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**SOUTH AFRICAN QUALIFICATIONS AUTHORITY (SAQA)**

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

Engineering

registered by Organising Field 06 – Manufacturing, Engineering and Technology, publishes the following Unit Standards for public comment.

This notice contains the titles, fields, sub-fields, NQF levels, credits, and purposes of the Unit Standards. The full Unit Standards can be accessed via the SAQA web-site at www.saqg.org.za. Copies may also be obtained from the Directorate for Standards Setting and Development at the SAQA offices, SAQA House, 1067 Arcadia Street, Hatfield, Pretoria.

Comment on the Unit Standards should reach SAQA at the address ***below and no later than 4 May 2009***. All correspondence should be marked **Standards Setting – SGB – Engineering** addressed to

The Director: Standards Setting and Development
SAQA

Attention: Mr. E. Brown

Postnet Suite 248

Private Bag X06

Waterkloof

0145

or faxed to 012 – 431-5144

e-mail: ebrown@saqa.org.za


P.P. **D. MPHUTHING**

ACTING DIRECTOR: STANDARDS SETTING AND DEVELOPMENT



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:***Conduct an energy audit***

SAQA US ID		UNIT STANDARD TITLE	
263896		Conduct an energy audit	
ORIGINATOR		PROVIDER	
SGB Engineering			
FIELD		SUBFIELD	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 6	10

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1

Explain the context in which energy audits are carried out.

SPECIFIC OUTCOME 2

Explain good energy practise in building operations.

SPECIFIC OUTCOME 3

Define a systems approach to energy auditing.

SPECIFIC OUTCOME 4

Define the energy audit.

SPECIFIC OUTCOME 5

Plan and implement an energy audit.

SPECIFIC OUTCOME 6

Conduct the audit.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

None



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:***Evaluate and apply heat recovery systems***

SAQA US ID		UNIT STANDARD TITLE	
263897		Evaluate and apply heat recovery systems	
ORIGINATOR		PROVIDER	
SGB Engineering			
FIELD		SUBFIELD	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 6	7

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1

Explain and apply the waste heat recovery process.

SPECIFIC OUTCOME 2

Describe and apply waste recovery equipment.

SPECIFIC OUTCOME 3

Identify and quantify energy management opportunities.

SPECIFIC OUTCOME 4

Identify and apply energy management opportunities.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

None



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:*Develop a plan to enable energy savings*

SAQA US ID		UNIT STANDARD TITLE	
263898		Develop a plan to enable energy savings	
ORIGINATOR		PROVIDER	
SGB Engineering			
FIELD		SUBFIELD	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 6	15

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1

Define the project and its scope.

SPECIFIC OUTCOME 2

Conduct a project feasibility study.

SPECIFIC OUTCOME 3

Develop an energy balance.

SPECIFIC OUTCOME 4

Conduct an energy audit.

SPECIFIC OUTCOME 5

Implement project and monitor energy savings.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

None



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate understanding of energy metering and tariffs

SAQA US ID	UNIT STANDARD TITLE		
263900	Demonstrate understanding of energy metering and tariffs		
ORIGINATOR	PROVIDER		
SGB Engineering			
FIELD	SUBFIELD		
6 - Manufacturing, Engineering and Technology	Engineering and Related Design		
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 5	13

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1

Describe the energy management process.

SPECIFIC OUTCOME 2

Record and process energy data.

SPECIFIC OUTCOME 3

Conduct a plant energy survey.

SPECIFIC OUTCOME 4

Perform meter checks.

SPECIFIC OUTCOME 5

Evaluate electricity tariffs.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

None



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:*Develop an energy management policy within an organisational structure*

SAQA US ID		UNIT STANDARD TITLE	
263902		Develop an energy management policy within an organisational structure	
ORIGINATOR		PROVIDER	
SGB Engineering			
FIELD		SUBFIELD	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 6	7

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1

Define the rationale for energy management.

SPECIFIC OUTCOME 2

Develop an effective energy policy.

SPECIFIC OUTCOME 3

Develop an organisational structure for energy management.

