Eskom	Standard	Technology

Title: **Qualification, Certification and Accreditation Requirements for Personnel and Entities Performing Welding Related Work on Eskom Plant Standard**

Unique Identifier:	**240-56246601**
Alternative Reference Number:	**36-505**
Area of Applicability:	**Engineering**
Documentation Type:	**Standard**
Revision:	**2**
Total Pages:	**13**
Next Review Date:	**November 2017**
Disclosure Classification:	**CONTROLLED DISCLOSURE**

APPROVED FOR AUTHORISATION
☑ TECHNOLOGY ENGINEERING
DOCUMENT CENTRE ☎ X4962

Compiled by	Functionally Responsible	Authorised by
D. Govender	M. Maroga	Dr T. Mathe
Senior Engineer	Boiler CoE Manager Pressure Parts	Power Plant Senior Manager
Date: 2014/11/11	Date: 11/11/2014	Date: 12/11/2014

Supported by SCOT/SC/TC

M. Maroga

Morris Maroga

Materials, Welding and NDT SC Chairperson

Date: 11/11/2014

PCM Reference: **240-53459108**

SCOT Study Committee Number/Name: **Materials, Welding and NDT Study Committee**

CONTENTS

Page

1. INTRODUCTION 3

2. SUPPORTING CLAUSES 3

2.1 SCOPE 3
2.1.1 Purpose 3
2.1.2 Applicability 3
2.2 NORMATIVE/INFORMATIVE REFERENCES 3
2.2.1 Normative 3
2.2.2 Informative 4
2.3 DEFINITIONS 4
2.3.1 Classification 4
2.4 ABBREVIATIONS 4
2.5 ROLES AND RESPONSIBILITIES 5
2.6 PROCESS FOR MONITORING 5
2.7 RELATED/SUPPORTING DOCUMENTS 5

3. PERSONNEL PERFORMING WELDING RELATED ACTIVITIES 5

3.1 WELDERS 5
3.1.1 Construction Code Qualification 5
3.1.2 International Welder (IW) Qualification 5
3.2 WELDING COORDINATOR 5
3.3 WELDING SUPERVISOR 7
3.4 WELDING INSPECTOR 8
3.5 WELDING INSTRUCTOR 9
3.6 SENIOR WELDING INSTRUCTOR/HEAD OF WELDING SCHOOL 10
3.7 HEAT TREATMENT TECHNICIANS 10
3.7.1 SAIW Heat Treatment Practitioner 10
3.7.2 Eskom Approved Training 10

4. ENTITIES PERFORMING WELDING AND WELDING RELATED ACTIVITIES 11

4.1 TRAINING SCHOOL FACILITIES 11
4.2 WELDING PERSONNEL TRAINING FACILITIES 11
4.3 RECOGNITION OF PRIOR LEARNING 12
4.4 COMPANY ACCREDITATION – ISO 3834 12

5. AUTHORISATION 12

6. REVISIONS 13

7. DEVELOPMENT TEAM 13

8. ACKNOWLEDGEMENTS 13

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

1. INTRODUCTION

Welding is a special process, which requires the coordination of welding operations in order to establish confidence in welded components and reliable performance in service. The minimum tasks and responsibilities of personnel involved in welding related activities (e.g. planning, executing, supervising and inspection) is defined in this standard. The standard also prescribes the minimum qualification, certification and/or accreditation requirements for personnel and companies performing welding and welding related activities on Eskom plant.

2. SUPPORTING CLAUSES

2.1 SCOPE

This standard is applicable when procuring, reviewing and placement of erection, maintenance and repair contracts for welding and related activities on Eskom plant. The standard also covers the manufacturing and fabrication of equipment or components for Eskom plant.

2.1.1 Purpose

The purpose of this standard is to clearly define the minimum qualification, certification, education and accreditation requirements for personnel and entities performing welding related work on Eskom plant.

2.1.2 Applicability

This document shall apply throughout Eskom Holdings Limited Divisions.

