No. 822 **11 August *2006***

SOUTH AFRICAN QUALIFICATIONS AUTHORITY (SAQA)

In accordance with Regulation 24(c) of the National Standards Bodies Regulations of 28 March 1998, the Standards Generating Body (SGB) for

Vehicle Maintenance

registered by Organising Field 06, Manufacturing, Engineering and Technology, publishes the following qualification and unit standards for public comment,

This notice contains the titles, fields, subfields, NQF levels, credits, and purpose of the qualification and unit standards. The qualification and unit standards can be accessed via the SAQA web-site at www.saqa.org.za. Copies may also be obtained from the Directorate for Standards Setting and Development at the SAQA offices, Hatfield Forum West, 1067 Arcadia Street, Hatfield, Pretoria.

Comment on the qualification and unit standards should reach SAQA at the address ***below*** and no later than 7 September 2006. All correspondence should be marked Standards Setting – **SGB for** Vehicle Maintenance and addressed to

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S BHIKHA
DIRECTOR STANDARDS SETTING AND DEVELOPMENT

SAQA

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

QUALIFICATION:

National Diploma: Automotive Repair and Maintenance

SAQA QUAL ID	*QUALIFICATION TITLE*		
57450	National Diploma: Automotive Repair and Maintenance		
SGB NAME		*ORGANISING FIELD ID*	*PROVIDER NAME*
SGB Vehicle Maintenance		6	
QUAL TYPE		*ORGANISING FIELD DESCRIPTION*	*SUBFIELD*
National Diploma		Manufacturing, Engineering and Technology	Manufacturing and Assembly
ABET BAND	*MINIMUM CREDITS*	*NQF LEVEL*	*QUALIFICATION CLASS*
Undefined	240	Level 5	Regular-Unit Stds Based

PURPOSE AND RATIONALE OF THE QUALIFICATION

Purpose:

The purpose of the qualification is to provide learners, education and training providers and employers with the competencies and the range of learning required to work effectively in various industries making use of automotive repair and maintenance skills and to meet the challenges of the automotive industry and related environments.

The primary competencies in this qualification focus on the diagnosis and repair vehicle systems and to take responsibility for work in a workshop. This includes a detailed understanding of how to develop subordinates, understand business operation principles and the cost of nonconformance.

Hand and business skills play an important role in this qualification. Recipients of one of the specialisations of this qualification are able to conduct the essential maintenance and related operations associated with the range of vehicles available today, and efficient and safe operational practices.

With this understanding learners will be able to participate in operational activities. What learners achieve in this qualification will also serve as a basis for further learning where they will engage in more complex management and related engineering activities in the field of automotive technology.

Rationale:

This qualification in automotive repair and maintenance NQF Level 5 has been developed as a progression from qualifications in automotive repair and maintenance at NQF Level 4. The development was necessary due to automotive repair and maintenance technology and serves as the introductory qualification for further automotive industry related management skills.

The field of automotive maintenance and repair is characterised by the overall diagnosis and repair of vehicle systems as well as the reconditioning of components where required. This in turn provides support and job opportunities to a variety of small businesses in the retail motor and related industries. The qualification also equips entrepreneurs with basic business and management skills to manage a business.

People working in the automotive repair and maintenance field require technical knowledge and well developed hand skills.

There is also a critical need in the industry to identify people who are able to conduct the essential maintenance and related operations associated with the range of vehicles available today, and apply efficient and safe operational practices in at least one of the following specialisation areas:

> Passenger and Light Delivery Vehicles.

> Earthmoving Equipment
> Commercial Vehicles.

This is the fourth qualification in a series for learners who want to follow a career in the field of automotive repair and maintenance. This qualification focuses on developing skills and knowledge necessary to perform as a competent person in the automotive industry.

It also provides learners who have gained relevant experience in the workplace with an opportunity to obtain credits through an RPL process. The qualification also forms the basis for further learning in the field of vehicle technology.

RECOGNIZE PREVIOUS LEARNING?

Y

LEARNING ASSUMED TO BE IN PLACE

It is assumed that learners have attained the outcomes described in the FETC in Automotive Repair and Maintenance or learners are already competent in Communication and Mathematical Literacy at NQF Level **4.**

Recognition of Prior Learning:

This qualification may be obtained through a process of RPL. The learner should be thoroughly briefed prior to the assessment and support provided to assist in the process of developing a portfolio.

