legal requirements relating to the vehicle (including road safety and refrigerant handling, fuel storage, high voltage or other requirements)
K2 the legislation and workplace procedures relevant to
K2.1 health and safety
K2.2 the environment (including waste disposal)
K2.3 appropriate personal and vehicle protective equipment
K3 the importance of documenting removal and replacement information
K4 the importance of working to agreed timescales and keeping others informed of progress
K5 the relationship between time and costs
K6 the importance of promptly reporting anticipated delays to the relevant person(s)

Use of technical information

K7 how to find, interpret and use sources of information applicable to electrical units and component removal and replacement
K8 the importance of using the correct sources of technical information
K9 the purpose of and how to use identification codes

Electrical auxiliary system operation and construction

K10 how electrical units and components are constructed, removed and replaced for the classification of vehicle worked upon
K11 how electrical units and components operate for the classification of vehicle worked upon

Equipment

K12 how to prepare, check and use all the removal and replacement equipment required

Electrical and electronic principles

K13 vehicle earthing principles and earthing methods
K14 electrical and electronic principles associated with electrical systems, including types of sensors and actuators, their application and operation
K15 types of circuit protection and why these are necessary
K16 electrical safety procedures
K17 how lighting, warning, charging and starter circuits work
K18 electric symbols, units and terms
K19 electrical/electronic control system principles
K20 the hazards associated with working on or near high energy electrical vehicle components

Electrical units and component removal and replacement

K21 how to remove and replace electrical units and components for the classification of vehicle worked upon
K22 how to test and evaluate the performance of replacement electrical units and components and the reassembled system against the vehicle operating specifications and any legal requirements
K23 the relationship between testing methods and the electrical units and components replaced – the use of appropriate test methods
K24 the manufacturer's specification for the type and quality of electrical units and components to be used
K25 how to work safely avoiding damage to other vehicle systems, units and contact with leakage and hazardous substances

Scope/range

1. Equipment is
1.1. hand tools
1.2. special workshop tools
1.3. general workshop equipment
1.4. electrical testing equipment
2. Testing methods are:
2.1. sensory
2.2. functional
2.3. measurement
3. Electrical units and components are
3.1. lighting systems
3.2. wiper systems
3.3. security and alarm systems
3.4. comfort and convenience systems (including infotainment and communications)
3.5. electric window systems
3.6. monitoring and instrumentation systems
3.7. engine starting systems
3.8. battery charging systems

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 customer.
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.
Comfort and convenience systems
Examples are infotainment and communications, heated seats, electrically adjusted seats, heated screens, electric mirrors, heating, climate control and air conditioning.
Units and components
Any unit or component from the electrical systems defined in the Scoping Statement above.
Vehicles
These can be any of the following types of light vehicle: SI, CI, Hybrid, Electric or Alternative fuel vehicles.

IMILV04 - Remove and Replace Light Vehicle Chassis Units and Components

Overview

This standard is about removing and replacing units and components where dismantling and re-assembly of chassis systems is required. It is also about evaluating the performance of replaced units and components.
The units and components concerned are not those replaced as part of normal routine, vehicle maintenance (servicing) activities.

Performance criteria

You must be able to:
P1 use suitable personal and vehicle protective equipment throughout all removal and replacement activities
P2 support your removal and replacement activities by reviewing:
P2.1 vehicle technical data
P2.2 removal and replacement procedures
P2.3 legal requirements
P3 prepare, check and use all the equipment required following manufacturers' instructions
P4 prepare the vehicle systems and work area for safe working procedures (where appropriate)

