
Overview

This standard is about the off vehicle repair and overhauling of electrical units and components.

NB: This unit does not include working on high voltage components.

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Performance**criteria**

- You must be able to:
- P1 select and use suitable personal protective equipment throughout all repair activities
 - P2 use suitable sources of technical information to support your repair activities
 - P3 assess and prepare all the electrical equipment required, following manufacturers' instructions, prior to use
 - P4 use the electrical equipment required correctly and safely throughout all repairing activities
 - P5 carry out all repair activities following:
 - P5.1 5.1 manufacturers' instructions
 - P5.2 5.2 recognised researched repair methods
 - P5.3 5.3 health, safety and environmental requirements
 - P6 work in a way which minimises the risk of:
 - P6.1 damage to other vehicle systems, units and components
 - P6.2 contact with leakage, hazardous substances and high voltage systems
 - P6.3 damage to your working environment
 - P6.4 injury to yourself and others
 - P7 ensure your initial assessment and testing methods of electrical units identifies accurately their condition and suitability for reconditioning, repair or replacement
 - P8 promptly inform the relevant person(s) where a repair is uneconomic or unsatisfactory to perform
 - P9 use electrical testing methods which are suitable for assessing the performance of the type of electrical unit repaired
 - P10 adjust electrical units and associated components to the specified settings correctly to ensure that they operate to requirements, when necessary
 - P11 ensure repaired alternators and starters conform to the electrical efficiency operating specification required and any legal requirements
 - P12 ensure your repair records are accurate, complete and promptly passed to the relevant person(s) in the format required
 - P13 complete all repair activities within the agreed timescale
 - P14 promptly report any anticipated delays in completion to the relevant person(s)

Knowledge and understanding

You need to know and understand:

Legislative and organisational requirements and procedures

- K1 the current health and safety legislation and workplace procedures relevant to workshop practices and personal protection when undertaking electrical unit repair activities
- K2 your workplace procedures for:
 - K2.1 recording fault location and repair / correction activities
 - K2.2 reporting the results of tests
 - K2.3 the referral of problems
 - K2.4 reporting delays to the completion of work
- K3 the importance of documenting repair/correction information
- K4 the importance of working to agreed timescales and keeping others informed of progress
- K5 the cost-benefit relationship between the reconditioning, repair and replacement of components within electrical units and components
- K6 the importance of promptly reporting anticipated delays to the relevant person(s)

You need to know and understand:

Electrical principles

- K7 the principles of electrical charging
- K8 how starting, charging and electrical motor circuits work
- K9 basic electrical and electronic principles, including Ohms Law, voltage, power, current (AD/DC) resistance, magnetism, electromagnetism and electromagnetic induction
- K10 electrical symbols, units and terms
- K11 the types of charging components, starting components and motors, and how they work
- K12 how starter motor drive mechanisms work (including epicyclic gearing)
- K13 electrical safety procedures

You need to know and understand:

Use of electrical testing equipment and electrical testing techniques

- K14 how to prepare, assess and test the accuracy and operation of all the electrical repair and testing equipment required

K15 how to use all the electrical repair and testing equipment required

K16 how to interpret test results and perform electrical efficiency calculations

You need to know
and understand:

Charging system components, starting system components and motors fault finding and repair

K17 how to find, interpret and use sources of information on electrical repair procedures

K18 manufacturers specifications for the units being repaired, and where this information can be sourced

K19 suppression requirements applicable to electrical components and the type and causes of faults which can occur in charging, starting and motor systems

K20 the purpose of, and when to use torque, resistance, insulation and visual tests

K21 how to test the internal components of an alternator including: diode pack, rotor field and stator windings

K22 the relationship between test methodology and the faults repaired – the use of appropriate testing methods

K23 how to assess the condition of components within charging system components, starting system components and motors and locate electrical faults

K24 how to repair charging system components, starting system components and motors

K25 how to test and evaluate the performance of repaired electrical components against the operating specification required

K26 how to carry out wiring harness repairs including soldering and crimping of wires and terminals

K27 how to identify the types and causes of alternator and starter failure

K28 how to make suitable adjustments to the starter drive setting

K29

Scope/range

- 1. Electrical equipment** includes:
 - 1.1. volt meters
 - 1.2. ammeters
 - 1.3. ohmmeters
 - 1.4. electrical insulation testing equipment

- 2. Testing methods** include:
 - 2.1. torque tests
 - 2.2. resistance tests
 - 2.3. insulation tests
 - 2.4. sensory
 - 2.5. measurement

- 3. Repair activities** include:
 - 3.1. stripping
 - 3.2. cleaning and evaluating the unit
 - 3.3. soldering
 - 3.4. replacing faulty parts
 - 3.5. reassembly
 - 3.6. testing

- 4. Electrical units** include:
 - 4.1. generators
 - 4.2. starters
 - 4.3. motors
 - 4.4. actuators

Additional information

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

Glossary**Agreed timescales**

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

Generators

These can be externally and internally regulated

Starters

Examples include pre-engaged, inertia, axial and co-axial

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