While this is primarily a workplace-based qualification, evidence from other areas of endeavour may be introduced if pertinent to any of the exit-level outcomes.

Access *to* the qualification:

Access to the qualification is open bearing in mind learning assume to be in place.

QUALIFICATION ***RULES***

> All the Fundamental unit standards totalling **36** credits are compulsory.

> All the Core unit standards totalling **70** credits are compulsory.

> Candidates may select a specialisation area of their choice as indicated below, and all the unit standards in that specialisation area must be completed. Additional unit standards may be selected from any of the other specialisation areas, or from the generic Elective category to supplement credits to achieve a minimum total of **240** credits.

> Specialisation area **1:** Passenger and Light Delivery Vehicles:

> **12230:** "Diagnose, test and repair electronic automobile fuel injection systems", Level **4, 16** Credits.
> **12231:** "Diagnose and repair engine management systems", Level **5, 20** Credits.
> **12232:** "Diagnose and repair vehicle stability, traction and drive control (VSTDC) systems", Level **5,** 20 Credits.
> **12227:** "Trace and repair faults on advanced auto electrical circuits", Level **4, 16** Credits.
> **230465:** "Diagnose and repair hydraulic systems", Level 5, **10** Credits.
> **230463:** "Diagnose and repair drive train systems", Level **5,** 8 Credits.
> **230466:** "Recondition automatic transmissions", Level 5, **10** Credits.
> **230462:** "Analyse failure of vehicle parts", Level 5, **12** Credits.
> Total: **112** Credits.

> Specialisation area **2:** Earthmoving Equipment

> **12230:** "Diagnose, test and repair electronic automobile fuel injection systems", Level **4, 16** Credits.
> **12231:** "Diagnose and repair engine management systems", Level 5, 20 Credits.
> **230467:** "Diagnose and repair hydrostatic systems", Level 5, 10 Credits.
> **230464:** "Diagnose and repair engine and exhaust braking systems", Level 5, **6** Credits.
> **230465:** "Diagnose and repair hydraulic systems", Level 5, 10 Credits.
> **230463:** "Diagnose and repair drive train systems", Level 5, 8 Credits.
> **230466:** "Recondition automatic transmissions", Level **5, 10** Credits.
> **230468:** "Assess and report on earthmoving equipment undercarriage condition", Level **5, 8** Credits.
> **230462:** "Analyse failure of vehicle parts", Level **5, 12** Credits.

> Total: 100 Credits.

> Specialisation area 3: Commercial Vehicles:

> 12230: "Diagnose, test and repair electronic automobile fuel injection systems", Level 4, 16 Credits.
> 12231: "Diagnose and repair engine management systems", Level 5, 20 Credits.
> 12232: "Diagnose and repair vehicle stability, traction and drive control (VSTDC) systems", Level 5, 20 Credits.
> 230464; "Diagnose and repair engine and exhaust braking systems", Level 5, 6 Credits.
> 230465: "Diagnose and repair hydraulic systems", Level 5, 10 Credits.
> 230463: "Diagnose and repair drive train systems", Level 5, 8 Credits.
> 230466: "Recondition automatic transmissions", Level 5, 10 Credits.
> 230462: "Analyse failure of vehicle parts", Level 5, 12 Credii.
> Total: 102 Credits.

EXIT LEVEL OUTCOMES

1. communicate and solve problems in a variety of ways.

2. Manage work in an automotive context.

3. Diagnose and repair vehicles in a specialised area.
> One of Passenger and Light Delivery Vehicles; Earthmoving Equipment or Commercial Vehicles.

Critical Cross-Field Outcomes:

This qualification addresses the following generic outcomes in an integrated manner through the application of various unit standards:

> Work effectively with others as a member of a team/group.
> Organise and manage oneself and one's activities.
> Communicate using visual, mathematical and/or language skills in modes of oral and/or written presentation.
> Identify and solve problems in which responses display that responsible decisions using critical and creative thinking have been made.
> Collect, analyse, organise and critically evaluate information.
> Use science and technology effectively and critically, showing responsibility towards the environment and health of others.
> Understand the world as a set of related systems.