P5 carry out all removal and replacement activities following;
P5.1 manufacturers' instructions
P5.2 recognised repair methods
P5.3 your workplace procedures
P5.4 health, safety and environmental requirements
P6 work in a way which minimises the risk of:
P6.1 damage to other vehicle systems
P6.2 damage to other vehicle units components
P6.3 contact with leakage
P6.4 contact with hazardous substances
P6.5 damage to your working environment
P7 ensure replacement chassis units and components conform to the vehicle operating specification and any legal requirements
P8 promptly record and report any additional faults you notice during the course of your work
P9 use suitable testing methods to evaluate the performance of the reassembled system accurately
P10 ensure the reassembled chassis system performs to the vehicle operating specification and meets any legal requirements prior to returning it to the customer
P11 ensure your records are accurate, complete and passed to the relevant person(s) in the agreed timescale and in the format required
P12 complete all removal and replacement activities within the agreed timescale
P13 promptly report any expected delays in completion to the relevant person(s)

Legislative and organisational requirements and procedures

Knowledge and understanding

You need to know and understand:
K1 the legislation and workplace procedures relevant to:
K1.1 health and safety
K1.2 the environment (including waste disposal)
K1.3 personal and vehicle protective equipment
K2 the importance of documenting removal and replacement information
K3 the importance of working to agreed timescales and keeping others informed of progress
K4 the relationship between time and costs
K5 the importance of promptly reporting anticipated delays to the relevant person(s)

Use of technical information

K6 how to find, interpret and use technical information applicable to unit and component removal and replacement within chassis systems
K7 the importance of using the correct sources of technical information
K8 the purpose of and how to use identification codes

Electrical and electronic principles

K9 vehicle earthing principles and earthing methods
K10 electrical and electronic principles associated with chassis systems, including types of sensors and actuators, their application and operation
K11 types of circuit protection and why these are necessary
K12 electrical safety procedures
K13 electric symbols, units and terms
K14 electrical and electronic control system principles
K15 the hazards associated with working on or near high energy electrical vehicle components

Chassis system operation and construction

K16 how chassis systems and their related units and components are constructed, removed and replaced for the classification of vehicle worked upon
K17 how chassis systems and their related units and components operate for classification of vehicle worked upon

Equipment

K18 how to prepare, check and use all the removal and replacement equipment required

Chassis system unit and component removal and replacement

K19 how to remove and replace chassis system mechanical, electrical and hydraulic units and components for the classification of vehicle worked upon
K20 how to select and use gaskets, sealants, seals, fittings and fasteners
K21 how to test and evaluate the performance of replacement chassis system units and components and the reassembled system against the vehicle operating specifications and any legal requirements
K22 the relationship between testing methods and the chassis system units and components replaced – the use of appropriate test methods
K23 when replacement units and components must meet the original equipment specification (OES) for warranty or other requirements
K24 how to work safely avoiding damage to other vehicle systems, units and components and contact with leakage and hazardous substances (any special arrangements or precautions when working with alternative fuel or hybrid vehicles must be covered)

Scope/range

1. Equipment is:
1.1. hand tools
1.2. special workshop tools
1.3. general workshop equipment
1.4. electrical testing equipment

2. Testing methods are:
2.1. sensory
2.2. functional
2.3. measurement
3. Units and components are:
3.1. mechanical
3.2. electrical
3.3. hydraulic/pneumatic
4. Chassis systems are:
4.1. steering
4.2. suspension
4.3. braking

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.

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.

Functional testing

Examples include: use of brake roller tester, chassis dynamometer, suspension activation, security activator.

Steering and suspension system

For the purposes of this NOS, this will also include wheels and tyres.

Units and components

Any unit or component from the chassis systems defined in the Scoping Statement above.

Vehicles

These can be any of the following types of light vehicle: SI, CI, Hybrid, Electric or Alternative fuel vehicles

IMILV06 – Inspect Light Vehicles

Overview

This standard is about carrying out a range of inspections on light vehicles using a variety of testing methods and equipment.