2.2 NORMATIVE/INFORMATIVE REFERENCES

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

2.2.1 Normative

[1] IIW document: IAB-252R2-14, Minimum requirements for the education, training, examination and qualification - Personnel with responsibility for welding coordination

[2] IIW document IAB-089r5-14, Minimum requirements for the education, training, examination and qualification - International Welder

[3] IIW document IAB-041r3-08, Minimum requirements for the education, training, examination and qualification; International Welding Inspection Personnel.

[4] BS EN ISO 3834, Quality requirements for fusion welding of metallic materials

[5] BS EN ISO 14731, Welding Coordination – Tasks and responsibilities.

[6] BS EN ISO 9606, Qualification testing of welders — Fusion welding

[7] ASME Boiler and Pressure Vessel Code - Section IX.

[8] SANS 10269, Welding of thermoplastics — Testing and approval of welders.

[9] 240-77196678 - Heat treatment of welded components standard

[10] 240-72273656, Power generation asset criticality classification standard

[11] 240-56241933 - Control of Plant Construction Repair and Maintenance Welding Activities Standard.

[12] 240-56355225 - Welding of High Pressure and Temperature Tube and Pipework Standard.

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

[13] 240-56241639 - Construction and Repair Welding of Primary Air, Induced and Forced Draught Fans

2.2.2 Informative

None.

2.3 DEFINITIONS

Health and Safety Standard

As defined in the Occupational Health and Safety Standard used within South Africa.

2.3.1 Classification

Controlled Disclosure: Controlled Disclosure to External Parties (either enforced by law, or discretionary).

2.4 ABBREVIATIONS

Abbreviation	Description
AIA	Approved Inspection Authority
ANB	Approved National Body in accordance with IIW
ASME	American Society of Mechanical Engineers
ATB	Approved Training Body in accordance with IIW
BS	British Standard
ECSA	Engineering Council of South Africa
EN	Norme Européenne /Europäische Norm,
IIW	International Institute of Welding
ISO	International Organization for Standardization
IWE	International Welding Engineer registered with IIW
IWP	International Welding Practitioner registered with IIW
IWS	International Welding Specialist registered with IIW
IWT	International Welding Technologist registered with IIW
NCR	Non Conformance Record
NDT	Non Destructive Testing
PQR	Procedure Qualification Record
PWHT	Post Weld Heat Treatment
QCP	Quality Control Plan
RPL	Recognition of prior learning
SAIW	Southern African Institute of Welding
SAQA	South African Qualification Authority
WPQR	Welding Procedure Qualification Record
WPS	Welding Procedure Specification
WQR	Welder Qualification Record

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

2.5 ROLES AND RESPONSIBILITIES

It is the responsibility of all contractors conducting welding related actives, to implement the requirements detailed in this standard.

Eskom shall conduct periodic audits to ensure contractor compliance to these requirements.

2.6 PROCESS FOR MONITORING

The implementation of this standard will be monitored by the Welding Coordinators (Eskom and Contractor).

2.7 RELATED/SUPPORTING DOCUMENTS

None.

3. PERSONNEL PERFORMING WELDING RELATED ACTIVITIES

The authorization for the following tasks and responsibilities for each site, project and manufacturing shall be accorded to the person in writing and accepted by signature. Appointment shall be made via the relevant managers and/or the Eskom Welding Care Group delegate.

Any qualification, other than that required within this standard, from another country/entity that is considered to be equivalent shall be evaluated by the Eskom Welding Care Group for relevance and/or use.

3.1 WELDERS

3.1.1 Construction Code Qualification

Welders and welding operators working on Eskom plant shall be qualified in accordance with the latest applicable health and safety standard.

3.1.2 International Welder (IW) Qualification

1) In addition to the mandatory qualifications required in section 3.1.1 above, welders working on Eskom levels one and two plant shall have at least one of the following requirements and only conduct welding for the type of welding qualified e.g. tube welding shall require an International Tube Welder qualification for the specific welding process being used.
    - International Tube Welder.
    - International Plate Welder.
    - International Fillet Welder.

This welder training shall be based on IIW documents IAB-089r5-14 Parts 1 and 2.

