

<b>Domain</b>	<b>AUTOMOTIVE ELECTRICAL AND ELECTRONICS</b>	<b>Unit ID: 490</b>
<b>Title:</b>	<b>Install and service motor vehicle air-conditioning system</b>	
<b>Level: 3</b>		<b>Credits: 10</b>

### **Purpose**

This unit standard specifies the competencies required to install and service motor vehicle air-conditioning system. It includes procedures for installing, inspecting and testing, evacuating and recharging an air-conditioning system. This unit standard is intended for those who work as automotive electricians.

### **Special Notes**

1. Entry information:
  - Prerequisite
    - Unit 65 - *Apply safety rules and regulations in an automotive mechanics workshop* or demonstrated equivalent knowledge and skills.
2. To demonstrate competence, at a minimum, evidence is required of inspecting and testing two (2) motor vehicle air-conditioning components and evacuating, and recharging one (1) motor vehicle air-conditioning system. It includes replacing defective air-conditioning system component(s).
3. Assessment evidence may be collected from a real workplace or a simulated real workplace or an appropriate simulated realistic environment in which automotive electrical and electronic operations are carried out.
4. Glossary of terms:
  - '*vacuum*' means a condition in a closed system where the pressure is significantly lower than atmospheric pressure
  - '*service operations*' refers to 'on-vehicle service' where operations can be directly performed on the vehicle and 'component repair' where the operations are done on the workbench after removing the component from the vehicle but are limited to electrical or electronic components, units, and systems.
5. Performance of all elements in this unit standard must comply with manufacturers' specifications, workplace specific requirements and reasonable flat rate time.

6. Regulations and legislation relevant to this unit standard include the following:
  - Labour Act, No. 6, 1992
  - Occupational Health and Safety Regulations No. 18, 1997
  - Road Traffic and Transport Regulations No. 266, 2000and all subsequent amendments.
7. This unit standard applies to passenger and commercial vehicles, heavy plant and earthmoving equipment.

### **Quality Assurance Requirements**

This unit standard and others within this subfield may be awarded by institutions which meet the accreditation requirements set by the Namibia Qualifications Authority and the Namibia Training Authority and which comply with the national assessment and moderation requirements. Details of specific accreditation requirements and the national assessment arrangements are available from the Namibia Qualifications Authority and the Namibia Training Authority. All approved unit standards, qualifications and national assessment arrangements are available on the Namibia Training Authority website [www.nta.com.na](http://www.nta.com.na).

### **Elements and Performance Criteria**

#### **Element 1: Plan and prepare for work**

##### **Range**

Planning and preparation may include but is not limited to workplace inspection, equipment defect identification, assessment of conditions and hazards and determination of work requirements.

Tools and equipment may include but are not limited to standard tool set, electrical drilling machine, refrigerant leak detecting equipment (electronic or fluorescent fluid leak detector), thermometer, and air-conditioning recycling and charging station.

Materials may include but are not limited to primer and rust proofing agents, refrigerant and refrigerant oils, lubricants, spare parts and cleaning material.

##### **Performance Criteria**

- 1.1 Installation and work instructions, including repair order forms, specifications and operational details are obtained, confirmed and applied.
- 1.2 Safety requirements are followed in accordance with safety plans and policies.
- 1.3 Tools and equipment selected to carry out tasks are consistent with the requirements of the job, checked for serviceability and any faults rectified or reported prior to commencement.
- 1.4 Material requirements are identified and obtained in accordance with repair order form and/or specifications.

- 1.5 Materials are safely handled and located ready for use in line with workplace procedures.
- 1.6 Technical and/or calibration requirements for tools and equipment are sourced and implemented in line with workplace procedures.
- 1.7 Environmental protection requirements are identified and applied in line with environmental plans and regulatory obligations.

## **Element 2: Install air-conditioning system components**

### **Performance Criteria**

- 2.1 Procedures and information required for installing air-conditioning system components are identified and sourced in line with workplace procedures.
- 2.2 Fittings and material are selected.
- 2.3 Installation is implemented according to workplace procedures and manufacturers' specifications.
- 2.4 Installation is tested prior to placing in service and results are documented in line with workplace procedures.

## **Element 3: Inspect air-conditioning system components**

### **Range**

Inspection methods are to include but are not limited to visual, aural and functional assessment (including damage, corrosion, leakage, wear) in line with manufacturers' specifications.

### **Performance Criteria**

- 3.1 Air passages in the condenser and radiator are visually inspected for restrictions in line with manufacturers' and workplace procedures.
- 3.2 Tension and condition of compressor driving belt is checked according to manufacturers' specifications.
- 3.3 Air-conditioning system components including electrical wiring are visually inspected in line with manufacturers' and workplace procedures.

## **Element 4: Test air-conditioning system performance**

### **Performance Criteria**

- 4.1 Compressor operation is tested while system is in air-conditioning mode in line with manufacturers' and workplace procedures.

- 4.2 Refrigerant system is checked for leakages using electronic or fluorescent fluid leak detector in line with manufacturers' and workplace procedures.
- 4.3 Refrigerant system is tested for correct refrigerant charge and pressure according to manufacturers' specifications in line with workplace procedures.
- 4.4 Performance test on the entire system as is conducted in line with manufacturers' and workplace procedures.
- 4.5 Fault finding and diagnosis procedures are applied in line with manufacturers' and workplace procedures.

### **Element 5: Evacuate air-conditioning refrigerant system**

#### **Range**

Service operations may include but are not limited to isolation of faults, removing and installing, disassembling and assembling, inspection and evaluation, adjustments, operational testing, repair, replacement, and visual inspections in line with manufacturers' specifications.

#### **Performance Criteria**

- 5.1 Vehicle is parked on even surface in line with workplace procedures.
- 5.2 Personal protective clothing and equipment is used in line with manufacturers' and workplace procedures.
- 5.3 Air-conditioning recycling and charging station is connected to system's pressure fittings in line with manufacturers' and workplace procedures.
- 5.4 Air-conditioning recycling and charging station is activated and pressure gauges are observed to determine depressurised system in line with manufacturers' and workplace procedures.
- 5.5 Air-conditioning recycling and charging station is disconnected in line with manufacturers' and workplace procedures.
- 5.6 Service operations are carried out and pipe fittings of depressurised air-conditioning refrigerant system are closed using appropriate sealing caps according to manufacturers' specifications.

### **Element 6: Recharge and test air-conditioning refrigerant system**

#### **Performance Criteria**

- 6.1 Correct information is accessed and interpreted from manufacturers' specifications.
- 6.2 Air-conditioning recycling and charging station is connected to pressure fittings in line with manufacturers' and workplace procedures.

- 6.3 Air-conditioning recycling and charging station is activated to pull deep vacuum. in line with manufacturers' and workplace procedures.
- 6.4 System is recharged in line with manufacturers' and workplace procedures.
- 6.5 Final performance test is carried out and compared with manufacturers' specifications.

**Element 7: Complete work and clean up**

**Range**

Work completion details may include but are not limited to repair order form, sign-out form for equipment, service record book and service plan form.

**Performance Criteria**

- 7.1 Work is completed and appropriate personnel notified in accordance with workplace procedures.
- 7.2 Work area is cleared of waste, cleaned, restored and secured in accordance with workplace procedures.
- 7.3 Reusable material is collected and stored in accordance with workplace procedures.
- 7.4 Equipment used is cleaned, checked, maintained and stored in accordance with workplace procedures.
- 7.5 Work completion details are finalised in accordance with workplace procedures.

**Registration Data**

<b>Subfield:</b>	Automotive Engineering
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