Performance criteria

You must be able to:
P1 use suitable personal and vehicle protective equipment throughout all vehicle inspection activities
P2 use suitable sources of technical information to support your vehicle inspection activities
P3 prepare the vehicle systems and work area for safe working procedures (where appropriate)
P4 confirm that equipment has been calibrated to meet manufacturers' and legal and statutory requirements where necessary
P5 conduct all vehicle inspections and testing following:
P5.1 the manufacturer's approved examination methods
P5.2 recognised methods
P5.3 your workplace procedures
P5.4 health, safety and environmental requirements
P6 ensure your inspection and testing of the vehicle against specification accurately identifies:
P6.1 differences from the vehicle specification
P6.2 vehicle appearance and condition faults
P6.3 non-compliance with legal and statutory requirements
P7 work in a way which minimises the risk of damage to the vehicle and its systems, other people and their property and your working environment
P8 make suitable recommendations for future action based upon the results of your tests and inspections
P9 explain the reasons for your recommendations to the relevant person(s)
P10 offer alternative options from your recommendations if the customer does not agree to your plan for future action
P11 ensure your report is accurate, complete and passed to the relevant person(s) within the agreed timescale and in the format required
P12 complete all inspection activities within the agreed timescale
P13 promptly report any anticipated delays in completion to the relevant person(s)

Legislative and organisational requirements and procedures

Knowledge and understanding

You need to know and understand:
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 the legislation and statutory requirements relevant to the vehicle inspections for: pre-purchase, pre-MOT test, safety, post-accident (pre-repair) and post-accident (post-repair)
K3 your workplace procedures for the referral of problems:
K4 the importance of making accurate reports of the results of your tests and inspections and interpreting them correctly
K5 the importance of working to agreed timescales and keeping others informed of progress
K6 the relationship between time, costs and productivity
K7 the importance of promptly reporting anticipated delays to the relevant person(s)

Sources of information

K8 how to find, interpret and use technical information
K9 the importance of using technical information to inform your inspection and testing of vehicles

Testing methods and the conduct of inspections

K10 the hazards associated with working on or near high energy electrical vehicle components
K11 how vehicle systems operate (including the engine area, transmission area, chassis or frame area and electrical area) and the operational tolerances for vehicle(s) on which you are working
K12 how to follow procedures and processes to enable a logical and systematic inspection of vehicles to take place
K13 how to test the operation and tolerances of vehicle systems and how to assess vehicle condition; including workshop based and road tests
K14 how to compare test and inspection results against vehicle specifications and legal requirements
K15 how to record test and inspection results in the format required
K16 how to make recommendations based upon the results of your inspections
K17 the full implications of failing to carry out an inspection correctly
K18 the implications of signing workplace documentation and vehicle records

Scope/range

1. Vehicle inspections are:
1.1. pre-purchase
1.2. pre-MOT test
1.3. safety
1.4. post-accident, pre-repair
1.5. post-accident, post-repair
2. Test methods are:
2.1. sensory
2.2. functional
2.3. measurement
3. Equipment includes:
3.1. emissions testing
3.2. brake testing
3.3. headlamp alignment
3.4. wheel alignment
3.5. torque setting
3.6. specialist diagnostic equipment
3.7. measuring equipment

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.

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.

Sources of technical information

Examples include inspection schedules, MOT inspection manuals and guides, manufacturers' manuals, Trade Association check lists and workplace procedures.

Vehicles

These can be any of the following types of light vehicle: SI, CI, Hybrid, Electric or Alternative fuel vehicles.

IMILV07 - Diagnose and Rectify Light Vehicle Combustion Engine and Component Faults

Overview

This standard is about diagnosing and rectifying faults occurring in the vehicle combustion engine's mechanical, electrical, hydraulic and fluid systems.

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 sufficient diagnostic information in a logical and systematic way to enable an accurate diagnosis of engine system faults
P7 accurately identify and record any system deviation from manufacturer’s tolerances
P8 ensure your assessment of dismantled sub-assemblies, units and components identifies their condition and suitability for repair or replacement
P9 promptly inform the relevant person(s) where repairs are uneconomic or unsatisfactory to perform
P10 carry out all diagnostic and rectification activities following:
P10.1 manufacturers' instructions
P10.2 recognised repair methods
P10.3 your workplace procedures
P10.4 health, safety and environmental requirements
P11 work in a way which minimises the risk of:
P11.1 damage to other vehicle systems
P11.2 damage to other components and units
P11.3 contact with leakages