3.2 WELDING COORDINATOR

Welding coordinators shall have one of the following minimum requirements for education, examination and qualification:

- International Welding Engineer (IWE) in line with IIW document IAB-252R2-14.
- International Welding Technologist (IWT) in line with IIW document IAB-252R2-14.

In addition the Welding Engineer/Technologist shall be registered with ECSA as professional engineer/technologist

CONTROLLED DISCLOSURE
When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

The minimum tasks and responsibilities assigned to the welding coordinator shall be as follows:

- Review the product standard to be used, together with any supplementary requirements.
- Ensure that all welding and related activities are performed in accordance with all applicable Eskom standards.
- Maintain a register of all WPS's and WPQR's and maintain their validity.
- Identify need for new WPS's and arrange compilation and qualification.
- Welding problem investigation.
- Provide technical advice to supervisory and inspection staff.
- Ensure all welders performing welding operations are correctly qualified to the applicable code.
- Maintain and update a register of welder's qualifications using a separate identification number for each welder.
- Review and approve all quality control plans related to welding activities.
- Select the appropriate WPS and qualified welder for each welding operation.
- Ensure conformance to approved WPS's for all welding operations.
- Coordinate training of welders to meet site/workshop specific conditions.
- Coordinate refresher training programs for welders and arrange requalification tests.
- Test new welders.
- Ensure that all welding work is inspected by competent and qualified personnel.
- Maintain appropriate records of all welding work.
- Review and approve all heat treatment procedures prior to heat treatment commencing.
- Witness the execution of WQR activities if qualification activities are not witnessed by AIA.
- Witness the execution of WPQR activities if qualification activities are not witnessed by AIA.
- Approval of WPQR.
- Verify that the information on the WPS accurately reflects the parameters reported on the WPQR before use on Eskom equipment/plant.
- Review the capacity of the site, project or manufacturer to meet the prescribed welding requirements.
- Enforce BS EN ISO 3834 philosophies and practices, as required.
- Conduct regular audits to ensure that welding management systems are operating correctly.
- Investigate any welding activity that could affect Eskom plant in a detrimental way.
- Compile and implement repair procedures.
- Enforce and maintain all legislative requirements related to welding.
- Specify welding sequences, should it be necessary.
- Technical review of:
  - The parent material(s) specification and welded joint properties.
  - The joint location with relation to the design requirements.
  - Quality and acceptance requirements for welds.
  - The location, accessibility and sequence of welds, including accessibility for inspection and non-destructive testing.
  - Other welding requirements, e.g. batch testing of consumables, ferrite content of weld metal, ageing, hydrogen content, permanent backing, use of peening, surface finish, weld profile.
  - The dimensions and details of joint preparation and completed weld.
- Review the suitability of any sub-contractor for intended welding operations.

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

- Review the compatibility, delivery conditions, storage and handling of welding consumables
- Review materials for:
  - Any supplementary requirements in the material purchasing specifications.
  - The storage and handling of parent material.
  - Traceability.

3.3 WELDING SUPERVISOR

Welding supervisors shall have at least one of the following minimum requirements for education, examination and qualification:

- International Welding Specialist (IWS) in line with IIW document IAB-252R2-14
- International Welding Practitioner (IWP) in line with IIW document IAB-252R2-14

The minimum tasks and responsibilities assigned to the welding supervisor shall be as follows:

- Plan, organise and control the work load of welders.
- Exercise general control over all welders and welding operations.
- Ensure conformance to approved WPS's for all welding operations.
- Ensure that the environment is conducive to welding.
- Ensure all welders welding in his/her area of responsibility are correctly qualified to execute the work assigned to them.
- Train welders to meet site/workshop conditions.
- Exercise control of materials and consumables for welding operations in accordance with the applicable codes and standards.
- Ensure the correct handling and storage of all welding consumables in accordance with the applicable codes and standards.
- Ensure that all consumables used conform to the relevant WPS used.
- Supervise all heat treatment processes.
- Ensure all equipment used in welding operations is calibrated in accordance with the applicable requirements.
- Ensure that all welding equipment is adequately maintained and the maintenance records are kept updated.
- Control of equipment as follows:
  - The suitability of welding associated equipment.
  - Auxiliaries and equipment supply, identification and handling.
  - Personal protective equipment and other safety equipment directly associated with the applicable welding process.
  - Equipment verification and validation.
- Execute effective production planning as follows:
  - The allocation of qualified personnel.
  - Plan for adequate equipment for preheating and post-heat treatment, including temperature indicators and power sources.
  - The arrangement for any production test.
  - Evaluate the issuing and use of work instructions.