SPECIFIC OUTCOME 4

Empower staff for effective energy management.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

None



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:**Analyse energy consumption data**

SAQA US ID		UNIT STANDARD TITLE	
263905		Analyse energy consumption data	
ORIGINATOR		PROVIDER	
SGB Engineering			
FIELD		SUBFIELD	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 6	15

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1

Collect and measure energy consumption data.

SPECIFIC OUTCOME 2

Analyse energy tariffs.

SPECIFIC OUTCOME 3

Analyse the demand profile.

SPECIFIC OUTCOME 4

Analyse an electrical load inventory.

SPECIFIC OUTCOME 5

Analyse a thermal load inventory.

SPECIFIC OUTCOME 6

Identify and select instrumentation for energy audits.

SPECIFIC OUTCOME 7

Calculate energy density.

SPECIFIC OUTCOME 8

Assess costs and benefits.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

None



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:***Demonstrate understanding of the basic principles of energy***

SAQA US ID	UNIT STANDARD TITLE		
263906	Demonstrate understanding of the basic principles of energy		
ORIGINATOR	PROVIDER		
SGB Engineering			
FIELD	SUBFIELD		
6 - Manufacturing, Engineering and Technology	Engineering and Related Design		
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 5	7

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1

Explain energy in its various forms.

SPECIFIC OUTCOME 2

Describe the units of energy.

SPECIFIC OUTCOME 3

Explain the basic principles of electricity.

SPECIFIC OUTCOME 4

Apply thermal energy principles.

SPECIFIC OUTCOME 5

Apply the principles of heat transfer.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

None



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:*Develop the business case for energy management opportunities*

SAQA US ID	UNIT STANDARD TITLE		
263909	Develop the business case for energy management opportunities		
ORIGINATOR	PROVIDER		
SGB Engineering			
FIELD	SUBFIELD		
6 - Manufacturing, Engineering and Technology	Engineering and Related Design		
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 5	4

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1

Build the business case for energy management investments.

SPECIFIC OUTCOME 2

Build the business case for financing energy management.

SPECIFIC OUTCOME 3

Apply the services of Energy Performance Contracts and ESCOs.

SPECIFIC OUTCOME 4

Manage Clean Development Mechanism projects.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

None



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Evaluate industrial insulation systems and make recommendations to improve efficiency

SAQA US ID	UNIT STANDARD TITLE		
263910	Evaluate industrial insulation systems and make recommendations to improve efficiency		
ORIGINATOR	PROVIDER		
SGB Engineering			
FIELD	SUBFIELD		
6 - Manufacturing, Engineering and Technology	Engineering and Related Design		
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 6	5

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1

Develop an understanding of heat transfer fundamentals.

SPECIFIC OUTCOME 2

Evaluate insulation systems.

SPECIFIC OUTCOME 3

Identify, apply and quantify energy management opportunities.

SPECIFIC OUTCOME 4

Use tables and graphs effectively.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

None



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Evaluate refrigeration and heat pump performance efficiency

SAQA US ID	UNIT STANDARD TITLE		
263914	Evaluate refrigeration and heat pump performance efficiency		
ORIGINATOR	PROVIDER		
SGB Engineering			
FIELD	SUBFIELD		
6 - Manufacturing, Engineering and Technology	Engineering and Related Design		
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 6	7

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1

Interpret the fundamentals of refrigeration.

SPECIFIC OUTCOME 2

Describe the operation of refrigeration system components.

SPECIFIC OUTCOME 3

Describe ways in which the refrigeration system is applied.

SPECIFIC OUTCOME 4

Identify and apply energy management opportunities.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

None



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:***Evaluate steam generation and distribution systems for efficiency***

SAQA US ID		UNIT STANDARD TITLE	
263915		Evaluate steam generation and distribution systems for efficiency	
ORIGINATOR		PROVIDER	
SGB Engineering			
FIELD		SUBFIELD	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 6	7

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1

Define the principles of steam generation and steam tables.

SPECIFIC OUTCOME 2

Describe boiler house operation.

SPECIFIC OUTCOME 3

Evaluate the components of a steam distribution system.