P11.4 contact with hazardous substances
P12 ensure all repaired and replacement components and units conform to the vehicle operating specification and any legal requirements
P13 adjust components and units, when necessary, correctly to ensure that they operate to meet system requirements
P14 promptly record and report any additional faults you notice during the course of work
P15 use testing methods which are suitable for assessing the performance of the system rectified
P16 ensure the rectified engine system performs to the vehicle operating specification and any legal requirements prior to return to the customer
P17 ensure your records are accurate, complete and passed to the relevant person(s) within the agreed timescale and in the format required
P18 complete all system diagnostic activities within the agreed timescale
P19 promptly report any anticipated delays in completion to the relevant person(s)

Legislative and organisational requirements and procedures

Knowledge and understanding

You need to know and understand:
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 and rectification procedures and processes and obtaining the correct information for diagnostic and rectification activities to proceed
K5 the importance of recording 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 productivity
K8 the importance of promptly reporting anticipated delays to the relevant person(s)

Electrical and electronic principles

K9 electrical and electronic principles associated with engine systems, including types of sensors and actuators, their application and operation
K10 how electrical and electronic engine 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 engine systems
K12 how engine electrical systems interlink and interact, including multiplexing
K13 electrical symbols, unit 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 engine mechanical, electrical, electronic, hydraulic/pneumatic and fluid systems; specialist engine repair tools and general workshop equipment

Combustion engine electrical faults, their diagnosis and rectification

K18 how engine mechanical, electrical, electronic, hydraulic/pneumatic and fluid systems are constructed and operate
K19 how engine mechanical, electrical, electronic, hydraulic/pneumatic and fluid systems are dismantled, reassembled and adjusted to manufacturers' specifications
K20 the types and causes of engine mechanical, electrical, electronic, hydraulic/pneumatic and fluid system, component and unit faults and failures
K21 engine mechanical, electrical, electronic, hydraulic/pneumatic and fluid component unit and 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 engine electrical and electronic operating specifications, diagnostic test procedures, repair procedures and legal requirements
K23 vehicle operating specifications for manufacturer's tolerances relating to engine 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 engine mechanical, electrical, electronic, hydraulic/pneumatic and fluid systems using prescribed processes or formats
K26 how to assess the condition of 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 engine system faults
K28 how to carry out the rectification activities in order to correct faults in the engine 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

1. Faults occur within:
1.1. the engine mechanical system
1.2. the engine electrical and electronic systems
1.3. the engine hydraulic and fluid systems
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 engine mechanical systems
4.2. diagnostic and rectification equipment for engine electrical systems
4.3. diagnostic and rectification equipment for engine hydraulic/pneumatic and fluid systems
4.4. specialist repair tools
4.5. general workshop equipment

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.

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.

Electrical systems

Excluding high voltage system.

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, diesel fuel injection, lubrication, engine management systems, exhaust emission reduction systems and pressure charged induction systems and starting/charging.

Engine and component faults

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

Functional testing

Examples include: compression testing, performance testing and road testing where relevant.

Hydraulic and fluid systems

These are fuels, oil, lubrication, cooling, air conditioning.

Recommendations

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

Rectification activities

These are defined as a suitable repair, replacement, re-coding or re-programming that rectifies the fault(s) identified from the diagnostic activities carried out.

Vehicles

These can be any of the following types of light vehicle: SI, CI, Hybrid, Electric or Alternative fuel vehicles.

IMILV08 - Diagnose and Rectify Light Vehicle Chassis System Faults

Overview

This standard is about diagnosing and rectifying faults occurring within vehicle steering, suspension and braking systems.

