

<b>Unit ID: 76</b>	
<b>Domain Title:</b>	<b>AUTOMOTIVE MECHANICS Produce and interpret engineering sketches related to automotive mechanics</b>
<b>Level: 2</b>	<b>Credits: 3</b>

### Purpose

This unit standard specifies the competencies required to produce and interpret engineering sketches related to automotive mechanics. It includes using free hand sketching techniques and orthogonal projection methods. This unit standard is intended for those who work as automotive mechanics.

### 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 the application of sketching procedures to produce two freehand sketches and two orthogonal projections. Perform these tasks ensuring correct identification of requirements, selection and use of appropriate processes, tools and equipment and completing all work to specification.
3. Assessment evidence may be collected from a real workplace or a simulated real workplace or an appropriate simulated realistic environment in which automotive mechanic operations are carried out.
4. All inspection, operation and maintenance procedures associated with the use of tools and equipment shall comply with manufacturers' specifications and company guidelines, instructions and reasonable flat rate time.
5. '*Specifications*' refers to any, or all of the following: manufacturers' specifications and recommendations, workplace specific requirements.
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, 2000
 and all subsequent amendments.
7. This unit standard applies to passenger and light commercial vehicles with a Gross Vehicle Mass  $\leq 5\,500$  kg (Petrol & Diesel).

## **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 on [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 are 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 pencils in various sizes (0.35 – 0.7 mm), eraser, workbook, calculation pad, chalk, ruler, drawing board.

Materials are to include, but are not limited to white blank or grid paper in A3 or A4 format.

#### **Performance Criteria**

- 1.1 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 Environmental protection requirements are identified and applied in line with environmental plans and regulatory obligations.

### **Element 2: Apply freehand sketching techniques**

#### **Performance Criteria**

- 2.1 Product, component, or item to be drawn is identified.
- 2.2 Tools, equipment and material is identified and selected for the required task.
- 2.3 Horizontal, vertical and oblique lines are sketched in line with specifications.
- 2.4 Small, medium and large curves and circles are sketched in line with specifications.

### **Element 3: Interpret orthogonal projections**

#### **Range**

Mechanical drawing symbols may include and are limited to diameter, radius, centre line, flat (material), plate (material), square, taper, slope, reference dimension, dimension not drawn to scale, countersink, counter bore, depth of a feature, feature identification, datum identification, equal, first angle projection, and third angle projection.

Electrical drawing symbols may include and are limited to direct and alternating current, positive and negative voltage, operated by pushing, operated by turning, boundary line, filament of a lamp, signal lamp, electrical buzzer, secondary cell, ground, frame or chassis connection, high voltage, mechanical coupling, manually operated, mechanical, pneumatic or hydraulic connection (general symbol), block diagram, circuit diagram, and wiring diagram.

Technical sketching standards and conventions may include and are limited to full sections, half sections, adjoining parts (crosshatching), thin area crosshatching, local or part sections, sectioning webs (fabricated and cast articles).

#### **Performance Criteria**

- 3.1 Three view third angle orthogonal projections with sectioning are interpreted.
- 3.2 General mechanical and electrical drawing symbols are identified and interpreted.
- 3.3 Components, assemblies and/or objects on a sketch are identified and interpreted.
- 3.4 Instructions and information on a detail sketch are explained and interpreted.

### **Element 4: Sketch object using orthogonal projection methods**

#### **Range**

Line types used in engineering drawings may include and are limited to outlines (visible and hidden outlines), centre lines (pitch lines and pitch circles), dimension lines (projection and leader lines), section lines (hatching and cutting plane lines).

Line thicknesses used in electrical drawings may include and are limited to: continuous – thick 0.7 mm, continuous – thick 0.35 mm, chain – thick 0.7 mm, chain – medium 0.5 mm, dashed – medium 0.5 mm, dashed – thin 0.35 mm, short dashed – thin 0.35 mm.

Technical sketching standards and conventions are limited to:

- mechanical drawing symbols namely diameter, radius, centre line, flat (material), plate (material), square, taper, slope, reference dimension, dimension not drawn to scale, countersink, counter bore, depth of a feature, feature identification, datum identification, equal, first angle projection, and third angle projection.
- electrical drawing symbols to direct and alternating current, positive and negative voltage, operated by pushing, operated by turning, boundary line, filament of a lamp, signal lamp, electrical buzzer, secondary cell, ground, frame or chassis connection, high voltage, mechanical coupling, manually operated, mechanical,

pneumatic or hydraulic connection (general symbol), block diagram, circuit diagram, and wiring diagram.

- full sections, half sections, adjoining parts (crosshatching), thin area crosshatching, local or part sections, sectioning webs (fabricated and cast articles).

### **Performance Criteria**

- 4.1 Orthogonal projection method is demonstrated.
- 4.2 Third angle projection procedures are applied.
- 4.3 Line types used on engineering drawings are identified and applied.
- 4.4 Accurate and clear dimensions, including datum point or line are allotted.
- 4.5 Technical sketching standards and conventions are applied.

### **Element 5: 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**

- 5.1 Work is completed and appropriate personnel notified in accordance with workplace procedures.
- 5.2 Work area is cleared of waste, cleaned, restored and secured in accordance with workplace procedures.
- 5.3 Reusable material is collected and stored in accordance with workplace procedures.
- 5.4 Tools and equipment are cleaned, checked and maintained in accordance with workplace procedures.
- 5.5 Work completion details are finalised in accordance with workplace procedures.

### **Registration Data**

<b>Subfield:</b>	Automotive Engineering
<b>Date first registered:</b>	28 September 2006
<b>Date this version registered:</b>	28 September 2006
<b>Anticipated review:</b>	2010
<b>Body responsible for review:</b>	Namibia Training Authority