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

Ensure identification and traceability as follows:

- The identification of production plans.
- The identification of routing cards.
- The identification of weld locations in construction.
- The identification of the location of repairs.
- The identification of the location of temporary attachments.
- Traceability for fully mechanized and automatic welding units to specific welds.
- Traceability of welder and welding operators to specific welds.
- Traceability of welding procedure specifications to specific welds.

3.4 WELDING INSPECTOR

Welding inspectors shall have the following minimum requirements for education, examination and qualification.

Minimum requirements for welding inspection on Eskom level 1 and 2 plant:

- SAIW Welding and Fabrication Inspector Level 2.

Minimum requirements for welding inspection on Eskom level 3 Eskom plant:

- SAIW Welding and Fabrication Inspector Level I.

The minimum tasks and responsibilities assigned to the welding inspector shall be as follows:

Inspection and testing before welding:

- The validity of welders' and welding operators' qualification certificates.
- The validity of the welding procedure specification.
- Verification of parent material identity by correlation of hard stamping and/or related product markings to parent material certificates.
- The identity and traceability of welding consumables.
- Verification of joint preparation (e.g. shape and dimensions), in relation to that specified in the design, drawing and/or WPS.
- Fit-up, jigging and tacking.
- Any special requirements in the welding procedures specification (e.g. prevention of distortion).
- The suitability of working conditions for welding, including environment.
- The calibration and validity of measuring, inspection and testing equipment.
- Confirming the training/competency of heat treatment technicians as per section 3.7 below.
- Review of quality control plans for completeness and relevance to the intended scope of work.
- Correct storage of welding consumables.
- The identification and traceability of the welding consumables (e.g. designation, trade name, manufacturer of consumables and batch or cast numbers).
- The identification and traceability of parent material (e.g. type, cast number).
- Review of NDT procedures to be used.
- Review of NDT technician certifications and qualifications in line with Eskom requirements.
- Compilation of weld maps.

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

- Review of relevant drawings to ensure welding compliance to design requirements.

Inspection and testing during welding:

- Verification of essential welding parameters (e.g. welding current, arc voltage and travel speed), as defined in the approved WPS.
- Verification and control of preheating/inter-pass temperatures as defined in the approved WPS.
- The cleaning of runs and layers of weld metal.
- Back gouging.
- The welding sequence as defined in the approved WPS.
- The correct use and handling of welding consumables.
- Control of distortion.
- Any intermediate examination (e.g. checking dimensions).
- Updating of quality control plan.

Inspection and testing after welding:

- Visual inspection (for completeness of welding, weld dimensions, shape).
- The use of correct NDT processes as per the quality control plan.
- The use of correct destructive testing processes as per the quality control plan.
- The form, shape, tolerance and dimensions of the construction against the acceptance criteria detailed in the quality control plan.
- The results and records of post-operations (e.g. post-weld heat treatment, ageing), as per the quality control plan.
- Verification by inspection that Post-Weld Heat Treatment (PWHT) activities are being performed in accordance with the specification/s, as per the quality control plan.
- Issuing of Non-Conformance and Corrective Actions.
- Ensure that the necessary measures and actions (e.g. weld repairs, re-assessment of repaired welds, corrective actions) are implemented.
- Ensure that all quality records including data book are prepared and maintained as per applicable specification.

It should be noted that Eskom is currently planning the implementation of an Eskom specific Welding Inspectors course, which will become mandatory for all Welding Inspectors working on Eskom plant. The implementation methodology and applicability will be detailed in the next revision of this standard.