ASSOCIATED ASSESSMENT CRITERIA

1:
> Oral communication is maintained and adapted as required to promote effective interaction in a work context
> Information is accessed from instructions, visual information and a range of other workplace texts and responses where required are appropriate to the context
> Written communication is clear and unambiguous and at an appropriate level for designated target audiences.
> Mathematical functions are used correctly to solve routine workplace problems and tasks.
> The financial aspects of personal, business and national issues are investigated.

2:
> Work is conducted in accordance with agreed time schedules.
> Work is conducted efficiently with a minimum of wastage.
> Quality is managed in accordance with customer requirements.

3:
> Work area and vehicle is prepared for diagnosis and repair.
> Appropriate test equipment is connected in accordance with set procedures.
> System faults are identified and appropriate data collected in accordance with set procedures.
> System faults identified and repaired in accordance with set specifications.
> System repair is confirmed in accordance with organisational requirements.
> Safety procedures are adhered to during the diagnosing and repairing task.

Integrated assessment

Integrated assessment at the level of the qualification provides an opportunity for learners to show they are able to integrate concepts, actions and ideas achieved across a range of unit standards and contexts.

Integrated assessment must evaluate the quality of observable performance as well as the thinking behind the performance. Some assessment aspects will demand practical demonstration while others may not. In some case inference will be necessary to determine competence depending on the nature and context within which performance takes place.

In order to ensure that the candidate is able to work within various contexts of the automotive industry, it is necessary to conduct assessments that will provide evidence that learners are able to apply their knowledge and skills in a range of other contexts and for further learning. The assessment should also ensure that all the critical cross-field outcomes have been achieved.

INTERNATIONAL COMPARABILITY

As a starting point, this qualification which is part of a series of qualifications in the field of vehicle technology including, servicing, maintenance, repairs and diagnostics, was compared to other, similar outcomes-based qualifications, certifications or skills standards in English speaking countries of the world.

It was found to be difficult to compare the New Zealand and Australian narrow focus qualifications with this broad-based qualification that also include fundamentals, however the generic core and specialisation areas' unit standards did compare favourably to both the Australian (AUR99) Automotive Industry, Service and Repair unit standards and the NVQ qualification in the United Kingdom.

An example of the exact multi specialisation area approach used in this qualification was found in Australia under Automotive Retail Service Repair Training (www.automotivetraining.org.au). The range of unit standards used in Australia that relate similarly to core unit standards in this qualification may be found at (www.ntis.gov.au).

It was further difficult to undertake specific comparisons given that the New Zealand and Australian qualifications, although they are in the same field of vehicle technology and cover the same areas of specialisation (thus containing a large degree of similar content) are conceptualised as three year qualifications without exit level outcomes at the intermediate levels.

This notwithstanding, the technical content of this qualification for automotive repair and maintenance (with the various specialisations) corresponds with the equivalent level of qualification in vehicle servicing (with the various specialisations) in Australia, New Zealand and the United Kingdom.

Elements of the Institute of Motor Industry (IMI) in the UK have been used in benchmarking best practice procedures in some of the unit standards used in this qualification. The NVQ qualifications offered in the UK cover all the same objectives of this series of qualifications at various levels of complexity. The qualifications are offered as an internship wherein the learner enrols with a college or training centre for the theoretical component, and achieves the practical component in-house. The qualifications are all based on specific levels of performance, and lead to progressive levels of complexity, but are identified as separate qualifications. The learning towards these qualifications is offered through long-term learner-employer relationships, with short-term stints at a training centre. Qualification titles in the UK include:

> Vehicle Mechanical & Electronic Systems, Maintenance and Repair - Level 3 (Q1015915).
> Vehicle Mechanical & Electronic Systems, Maintenance and Repair - Level 3 (Q1015916).
> Motorcycle Mechanical & Electronic Systems, Maintenance and Repair - Level 3 (Q1015918).
> Vehicle Refinishing - Level 3 (Q1017590).
> Vehicle Body Repair - Level 3 (Q1015917).
> Vehicle Body Fitting - Level 2 (Q1015913).
> Vehicle Mechanical & Electronic Systems, unit Replacement - Level 2 (Q1015914).