SPECIFIC OUTCOME 4

Identify and apply energy management opportunities.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

None



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Apply electrical fundamentals to implement energy saving initiatives

SAQA US ID	UNIT STANDARD TITLE		
263916	Apply electrical fundamentals to implement energy saving initiatives		
ORIGINATOR		PROVIDER	
SGB Engineering			
FIELD		SUBFIELD	
6 - Manufacturing, Engineering and Technology		Engineering and Related Design	
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 6	7

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1

Explain the electrical fundamentals applicable to industry.

SPECIFIC OUTCOME 2

Explain the principles of three phase systems.

SPECIFIC OUTCOME 3

Analyse and correct power factor.

SPECIFIC OUTCOME 4

Analyse and implement demand management.

SPECIFIC OUTCOME 5

Determine the energy losses of electric motors.

SPECIFIC OUTCOME 6

Apply electric motor energy management.

SPECIFIC OUTCOME 7

Evaluate lighting systems and introduce energy management opportunities.

SPECIFIC OUTCOME 8

Implement energy saving initiatives.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

None



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Implement energy efficiency in building systems

SAQA US ID	UNIT STANDARD TITLE		
263917	Implement energy efficiency in building systems		
ORIGINATOR	PROVIDER		
SGB Engineering			
FIELD	SUBFIELD		
6 - Manufacturing, Engineering and Technology	Engineering and Related Design		
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 6	20

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1

Explain buildings as an energy system.

SPECIFIC OUTCOME 2

Assess energy efficiency in the building envelope.

SPECIFIC OUTCOME 3

Determine energy efficient lighting requirements.

SPECIFIC OUTCOME 4

Identify and select energy efficient equipment.

SPECIFIC OUTCOME 5

Determine requirements for efficient use of motor drives and driven equipment.

SPECIFIC OUTCOME 6

Analyse efficiency in heating, ventilation and air conditioning systems.

SPECIFIC OUTCOME 7

Implement efficient building control systems.

SPECIFIC OUTCOME 8

Determine the potential for energy saving through the efficient use of water.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

None



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Apply energy management methodologies to fans and pumps

SAQA US ID	UNIT STANDARD TITLE		
263934	Apply energy management methodologies to fans and pumps		
ORIGINATOR	PROVIDER		
SGB Engineering			
FIELD	SUBFIELD		
6 - Manufacturing, Engineering and Technology	Engineering and Related Design		
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 6	7

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1

Define and explain fan operating principles.

SPECIFIC OUTCOME 2

Analyse fan performance.

SPECIFIC OUTCOME 3

Identify fan energy management opportunities.

SPECIFIC OUTCOME 4

Explain pump operating principles.

SPECIFIC OUTCOME 5

Identify pump energy management opportunities.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

None



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Evaluate compressed air performance efficiency

SAQA US ID	UNIT STANDARD TITLE		
263935	Evaluate compressed air performance efficiency		
ORIGINATOR	PROVIDER		
SGB Engineering			
FIELD	SUBFIELD		
6 - Manufacturing, Engineering and Technology	Engineering and Related Design		
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 6	7

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1

Describe the fundamentals of compressed air systems.

SPECIFIC OUTCOME 2

Identify energy conservation opportunities and measures.

SPECIFIC OUTCOME 3

Analyse the demand profile.

SPECIFIC OUTCOME 4

Analyse an electrical load inventory.

SPECIFIC OUTCOME 5

Analyse a thermal load inventory.

SPECIFIC OUTCOME 6

Identify and select instrumentation for energy audits.

SPECIFIC OUTCOME 7

Analyse data.

SPECIFIC OUTCOME 8

Assess costs and benefits.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

None



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Evaluate fuel fired equipment performance efficiency

SAQA US ID	UNIT STANDARD TITLE		
263954	Evaluate fuel fired equipment performance efficiency		
ORIGINATOR	PROVIDER		
SGB Engineering			
FIELD	SUBFIELD		
6 - Manufacturing, Engineering and Technology	Engineering and Related Design		
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 6	7

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1

Evaluate the properties of fuels.

SPECIFIC OUTCOME 2

Explain the combustion process and its fundamentals.

SPECIFIC OUTCOME 3

Describe air pollution control and fuel fired equipment applications.

SPECIFIC OUTCOME 4

Identify and apply energy management opportunities.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

None