3.5 WELDING INSTRUCTOR

Welding instructors shall have the following minimum requirements for education, examination and qualification:

For practical training:

- International Welding Practitioner (IWP) in line with IIW document IAB-252R2-14.

For theoretical training:

- International Welding Specialist (IWS) in line with document IAB-252R2-14.

The minimum tasks and responsibilities assigned to the welding instructor are as follows:

- Present Welder Training (both theory and practical).

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

- Maintain Welding Facilities and Equipment.
- Facilitating the Training needs analysis.
- Administer the practical training of the trainees.
- Administer the on-job training of the trainees.

3.6 SENIOR WELDING INSTRUCTOR/HEAD OF WELDING SCHOOL

Courses leading to IIW qualifications are closely related to industrial practice, and it is essential for teaching staff to have continuing contact with industry. With this in mind teaching staff need to combine the following elements:

- Teaching ability – evidence of training in lecturing, public speaking or verbal communication.
- Competence in the subjects being taught.
- Knowledge and experience of current industrial practice in the subjects being taught.
- Practical skills in the demonstration of welding practice.

Senior Welding Instructor/Head of Welding School shall have one of the following as the minimum requirements for education, examination and qualification:

- International Welding Engineer (IWE) in line with document IAB-252R2-14.
- International Welding Technologist (IWT) in line with document IAB-252R2-14.
- International Welding Specialist (IWS) in line with document IAB-252R2-14.

The minimum tasks and responsibilities assigned to the welding training specialist are as follows:

- Supervise the welding training staff.
- Conduct learner assessments.
- Develop training material and programs.
- Administer the assessments and examinations in line with International Institute of Welding requirements.
- Administer the testing of trainees.
- Execute continuous assessment of the training programs to ensure relevance and effectiveness.
- Updating of the syllabus as required.
- Maintain the current industrial best practice.

3.7 HEAT TREATMENT TECHNICIANS

Heat treatment technicians shall meet at least one the following minimum requirements for education, examination and qualification:

3.7.1 SAIW Heat Treatment Practitioner

The heat treatment technician shall have successfully completed this training course via the SAIW.

3.7.2 Eskom Approved Training

The technician shall have successfully completed an Eskom approved training course by his/her employer.

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

Heat treatment service providers intending to provide such training to their technicians shall have their training programmes reviewed and approved by the Eskom Welding and Materials Care Groups. Heat treatment companies shall apply to the chairman of the Welding Care Group to facilitate such approvals.

The minimum tasks of the heat treatment technician are as follows:

- Compilation of the heat treatment method statements.
- Review of applicable design/construction/repair codes and standards to ensure compliance.
- Selection of appropriate heat treatment equipment for use.
- Verification of equipment calibration.
- Set up of heat treatment equipment.
- Execution of heat treatment in accordance with approved method statement.
- Verification of minimum requirements by signing of the heat treatment chart and QCP's at critical intervention points.
- Compilation of all records pertinent to the heat treatment process.
- Execute heat treatment activities in accordance with Eskom's standard, 240-77196678 – "Heat treatment of welded components"

4. ENTITIES PERFORMING WELDING AND WELDING RELATED ACTIVITIES

4.1 TRAINING SCHOOL FACILITIES

The ATB shall provide an appropriate complement of teaching staff which has, collectively, the knowledge and skills necessary to deliver the course in an effective manner. The number of such staff shall be sufficient to ensure that the essential specialist knowledge and industrial experience to cover the syllabus is adequately represented in the team of teachers and visiting lecturers. In order to effectively deliver the course, one instructor is required for each 10 trainees.

The facilities should be clean, well lit and comfortable. For practical work each student should have ample bench space and good access to test specimens. Classrooms should have adequate desks or tables, and be equipped with suitable teaching aids, such as blackboards, overhead projectors, closed circuit television, slide projectors and video equipment, as appropriate to the course.

The lectures must be supported by good quality visual aids, for example: slides, physical samples and/or videos.

The ATB shall maintain a reference library of key material available to students for background study. This library shall include a comprehensive collection of standards relevant to welding.