The qualifications offered in other European countries, such as Germany, are also predominantly vocational qualifications with theoretical components being achieved through a specified period at a training centre. The qualifications are aimed at achieving complete competence in all aspects of vehicle maintenance through the progressive series of qualifications and includes mechanical, electrical and coach works. The training programmes are progressive qualifications of one-year duration each and include ongoing training through workbooks in which the trainee is required to complete evidence of understanding for each month of the registered year of learning. Germany has a requirement that competent people be licensed to operate under the meister (master craftsman) programme, and this licence is valid for a period of two years. The qualification titles offered in Germany include:

> Auto Fachman - Level 1.

> Auto Fachman - Level 2.
> Auto Fachman - Level 3.
> Auto Fachman - Meister.

America uses a system of specialisation areas, with a master technician being identified as a person who is competent in all areas and will be able to perform on almost any part of a vehicle. The learning is conducted through apprenticeships and has specialisation areas for engine technicians, transmission technicians, steering and suspension technicians, brake technicians, electrical system technicians, heating and air conditioning technicians, driveabilii and performance technicians and lubrication technicians.

None of the SADC countries have their own qualifications relating to vehicle maintenance, but use the British City and Guilds Standards for training learners in the automotive field. Namibia has indicated interest in the South African qualifications and may implement thii qualification once it has been registered.

ARTICULATION OPTIONS

This qualification allows for both horizontal and vertical articulation.

Horizontal articulation can occur with:

> 22861: "National Certificate: Autotronics", NQF Level 5.

Vertical articulation can occur with:

> 48694: "Bachelor of Science: Engineering", NQF Level 7.

MODERATION OPTIONS

> Anyone assessing a learner or moderating the assessment of a learner against this unit standard must be registered as an assessor with the relevant Education, Training, Quality, Assurance (ETQA) Body, or with an ETQA that has a Memorandum of Understanding with the relevant ETQA

> Any institution offering learning that will enable the achievement of this unit standard must be accredited as a provider with the relevant Education, Training, Qualii, Assurance (ETQA) Body, or with an ETQA that has a Memorandum of Understanding with the relevant ETQA.

> Assessment and moderation of assessment will be overseen by the relevant Education, Training, Quality, Assurance (ETQA) Body, or by an ETQA that has a Memorandum of Understanding with the relevant ETQA, according to the ETQA's policies and guidelines for assessment and moderation.

> Moderation must include both internal and external moderation of assessments, unless ETQA policies specify otherwise. Moderation should also encompass achievement of the competence described in the Unit Standard.

CRITERIA FOR THE REGISTRATION OF ASSESSORS

The following criteria should be applied by the relevant ETQA:

> Appropriate qualification and a minimum of 3 years experience in the field of vehicle servicing or a similar environment.
> Registration as an assessor with the relevant ETQA.

NOTES

N/A

	UNIT STANDARD ID AND TITLE	LEVEL	CREDITS	STATUS
Core	7876 Conduct on-the-Job-Training	Level 5	8	Reregistered
Core	10053 Manage customer requirements and needs and implement action plans	Level 5	8	Reregistered
Core	10066 Establish customer needs and relationships	Level 5	16	Reregistered
Core	15219 Develop and implement a strategy and action plans for a team, department or division	Level 5	4	Reregistered
Core	15230 Monitor team members and measure effectiveness of performance	Level 5	4	Reregistered