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 chassis system faults
P8 identify and record any system deviation from manufacturer’s tolerances accurately
P9 accurately ensure your assessment of dismantled sub-assemblies, units and components identifies their condition and suitability for repair or replacement
P10 promptly inform the relevant person(s) where repairs are uneconomic or unsatisfactory to perform
P11 carry out all rectification activities following:
P11.1 manufacturers' instructions
P11.2 your workplace procedures
P11.3 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 units and components
P12.3 contact with leakages
P12.4 contact with hazardous substances
P13 ensure all repaired and replacement units and components conform to the vehicle operating specification and any legal requirements
P14 correctly adjust units and components when necessary to ensure that they operate to meet system requirements
P15 promptly record and report any additional faults you notice during the course of work
P16 use testing methods which are suitable for assessing the performance of the system rectified

P17 ensure the chassis 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 in the format required
P19 complete all system diagnostic activities within the agreed timescale
P20 promptly report any anticipated delays in completion to the relevant person(s)

Legislative and organisational requirements and procedures

Knowledge and understanding

You need to know and understand:
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 and rectification procedures and processes and obtaining the correct information for diagnostic and rectification 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 productivity
K8 the importance of promptly reporting anticipated delays to the relevant person(s)

Electrical and electronic principles

K9 electrical and electronic principles associated with chassis systems, including types of sensors and actuators, their application and operation
K10 how electrical and electronic chassis 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 chassis systems
K12 how chassis 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 chassis mechanical, electrical, hydraulic/pneumatic and fluid systems, specialist repair tools and general workshop equipment

Chassis faults, their diagnosis and correction

K18 how chassis mechanical, electrical, electronic, hydraulic/pneumatic and fluid systems are constructed and operate
K19 how chassis mechanical, electrical, electronic, hydraulic/pneumatic and fluid systems are dismantled, reassembled and adjusted to manufacturers specifications
K20 the types and causes of chassis mechanical, electrical, electronic, hydraulic/pneumatic and fluid system, component and unit faults and failures
K21 chassis 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 chassis electrical operating specifications, diagnostic test procedures, repair procedures and legal requirements
K23 vehicle operating specifications for limits, fits and tolerances relating to chassis 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 chassis mechanical, electrical, electronic, hydraulic/pneumatic and fluid systems using a prescribed process or format
K26 how to assess the condition evident within chassis mechanical, electrical, electronic, hydraulic/pneumatic and fluid units and components
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 chassis 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

1. Chassis systems are:
1.1. steering
1.2. suspension
1.3. braking
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 chassis mechanical systems
4.2. diagnostic and rectification equipment for chassis electrical systems
4.3. diagnostic and rectification equipment for chassis 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

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.

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.

Chassis or Frame area

Suspension systems, assisted steering systems, non-assisted steering systems, braking systems, ABS/traction control, wheels and tyres.

Chassis system faults

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: suspension and steering alignment, performance testing and road testing where relevant.

Hydraulic/pneumatic and fluid systems

Examples are: hydraulic braking systems, hydro-pneumatic suspension systems, power steering.

Recommendations

Examples include: servicing, dismantling for further inspection and test, repair and replacement.
Rectification activities
These 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 types of light vehicle: SI, CI, Hybrid, Electric or Alternative fuel vehicles.

IMILV12 - Remove and Replace Light Vehicle Transmission and Driveline Units and Components

Overview

This standard is about removing and replacing units and components where dismantling and re-assembly of transmission and driveline systems is required. It is also about evaluating the performance of replaced units and components.
The units and components concerned are not those replaced as part of normal routine, vehicle maintenance (servicing) activities.

Performance criteria

You must be able to:
P1 use suitable personal and vehicle protective equipment throughout all removal and replacement activities
P2 support your removal and replacement activities by reviewing:
P2.1 vehicle technical data
P2.2 removal and replacement procedures
P2.3 legal requirements
P3 prepare the vehicle systems and work area for safe working procedures (where appropriate)
P4 prepare, check and use all the equipment required following manufacturers' instructions
P5 carry out all removal and replacement activities following;
P5.1 manufacturers' instructions
P5.2 recognised repair methods
P5.3 health, safety and environmental requirements
P5.4 your workplace procedures
P6 work in a way which minimises the risk of:
P6.1 damage to other vehicle systems
P6.2 damage to other vehicle units and components
P6.3 contact with leakage
P6.4 contact with hazardous substances
P6.5 damage to your working environment
P7 ensure replacement transmission or driveline units and components conform to the vehicle operating specification and any legal requirements
P8 promptly record and report any additional faults you notice during the course of your work
P9 use suitable testing methods to evaluate the performance of the reassembled system accurately
P10 ensure the reassembled transmission or driveline system performs to the vehicle operating specification and meets any legal requirements prior to return to the customer
P11 ensure your records are accurate, complete and passed to the relevant person(s) within the agreed timescale and in the format required
P12 complete all removal and replacement activities within the agreed timescale
P13 promptly report any expected delays in completion to the relevant person(s)