A full set of good quality course notes should be maintained in order to ensure consistency between courses and in the event of any change of staff. Lectures should be supported by good quality handbooks issued to students containing key information for reference.

A final examination to assess student performance, in accordance with the relevant IIW guideline will be conducted by a Board of Examiners appointed by the Governing Board of the ANB. This examination is mandatory, and is independent of any assessment procedure conducted by the ATB.

4.2 WELDING PERSONNEL TRAINING FACILITIES

The training facilities for all welding personnel shall be accredited by IIW and use the IIW training programme as the basis for its training and qualification programme.

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

4.3 RECOGNITION OF PRIOR LEARNING

Eskom is moving towards standardisation of welding coordination activities, based on IIW standards and qualifications.

With this, Eskom is cognisant of the fact that the following will transpire:

1) There will be a significant shift in skills development of the welding personnel within the industry and country.
2) There will be selected experienced personnel that may not be able to achieve these requirements due to age, literacy, numerous etc.

In an effect to facilitate a smooth transition from the previous education, training, examination and qualification requirements, Eskom will consider an RPL approach for those personnel of significant age and experience and where there is no plausible method for them to achieve the requirements set out in this standard.

The RPL process will only be considered for exceptional cases and will be based on the RPL objectives specified by SAQA, SAIW and/or IIW as applicable.

Should there be a need to apply the RPL approach to any one of the minimum education, training, examination and qualification requirements detailed above, the contractor shall make a formal application to the Eskom Welding Care Group. This will be considered by Eskom in conjunction with the relevant training authorities.

The following minimum information shall form part of the RPL application, per individual:

- Years of related experience.
- Detailed Performance record/s eg. Weld repair rate records, specific to material type, position, type of welding etc. for welders.
- Results of a gap analysis on relevant skills shortfall (numeracy, literacy etc.).
- Proof of highest education level obtained.
- Proof of related training received during the individual's career.
- Detailed proposal on how to implement the RPL process for the specific skill.

4.4 COMPANY ACCREDITATION – ISO 3834

All companies performing welding related activities on Eskom plant shall have accreditation to ISO 3834 as follows.

Equipment Group	Minimum Quality Level	Type
Eskom Level 1 Plant	IS0 3834 Part 2	Comprehensive
Eskom Level 2 Plant	IS0 3834 Part 3	Standard
Eskom Level 3 Plant	IS0 3834 Part 4	Elementary

5. AUTHORISATION

This document has been seen and accepted by:

Name & Surname	Designation
Christine Schutte	Engineer
Dhiraj Bhimma	Senior Manager (PEIC)
Leslie Too	Senior Advisor

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.

Name & Surname	Designation
Mark Digby	NDT Level III Specialist
Russel Tarr	Senior Consultant: Fleet Technology
Thobeka Pete	Chief Engineer
Tinus Keyser	Chief Engineer Mechanical
Werner Smit	Chief Engineer

6. REVISIONS

Date	Rev.	Compiler	Remarks
September 2011	0.0	M.M. Maroga	This is a new document.
December 2011	0.1	M.M. Maroga	First Revision for Review Comments.
February 2012	0.2	M.M. Maroga	Final Revision updated.
May 2013	0.3	N, Chabula	Assigned new 240 number.
October 2014	1	D Govender	Revised as part of Welding Rule Book revision exercise.
September 2014	1.2	D Govender	Draft Document for Comments Review
November 2014	2	D Govender	Final Document for Authorisation and Publication

7. DEVELOPMENT TEAM

The following people were involved in the development of this document:

- Philip Doubell
- Hennie Coetzer
- Michael Mkize
- Nanda Chabula
- Papy Mwilambwe
- Sma Msomi
- Morongwa Mogale
- Jan Volschenk
- Eliza Dlamini
- Prenola Naidoo
- Phathu Nemakhavhani
- Marcel Rabie
- Devilliers Moll

8. ACKNOWLEDGEMENTS

- SAIW
- IIW

CONTROLLED DISCLOSURE

When downloaded from the EDMS, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the system.