No. 1183 **20 September 2002**

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

Manufacturing and Assembly

Registered by NSB 06, Manufacturing, Engineering and Technology, publishes the following qualifications and unit standards for public comment.

This notice contains the titles, fields, sub-fields, NQF levels, credits, and purpose of the qualification and unit standards upon which qualifications are based. The full 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 of Standards Setting and Development at the SAQA offices, 659 Pienaar street, Brooklyn, Pretoria.

Comment on the unit standards should reach SAQA at the address ***below and no later than 21 October 2002.*** All correspondence should be marked **Standards Setting – SGB for Manufacturing and Assembly** and addressed to

The Director: Standards Setting and Development
SAQA
Attention: Mr. D Mphuthing
Postnet Suite 248
Private Bag X06
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pp SAMUEL B.A. ISAACS
EXECUTIVE OFFICER

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

National Diploma in Rubber Technology: NQF Level 5

Field: Manufacturing, engineering and technology

Sub-field: Manufacturing & assembly

Level: 5

Credit: 239

Issue date:

Review date:

Rationale of the qualification:

The rubber manufacturing industry is characterized by a sophisticated manufacturing and assembly process within a competitive and challenging environment. The rubber products produced must meet a wide variety of exacting safety, quality, customer and consumer specifications. The industry has to respond to quality issues and increasing competition in export and domestic markets and ensure the on-going development of new products required by changing customer needs. Within the rubber manufacturing and assembly industry, the rubber technology skills area is concerned with ensuring that all inputs to the manufacturing and assembly process deliver the required quality and quantity of product. People working as rubber technologists require specialized technical skills and knowledge in order to assure that material specifications critical to the manufacturing process are met, quality assurance practices are adhered to during the rubber manufacturing and assembly

process, and processes are in place to adapt to and meet the requirements of the constantly changing products that must be manufactured.

This is one of a series of qualifications for learners who want to follow a career in any industry in which rubber (elastomeric) materials are used.

For those who have been in the workplace for a long time, this qualification represents part of the RPL process to acknowledge workplace skills acquired without the benefit of formal education or training.

The qualification also forms the basis for further development within rubber technology, materials technology and management in the higher education and training band.

Purpose:

The purpose of the qualification is to provide learners, education and training providers and employers with the standards and the range of learning required to work effectively as rubber technologists within the rubber manufacturing and assembly environment and meet the challenges of such an environment.

The chief skills that are recognised in this qualification are the ability to test and analyse rubber materials, components and products, determine requirements for rubber applications, perform auditing activities and manage projects. These skills require an in-depth understanding of rubber manufacturing and assembly processes and applicable rubber chemistry, rubber physics, organic chemistry and mathematical concepts.

Qualified learners will also understand:

- How to maintain and influence relationships in a complex production environment
- How to achieve change
- How to maintain quality specifications to optimise the quality assurance process
- How to work with a range of information sources to optimise performance

Qualifying learners will also be able to support the various policies and procedures related to the safety, health and environmental systems that govern their workplace.

Access to the Qualification:

Open Access

This qualification series recognises skills, knowledge and values relevant to a workplace. It is designed for learners who:

- Have attended courses and then apply the knowledge gained to activities in the workplace
- Are already workers and have acquired the skills and knowledge without attending formal courses
- Are part of a learnership programme, which integrates structured learning, and work experience

Learning assumed to be in place:

This qualification assumes learners have a rubber manufacturing and assembly related qualification at NQF level 4 and the equivalent of physical science at NQF level 4.

If the learner does not already have such a qualification, learning in preparation for this qualification would also have to include:

- Communication, mathematics and physical science at NQF level 4
- An understanding of rubber materials, components and products and their functions
- An understanding of the rubber manufacturing process (stages of and what happens at each stage)
- Concepts of influencing small levels of changes in quality assurance practices
- Dealing with change in relation to procedures that support workplace relationships, procedures, roles and responsibilities

Exit Level Outcomes and Assessment Criteria:

Exit level outcome 1

Demonstrate an understanding of rubber compounding and processing and an ability to conduct investigations for verification purposes, to explain product non-conformances, for product modifications and for new product development

Associated Assessment Criteria

- Experimental design is determined based on evaluation of presented task
- Tests are conducted and reliability of test results confirmed
- Report on findings is generated
- Can respond to and discuss issues related to rubber compounding and physics as they apply to the testing and analysis of rubber materials, components and products

Exit level outcome 2

Demonstrate an ability to determine the requirements for common commercial rubber applications

Associated Assessment Criteria

- Predictions are formulated
- Relevant and appropriate information is collected
- Recommendations are made based on customer requirements
- Customer is satisfied with performance criteria of product in use, recommendations made and cost/quality relationship
- Report is compiled
- Recommendations made are justified with reference to rubber chemistry and physics

Exit level outcome 3

Demonstrate an ability to implement new projects in a rubber manufacturing and assembly process

Associated Assessment Criteria

- Project plan is formulated with performance indicators
- Project is completed
- Feasibility of implementing project results is determined
- Report is generated and applicable persons briefed
- Can respond to and discuss issues related to project management

Exit level outcome 4

Demonstrate an ability to audit materials, components, process performance and final product for compliance with specifications, e.g. policies and procedures, company performance criteria.