Legislative and organisational requirements and procedures

Knowledge and understanding
You need to know and understand:
K1 the legal requirements relating to the vehicle
K2 the legislation and workplace procedures relevant to
K2.1 health and safety
K2.2 the environment (including waste disposal)
K2.3 personal and vehicle protective equipment
K3 your workplace procedures for:

K3.1 recording removal and replacement information
K3.2 the referral of problems
K3.3 reporting delays to the completion of work
K4 the importance of documenting removal and replacement information
K5 the importance of working to agreed timescales and keeping others informed progress
K6 the relationship between time and costs
K7 the importance of promptly reporting anticipated delays to the relevant person(s)

Use of technical information

K8 how to find, interpret and use sources of information applicable to units and component removal and replacement within transmission and driveline systems
K9 the importance of using suitable sources of technical information
K10 the purpose of and how to use identification codes

Electrical and electronic principles

K11 vehicle earthing principles and earthing methods
K12 electrical and electronic principles associated with transmission and driveline systems
K13 types of circuit protection and why these are necessary
K14 electrical safety procedures electric symbols, units and terms
K15 electrical and electronic control system principles
K16 the hazards associated with working on or near high energy electrical vehicle components

Transmission and driveline system operation and construction

K17 how transmission and driveline systems and their related units and components are constructed, removed and replaced for the classification of vehicle worked upon
K18 how transmission and driveline systems and their related units and components operate for the classification of vehicle worked upon

Equipment

K19 how to prepare, check and use all the removal and replacement equipment required

Transmission and driveline system units and components removal and replacement

K20 how to remove and replace transmission and driveline system mechanical, electrical and hydraulic/pneumatic units and components for the classification of vehicle worked upon
K21 how to select and use gaskets, sealants, seals, fittings and fasteners
K22 how to test and evaluate the performance of replacement transmission and driveline system units and components and the reassembled system against the vehicle operating specifications and any legal requirements

K23 how to select the appropriate test method when checking transmission and driveline systems following replacement of components
K24 when replacement units and components must meet the original equipment specification (OES) for warranty or other requirements
K25 how to work safely avoiding damage to other vehicle systems, units and components and contact with leakage and hazardous substances

Scope/range

1. Equipment is:
1.1. hand tools
1.2. special workshop tools
1.3. general workshop equipment
1.4. electrical testing equipment
2. Testing methods are:
2.1. sensory
2.2. functional
2.3. measurement
3. Units and components are:
3.1. mechanical
3.2. electrical
3.3. hydraulic/pneumatic
4. Transmission and driveline systems are:
4.1. gearbox
4.2. hubs and bearings
4.3. final drive assembly
4.4. driveline components (including propeller shafts and drive shafts)
4.5. clutch

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.

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.

Functional testing

Examples include: use of brake roller tester, chassis dynamometer, transmission stall test.

Units and components

Any unit or component from the transmission and driveline systems defined in the scope/range above.

Vehicles

These can be any of the following types of light vehicle: SI, CI, Hybrid, Electric or Alternative fuel vehicles.

