

Unit ID: 2218

Domain

**AUTOMOTIVE MECHATRONICS**

Title:

**Repair engine cooling systems**

Level: 3

**Credits: 6**

### Purpose

This unit standard is intended for those who repair engine cooling systems. People credited with this unit standard are able to describe principles of heat transfer, describe types of cooling systems, describe cooling system components, maintain cooling systems, replace cooling systems components, and test cooling systems.

This unit standard is intended for those who work in automotive mechatronics environment.

### Special Notes

1. Entry information

Prerequisite

- *none*

2. This unit standard is to be assessed in the context of industrial safety operations and should be assessed in conjunction with other relevant technical unit standards selected from this domain.

3. Assessment evidence may be collected at a real workplace or simulated workplace in which safety operations are carried out.

4. Glossary of terms:

- '*Specifications*' refers to any, or all the following: manufacturers' specifications and recommendations, workplace specific requirements, national and international standards and legislations
- '*ISO*' refers to International Organization for Standards

5. Performance of all elements in this unit standard must comply with industry standards and workplace requirements.

6. Regulations and legislation relevant to this unit standard include the following:

- Labour Act No. 11 of 2007
- Regulations relating to the health and safety of employees at work under Schedule 1 (2) of the Labour Act No.11 of 2007
- ISO 14001 (Environmental Management Standard) and all subsequent amendments to any of the above.

### 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 on [www.namqa.org](http://www.namqa.org) and the Namibia Training Authority on [www.nta.com.na](http://www.nta.com.na).

## **Elements and Performance Criteria**

### **Element 1: Describe principles of heat transfer**

#### **Range**

A mode of heat transfer includes and is not limited to conduction, convection and radiation.

#### **Performance Criteria**

- 1.1 The purpose of cooling in a motor vehicle is explained.
- 1.2 Principles of heat transfer are explained.
- 1.3 Applications of heat transfer principles are explained.

### **Element 2: Describe types of cooling systems**

#### **Range**

Types of cooling systems includes and is not limited to water and air cooling.

#### **Performance Criteria**

- 2.1 Different types of motor vehicle cooling systems are listed and explained.
- 2.2 Advantages and disadvantages of each motor vehicle cooling system are explained.
- 2.3 Different types of engines to be cooled are listed and explained.
- 2.4 Operation of direct and indirect cooled engine is explained.

### **Element 3: Describe cooling system components**

#### **Performance Criteria**

- 3.1 Components of motor vehicle cooling are identified and explained.
- 3.2 Operation characteristics of motor vehicle cooling system components are described.
- 3.3 Electronic monitoring cooling systems is explained.

## **Element 4: Maintain cooling systems**

### **Range**

Cooling service maintenance is to include coolant level and mixture, cleaning, adjusting, bleeding and operational testing.

### **Performance Criteria**

- 4.1 Cooling system inspection are carried out in line with workplace procedures and manufacturers' specifications.
- 4.2 Results are checked for compliance with manufacturers' specifications.
- 4.3 Inspection results, along with evidence, supporting information and recommendations are documented in line with workplace procedures.
- 4.4 Service is implemented in line with workplace procedures and manufacturers' specifications.
- 4.5 Adjustments are made during the service in line with manufacturer specifications.

## **Element 5: Replace cooling systems components**

### **Range**

Repair methods are to include isolation of fault(s), dismantling, evaluation and replacement of components and/or parts, assembly and completion of operational tests and documents.

Adjustments may include but are not limited to driving belt, timing belt, and other cooling system components as required by the manufacturer.

### **Performance Criteria**

- 5.1 Faulty components are identified according to workplace procedures.
- 5.2 Method for repair is identified and selected in line with workplace procedures and manufacturers' specifications.
- 5.3 Faulty components are removed and new components are fitted according to manufacturer's specifications and procedures.
- 5.4 Adjustments are made during the repair in line with manufacturers' specifications.

## **Element 6: Test cooling systems**

### **Range**

Testing methods are to include and not limited to functional testing of components e.g. thermostat, radiator pressure cap pressure testing and coolant testing.

### **Performance Criteria**

- 6.1. Method for testing cooling system is identified, selected and implemented in line with workplace procedures and manufacturers' specifications.
- 6.2. Test results are checked for compliance with manufacturers' specifications.
- 6.3. Test results, along with evidence, supporting information and recommendations are documented in line with workplace procedures.
- 6.4. Reports are forwarded to supervisor for action in line with workplace procedures.

### **Registration Data**

<b>Subfield:</b>	Automotive Engineering
<b>Date first registered:</b>	22 April 2020
<b>Date this version registered:</b>	22 April 2020
<b>Anticipated review:</b>	2025
<b>Body responsible for review:</b>	Namibia Training Authority