Associated Assessment Criteria

- Audit plan is produced
- Affected stakeholders are informed of audit plan
- Audit data is collected and recorded
- Findings are evaluated for conformance / non-conformance to legislation, company policy and procedures
- Findings report is compiled, processed and circulated to affected parties
- Audit findings and suitable recommendations are discussed with affected parties
- Corrective action(s) / improvements made are evaluated, recorded and processed
- Can respond to and discuss issues related to auditing activities

Exit level outcome 5

Demonstrate an ability to coordinate work activities and plan, schedule and arrange work

Associated Assessment Criteria

- Work schedules are met
- Work activities are planned
- Goals set are specific, measurable and achievable and aligned to customer and business needs
- Schedules are developed in consultation with relevant parties and any scheduling conflicts are resolved

Exit level outcome 6

Demonstrate an understanding of options for further learning in this or a related field of learning and preparation requirements for such learning

Associated Assessment Criteria

- Options are explained
- Preparation requirements are explained
- Learning plan is developed

International comparability

This qualification has been designed in response to a need from the rubber manufacturing and assembly industry for persons at NQF level 5 with a particular set of skills. No direct international comparisons were found for this qualification at the equivalent of NQF level 5. However, this qualification articulates into further learning within the higher education band in materials and polymer technology. Such higher level qualifications are found in many countries such as Australia, New Zealand, United Kingdom, the United States and Canada.

Integrated Assessment:

The integrated assessment must be based on a summative assessment guide. The guide will spell out how the assessor will assess different aspects of the performance and will include:

- Observing the learner at work (both in the primary activity as well as other interactions)
- Asking questions and initiating short discussions to test understanding
- Looking at records and reports in the portfolio and reviewing previous assessments

The learner may choose in which language s/he wants to be assessed. This should be established as part of a process of preparing the learner for assessment and familiarising the learner with the approach being taken.

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.

The assessment process should cover both the explicit tasks required for the qualification as well as the understanding of the concepts and principles which underpin the activities and the manufacturing process. The assessment process should also establish how the critical outcomes have been advanced by the learning process.

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.

Articulation possibilities:

The qualification has been designed and structured so that qualifying learners can move from one context to another. Employers or institutions should be able to evaluate the outcomes of this qualification against the needs of their context and structure top-up learning appropriately.
Equally, holders of other qualifications may be evaluated against this qualification for the purpose of RPL.

Moderation Options:

To assure the quality of the assessment process, the moderation should cover one of more of the following:

1. assessor credentials
2. the assessment instrument
3. the assessment process (including preparation and post-assessment feedback)

Where assessment and moderation are taking place in sectors other than the Manufacturing, Engineering and Related Services, assessment and moderation should be in terms of a Memorandum of Understanding negotiated with the MERS ETQA

Criteria for registration of assessors

The following criteria should be applied by the relevant ETQA:

1. Appropriate tertiary 3 year or equivalent qualification in the field of chemistry and physics – with a minimum of 7 years in a rubber manufacturing and assembly environment. The subject matter experience of the assessor can be established by recognition of prior learning.

2. Appropriate experience and understanding of assessment theory, processes and practices
3. Good interpersonal skills and the ability to balance the conflicting requirements of:
   - Maintaining national standards
   - The interests of the learner
   - The need for transformation and redressing the legacies of the past
   - The cultural background and language of the learner
4. Registration as an assessor with the MERS ETQA or any other relevant ETQA
5. Any other criteria required by the MERS ETQA or any other relevant ETQA

National Diploma in Rubber Technology: NQF Level 5

Fundamental			
NLRD	**Title**	**Level**	**Credits**
	Communication		
	Use communication techniques effectively	5	8
	Mathematics		
	Use mathematical and statistical techniques effectively as a rubber technologist	5	34
	Total fundamental		**42**
Core			
NLRD	**Title**	**Level**	**Credits**
	Rubber Technology		
	Test and analyse rubber materials, components and products	5	45
	Determine requirements for rubber applications	5	60
	Perform auditing activities	5	12
	Business skills		
	Implement new projects in a rubber manufacturing and assembly process	5	30
	Quality		
	Optimise the quality assurance system	5	6
	Business relations		
	Maintain business processes	5	10
	People interacting, leading and developing		
9406	Manage a team	5	4
	Total Core		**167**
Elective			
NLRD	**Titles**		**Credits**
	Choice of a minimum of 30 elective credits to be drawn from the following learning areas:		
	• Business management, e.g. purchasing, stock control, accounting		
	• Technical drawing		
	• Mercantile law		
	• Physics		
	Minimum elective credits towards qualification		**30**
	Total for qualification		**239**

National Diploma in Rubber Technology: NQF Level 5

Title	Level	Credits	NLRD ID
Communication			
Use communication techniques effectively	5	8	
Mathematics			
Use mathematical and statistical techniques effectively as a rubber technologist	5	34	
Total fundamental		**42**	