Core	15234 Apply efficient time management to the work of a department/division/section	Level 5	4	Reregistered
core	114226 Interpret and manage conflicts within the workplace	Level 5	8	Registered
core	114879 Promote a productivity improvement strategy	Level 5	10	Registered
Core	117701 Address safety, health and environmental requirements and hazards in a technical context	Level5	8	Registered
Elective	12225 Construct and test advanced electronic circuits	Level 4	16	Registered
Elective	12227 Trace and repair faults on advanced auto electrical circuits	Level4	16	Reregistered
Elective	12230 Diagnose, Wand repair electronic automobile fuel injection systems	Level 4	16	Reregistered
Elective	12231 Diagnose and repair engine management systems	Level 5	20	Reregistered
Elective	12232 Diagnose and repair vehicle stability, traction and drive control (VSTDC) systems	Level 5	20	Reregistered
Elective	15217 Develop an organisational bainii and development plan	Level 5	6	Registered
Elective	15235 Prepare and conduct staff selection interviews	Level 5	3	Reregistered
Elective	115753 Conduct outcomes-based assessment	Level 5	15	Registered
Elective	230462 Analyse failure of vehicle parts	w 5	12	Draft - Prep for P Comment
Elective	230463 Diagnose and repair drivetrain systems	Level 5	8	Draft - Prep for P Comment
Elective	230464 Diagnose and repair engine and exhaust braking systems	Level 5	6	Draft - Prep for P Comment
Elective	230465 Diagnose and repair hydraulic systems	Level 5	10	Draft - Prep for P Comment
Elective	230466 Recondition automatic transmissions	Level 5	10	Draft - Prep for P Comment
Elective	230467 Diagnose and repair hydrostatic systems	Level 5	10	Draft - Prep for P Comment
Elective	230468 Assess and report on earthmoving equipment undercarriage condition	Level 5	8	Draft - Prep for P Comment
Fundamental	12432 Use mathematical and statistical techniques effectively	Level 5	20	Registered
Fundamental	12433 Use communication techniques effectively	Level 5	8	Registered
Fundamental	15236 Apply financial analysis	Level 5	4	Reregistered
Fundamental	115821 Apply business financial practices	Level 5	4	Reaistered

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UNIT STANDARD: 1

Analyse failure *of* vehicle parts

SAQA US ID	*UNIT STANDARD TITLE*
230462	Analyse failure of vehicle parts

SGB NAME	*ORGANISING FIELD ID*	*PROVIDER NAME*
SGB Vehicle Maintenance	6	
UNIT STANDARD TYPE	*A I FI D E C*	*SUBFIELD DESCRIPTION*
ula	ctu E ing and Technology	Manufacturing

ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	12	Level 5	Regular

SPECIFIC OUTCOME 1

Read and interpret the job instructions.

SPECIFIC OUTCOME 2

Prepare to analyse failure.

SPECIFIC OUTCOME 3

Determine the reason for part failure.

SPECIFIC OUTCOME 4

Apply safety concepts during work functions.

SPECIFIC OUTCOME 5

Restore work area, complete and process documentation.

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UNIT STANDARD: **2**

Diagnose and repair drive train systems

SAQA US ID	*UNIT STANDARD TITLE*
230463	Diagnose and repair drive train systems

SGB NAME	*ORGANISING FIELD ID*	*PROVIDER NAME*
SGB Vehicle Maintenance	6	

UNIT STANDARD TYPE		*FIELD*	*SUBFIELD*
		Engineering and	Manufacturing
NQF	*CREDITS*		*UNIT STANDARD TYPE*
	8	5	Regular

SPECIFIC OUTCOME 1

Read and interpret the job instructions.

SPECIFIC OUTCOME 2

Prepare to conduct tests.

SPECIFIC OUTCOME 3

Test and diagnose the system faults.

SPECIFIC OUTCOME 4

Repair the system.

SPECIFIC OUTCOME 5

Apply safety concepts during work functions.

SPECIFIC OUTCOME 6

Restore work area, complete and process documentation.

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UNIT STANDARD: 3

Diagnose and repair engine and exhaust braking systems

SAQA US ID	*UNIT STANDARD TITLE*
230464	Diagnose and repair engine and exhaust braking systems

SGB NAME		*ORGANISING FIELD ID*	*PROVIDER NAME*
SGB Vehicle Maintenance		6	
UNIT STANDARD TYPE		*ORGANISING FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Manufacturing and Assembly
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	6	Level 5	Regular

SPECIFIC OUTCOME 1

Read and interpret the job instructions.

SPECIFIC OUTCOME 2

Prepare and position the vehicle.

SPECIFIC OUTCOME 3

Diagnose and repair system faults.

SPECIFIC OUTCOME 4

Test and commission the system.

SPECIFIC OUTCOME 5

Apply safety procedures during the diagnosing and repair of the brake system.

SPECIFIC OUTCOME 6

Restore work area, complete and process documentation.