IMILV13 - Diagnose and Rectify Light Vehicle Transmission and Driveline System Faults

Overview

This standard 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 accurately identify and record any system deviation from acceptable limits
P9 accurately ensure your assessment of dismantled sub-assemblies, units and components identifies their condition and suitability for repair or replacement

P10 promptly inform the relevant person(s) 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 units and components
P12.3 contact with leakages
P12.4 contact with hazardous substances
P13 ensure all repaired and replacement units and components conform to the vehicle operating specification and any legal requirements
P14 adjust units and components correctly, when necessary, to ensure that they operate to meet system requirements
P15 promptly record and report any additional faults you notice during the course of work
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 promptly report any anticipated delays in completion to the relevant person(s)

Legislative and organisational requirements and procedures

Knowledge and understanding

You need to know and understand:
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 promptly reporting anticipated delays to the relevant person(s)

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 units and components
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

1. Transmission and driveline systems 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

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

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.

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.

Electrical systems

Excluding high voltage system.

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.

Recommendations

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

Rectification activities

A suitable repair or replacement that rectifies the fault(s) identified from the diagnostic activities carried out.
Transmission and driveline system fault
These are faults that require a multistage inspection and a series of test results to identify the cause.

Transmission area

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

Vehicles

These can be any of the following types of light vehicle: SI, CI, Hybrid, Electric or Alternative fuel vehicles.

Underpinning Knowledge Requirements

Suspension

Types of wheel bearings commonly used and construction
Different types of suspension, how to inspect and diagnose faults
Suspension angles
Suspension bushes & wear
Four-wheel alignment
Understanding of wheel alignment
Checking and adjustment of wheel alignment
ABS and operation
Wheel alignment and diagnosis
Tyre wear & characteristics
Wheel alignment pre-checks
Wheel alignment diagnosis
Effects of wheel alignment settings
Suspension components and their operation
Front and rear wheel drive vehicles and their components
Driver liaison & questioning

Braking systems

Tools & equipment used to inspect and diagnose brake system faults
Electronic parking brake, operation and fault finding
Brake linings, brake pads and brake shoes
Braking components and their operation
Braking system fault finding
Brake hydraulic systems & fault finding
Brake wear indicators
Servicing and the replacement of braking components
Brake fluid, characteristics & fault finding
Braking system fault finding
ABS operation
ABS fault finding
Braking system servicing

Engine and Emission Systems

Engine management petrol and diesel
Engine management diagnosis
Tools and equipment used in the diagnosis of engine management systems (petrol and diesel)
Fuel - Petrol & Diesel
Engine management components and system operation
Petrol and diesel systems service operations
Petrol and diesel system replacement of components
Emission system warning lamps
Petrol and diesel sensors and actuators
Engine components and their function
Workshop engine tools and equipment measurement
Engine 4 stroke cycle and engine operation
Driveline component and operation (manual & automatic transmission
Engine emission control systems, components and operation
Air conditioning and climate control
In-direct and direct fuel systems (petrol and diesel)
Engine system fault diagnosis
Fuel system air / fuel ratios

Steering, wheels and tyres

Tools and equipment used in the service and repair of steering, wheel and tyre repair
Wheel and tyre construction
Wheel and tyre inspection
Tyre repair techniques
Tyre wear and causes
Tyre pressure monitoring system operation and repair
Ackerman Principle
Toe Out On Turns
4 wheel alignment
Steering components and operation
Steering geometry
Driver steering symptoms
Steering mechanisms
Power steering systems and components (hydraulic, electro hydraulic, electric)
Steering and suspension faults
Supplementary restraint system components and operation
Tyre legislation
Tyre construction identification

Vehicle Electrical

Electrical systems and their operation
Vehicle batteries and their construction

Electric and hybrid vehicles system and components
Tools and equipment used in the service repair of electrical systems
Electrical units and components and their operation
How to use tools and equipment in the diagnosis of electrical systems
Vehicle network systems, operation, diagnosis and repair
Sensors, how they operate and how they are tested
Electricity and how it works
Electrical diagnosis
Electrical laws (i.e. Ohms law)
Oscilloscope use, operation and use in the diagnosis of electrical / mechanical faults
Oscilloscope waveforms
Vehicle immobilisation
Vehicle electrical systems (ABS, SRS, ICE, networks)
Volt drop testing procedures
Electrical circuit testing and diagnosis
Electrical system components
Stop - start systems, components used and diagnosis