Title	Level	Credits	NLRD ID
Rubber Technology			
Test and analyse rubber materials, components and products	5	45	
Determine requirements for rubber applications	5	60	
Perform auditing activities	5	12	
Business skills			
Implement new projects in a rubber manufacturing and assembly process	5	30	
Quality			
Optimise the quality assurance system	5	6	
Business relations			
Maintain business processes	5	10	
People interacting, leading and developing			
Manage a team	5	4	9406
Total Core		**167**	
Titles		**Credits**	**NLRD ID**
Choice of a minimum of 30 elective credits to be drawn from the following learning areas:			
• Business management, e.g. purchasing, stock control, accounting			
• Technical drawing			
• Mercantile law			
• Physics			
Minimum elective credits towards qualification		**30**	
Total for qualification		**249**	

NATIONAL DIPLOMA IN RUBBER TECHNOLOGY – NQF LEVEL 5

UNIT STANDARDS ON NQF LEVEL 5

FUNDAMENTAL

Title 1 Use mathematical and statistical techniques effectively as a rubber technologist

CORE

Title 1: Test and analyse rubber materials, components and products

Title 2: Determine requirements for rubber applications

Title 3: Perform auditing activities

Title 4: Implement new projects in a rubber manufacturing and assembly process

UNIT STANDARDS AND SPECIFIC OUTCOMES FOR THE NATIONAL DIPLOMA IN RUBBER TECHNOLOGY – NQF LEVEL 5

Title 1: Use mathematical and statistical techniques effectively as a rubber technologist

Specific outcome 1.1: Discuss and explain a range of mathematical and statistical techniques used in the rubber technology field and applicable mathematical and statistical theory

Specific outcome 1.2: Demonstrate an ability to perform basic differentiation and integration of polynomials and logarithms and use mathematics for chemometrics

Specific outcome 1.3: Apply mathematical techniques to:

- Forecast needs
- Determine optimum parameters
- Use and work with formulations
- Quantify productivity gains

Specific outcome 1.4: Perform statistical analyses

Specific outcome 1.5: Perform costing, estimating and budget calculations

Title 2: Test and analyse rubber materials, components and products

Specific outcome 2.1: Evaluate the presented task

Specific outcome 2.2: Determine experimental design

Specific outcome 2.3: Select and/or prepare the required test samples

Specific outcome 2.4: Perform the experiment

Specific outcome 2.5: Analyse and interpret data based on the experiment's objectives

Specific outcome 2.6: Assess the reliability of the test results

Specific outcome 2.7: Report on findings

Specific outcome 2.8: Monitor the implementation of recommendations made

Title 3: Determine requirements for rubber applications

Specific outcome 3.1: Make predictions based on customer requirements

Specific outcome 3.2: Collect appropriate information pertaining to the project needs from a range of data sources

- Communicate cost implications of data collection process to customer prior to starting process and obtain approval

Specific outcome 3.3: Compare the specifications of various possible raw materials with the final application in mind

Specific outcome 3.4: Recommend a particular formulation and processing requirements where appropriate

Specific outcome 3.5: Compile recommendations in a structured report

Specific outcome 3.6: Confirm performance criteria of product in use with customer/consumer and make the necessary adjustments to the recommendations

Specific outcome 3.7: Justify recommendations made with reference to rubber chemistry and physics

Title 4: Perform auditing activities

Specific outcome 4.1: Plan and prepare for the audit process

Specific outcome 4.2: Communicate the audit plan with affected parties

Specific outcome 4.3: Conduct the audit process

Specific outcome 4.4: Interpret and evaluate findings

Specific outcome 4.5: Compile an audit report

Specific outcome 4.6: Report on the audit findings

Specific outcome 4.7: Follow-up and evaluate corrective action(s) / improvements made

Title 5: Implement new projects in a rubber manufacturing and assembly process

Specific outcome 5.1: Determine project requirements

Specific outcome 5.2: Research the availability of local project expertise

Specific outcome 5.3: Select and brief project team

Specific outcome 5.4: Collect project data from a variety of sources

Specific outcome 5.5: Formulate project plan and performance indicators and present plan to affected parties

Specific outcome 5.6: Manage the implementation of the project

Specific outcome 4.7: Sign off project and compile project report

Specific outcome 4.8: Brief applicable persons on way forward

Specific outcome 4.9: Discuss and explain project planning, management and implementation

QUALIFICATIONS

Section A: Layout and Formatting of the Qualification

a) Title

b) Rationale

c) Level, total credits required credits and learning components assigned to the qualification; Minimum credits required at specific levels or maximum credits when these exceed the minima specified in regulation 8 or 9

d) Access to the qualification

e) Field and sub-field of the qualification

f) A statement of the purpose of the qualification.

g) Assumptions of learning already in place before the programmes leading to the qualification are commenced.

h) Exit level outcomes as contemplated in regulation 5(1)(b) and (c) and the associated assessment criteria.

i) International comparability

j) Integrated assessment appropriately incorporated to ensure that the purpose of the qualification is achieved.

k) Recognition of prior learning (RPL)

l) Articulation possibilities with related qualifications (either generic or specific arrangements for articulation).

m) Moderation options including

- Recommendation of a moderating body or bodies
- Criteria for the registration of assessors