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UNIT STANDARD: 4

Diagnose and repair hydraulic systems

SAQA US ID	*UNIT STANDARD TITLE*
230465	Diagnose and repair hydraulic systems

SGB NAME		*ORGANISING FIELD ID*	*PROVIDER NAME*
SGB Vehicle Maintenance		6	
UNIT STANDARD TYPE		*ORGANISING FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
Regular		Manufacturing, Engineering and Technology	Manufacturing and Assembly
ABET BAND	*CREDITS*	*NQF LEVEL*	*UNIT STANDARD TYPE*
Undefined	10	Level 5	Regular

SPECIFIC OUTCOME 1

Read and interpret the job instructions.

SPECIFIC OUTCOME 2

Prepare to conduct tests.

SPECIFIC OUTCOME 3

Test and diagnose the system faults.

SPECIFIC OUTCOME 4

Repair the system.

SPECIFIC OUTCOME 5

Apply safety concepts during work functions.

SPECIFIC OUTCOME **6**

Restore work area, complete and process documentation.

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UNIT STANDARD: **5**

SAQA US ID	***UNIT STANDARD TITLE***		
230466	Recondition automatic transmissions		
SGB NAME		***ORGANISING FIELD ID***	***PROVIDER NAME***
SGB Vehicle Maintenance		6	
UNIT STANDARD TYPE		***ORGANISING FIELD DESCRIPTION***	***SUBFIELD DESCRIPTION***
Regular		Manufacturing, Engineering and Technology	Manufacturing and Assembly
ABET BAND	***CREDITS***	***NQF LEVEL***	***UNIT STANDARD TYPE***
Undefined	10	Level 5	Regular

SPECIFIC OUTCOME 1

Read and interpret the job instructions.

SPECIFIC OUTCOME 2

Assess the condition of the parts.

SPECIFIC OUTCOME 3

Repair and assemble the transmission.

SPECIFIC OUTCOME 4

Check the operational condition after assembly.

SPECIFIC OUTCOME 5

Apply safety procedures during the repair and assembly task.

SPECIFIC OUTCOME 6

Restore work area, complete and process documentation.

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UNIT STANDARD: **6**

Diagnose and repair hydrostatic systems

SAQA US ID	*UNIT STANDARD TITLE*
230467	Diagnose and repair hydrostatic systems

SGB NAME	*ORGANISING FIELD ID*	*PROVIDER NAME*
SGB Vehicle Maintenance	6	

UNIT STANDARD TYPE	*ORGANISING FIELD DESCRIPTION*	*SUBFIELD DESCRIPTION*
gula	Technology	and

NQF LEVEL	*CREDITS*	*LEVEL*	*UNIT STANDARD TYPE*
	10	5	Regular

SPECIFIC OUTCOME 1

Read and interpret the job instructions.

SPECIFIC OUTCOME 2

Prepare to conduct tests.

SPECIFIC OUTCOME 3

Test and diagnose the system faults.

SPECIFIC OUTCOME 4

Repair the system.

SPECIFIC OUTCOME 5

Apply safety concepts during work functions.

SPECIFIC OUTCOME 6

Restore work area, complete and process documentation.

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UNIT STANDARD: ***7***

SAQA US ID	***UNIT STANDARD TITLE***		
230468	Assess and report on earthmoving equipment undercarriage condition		
SGB NAME		***ORGANISING FIELD ID***	***PROVIDER NAME***
SGB Vehicle Maintenance		6	
UNIT STANDARD TYPE		***ORGANISING FIELD DESCRIPTION***	***SUBFIELD DESCRIPTION***
Regular		Manufacturing, Engineering and Technology	Manufacturing and **Assembly**
ABET BAND	***CREDITS***	***NQF LEVEL***	***UNIT STANDARD TYPE***
Undefined	***8***	Level 5	Regular

SPECIFIC OUTCOME 1

Identify and select the type of undercarriage and source the appropriate data.

SPECIFIC OUTCOME 2

Discuss and explain the function and operation of undercarriage components.

SPECIFIC OUTCOME 3

Inspect and prepare the undercarriage for assessment

SPECIFIC OUTCOME 4

Measure and assess the undercarriage component for wear and record the findings.

SPECIFIC OUTCOME 5

Apply safety procedures during the assessment process.

SPECIFIC OUTCOME 6

Restore and report incidents and problems related to the assessment of the undercamage condition and compile fault-finding reports and record results.