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1. Introduction

The primary purpose of fire detection system (FDS) is to provide early fire warning and to notify the Operators and the Fire Station in case of a fire event. The secondary purpose of the FDS is to initiate fire safety functions which are intended to extinguish fire and prevent fire from spreading to other areas.
There are different fire detection technologies at Kendal Power Station. The main Aritech fire system monitors over 3200 points throughout the station and consists of 9 Panels, 1 Global and 1 Local Repeater. These points consist of Switch Monitors (Water and Air Pressure switches), Zone Monitors (Spindles and Conventional detectors - Optical and Ionization) and Detectors {Addressable Ionization and Optical). The existing fire detection systems include the VESDA (Very Early Smoke Detection Alarm) system, Crowcon Gas Monitoring Unit, Linear Heat Detection System, Optical Beam Detectors and the Infrared Camera System. The fire detection system to be maintained is located at Unit 1 to 6 and Outside Plant.

2. Supporting Clauses

2.1 Scope

The scope for the contractor is to maintain and ensure availability of the fire detection and suppression systems at Kendal Power Station.

2.1.1 Purpose

The purpose of this document is to clearly state the work that the contractor must comply to and deliver once the contract is placed.

2.1.2 Applicability

This document shall apply to all affected parties at Kendal Power Station and the selected supplier.

The document is effective from the date of authorisation.

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] ISO 9001 Quality Management Systems

[2] Requirement of Department of Labour – Compliance with OHSA, SAQCC (Fire) registered

[3] SANS 10139: Fire Detection and Alarm Systems for Buildings – System Design, Installation and Servicing.

[4] SANS 10400: National Building Regulations

[5] SANS 246: Code of Practice for Fire Protection for Electronic Equipment Installations

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[6] SANS 369-1: Code of Practice for the Operation of Fire Protection Measures – Part 1: Electrical Actuation of Gaseous Total Flooding Extinguishing Systems

[7] NFPA 72: National Fire Alarm and Signalling Code

2.2.2 Informative

[1] 240-56536505- Hazardous location standard

[2] ISO 5725-2:1994 Accuracy (trueness and precision) of measurement methods and results. Basic methods for the determination of repeatability and reproducibility of a standard measurement method

[3] ISO 5725-3:1994 Accuracy (trueness and precision) of measurement methods and results. Intermediate measures of the precision of a standard measurement method

[4] ISO 5725-4:1994 Accuracy (trueness and precision) of measurement methods and results. Basic methods for the determination of the trueness of a standard measurement method

[5] ISO 5725-5:1998 Accuracy (trueness and precision) of measurement methods and results Alternative methods for the determination of the precision of a standard measurement method

[6] ISO 5725-6:1994 Accuracy (trueness and precision) of measurement methods and results. Use in practice of accuracy values

[7] ISO 8995:2002 Lighting of workplaces

[8] ISO 9000:2000 Quality management systems

[9] ISO 9000-1:1994 Quality management and quality assurance standards. Guidelines for selection and use

[10] ISO 9000-2:1997 Quality management and quality assurance standards. Generic guidelines for the application of ISO 9001, ISO 9002 and ISO 9003

[11] ISO 9000-3:1997 Quality management and quality assurance standards. Guidelines for the application of ISO 9001:1994 to the development, supply, installation and maintenance of computer software

[12] ISO 9001:1994 Quality systems. Model for quality assurance in design, development, production, installation and servicing

[13] ISO 9001:2000 Quality management systems. Requirements

[14] ISO 9001:2000 Quality management systems. Requirements

[15] ISO 9002:1994 Quality systems. Model for quality assurance in production, installation and servicing

[16] ISO 9003:1994 Quality systems. Model for quality assurance in final inspection and test

[17] ISO 9004:2000 Quality management systems. Guidelines for performance improvements

[18] ISO 10005:1995 Quality management. Guidelines for quality plans

[19] ISO 10006:2003 Quality management systems. Guidelines for quality management in projects

[20] ISO 10007:2003 Quality management systems. Guidelines for configuration management

[21] ISO 10012:2003 Measurement management systems. Requirements for measurement processes and measuring equipment

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[22] ISO 10015:1999 Quality management. Guidelines for training

[23] ISO 14001:1996 Environmental management systems. Specification with guidance for use

[24] ISO 14004:1996 Environmental management systems. General guidelines on principles, systems and supporting techniques Definitions

[25] SANS 10139: Fire Detection and Alarm Systems for Buildings – System Design, Installation and Servicing

[26] SANS 10400: National Building Regulations

[27] SANS 246: Code of Practice for Fire Protection for Electronic Equipment Installations

[28] SANS 369-1: Code of Practice for the Operation of Fire Protection Measures – Part 1: Electrical Actuation of Gaseous Total Flooding Extinguishing Systems

[29] SANS 1411-5: Materials of Insulated Electric Cables and Flexible Cords Part 5: Halogen-free, Flame-retardant Materials

[30] SANS 50054-2: Fire Detection and Fire Alarm Systems – Part 2: Control and Indicating Equipment

[31] SANS 50054-3: Fire Detection and Fire Alarm Systems – Part 3: Fire Alarm Devices Sounders

[32] SANS 50054-4: Fire Detection and Fire Alarm Systems – Part 4: Power Supply Equipment

[33] SANS 50054-5: Fire Detection and Fire Alarm Systems – Part 5: Heat Detectors – Point Detectors

[34] SANS 50054-7: Fire Detection and Fire Alarm Systems – Part 7: Smoke Detectors – Point Detectors Using Scattered Light, Transmitted Light or Ionization

[35] SANS 50054-10: Fire Detection and Fire Alarm Systems – Part 10: Flame Detectors – Point Detectors

[36] SANS 50054-11: Fire Detection and Fire Alarm Systems – Part 11: Manual Call Points

[37] SANS 50054-12 Fire Detection and Fire Alarm Systems – Part 12: Smoke Detectors – Light Detectors using an Optical Beam

[38] SANS 50054-15: Fire Detection and Fire Alarm Systems – Part 15: Multi-sensor Detectors

[39] SANS 50054-20: Fire Detection and Fire Alarm Systems – Part 20: Aspirating Smoke Detectors

[40] SANS 50200: Method of Test for Resistance to Fire for Unprotected Small Cables for Use in Emergency Circuits

[41] SANS 60079-10: Electrical Apparatus for Explosive Gas Atmospheres

[42] SANS 60849: Sound Systems for Emergency Purposes

[43] SANS 10108: The Classification of Hazardous Locations and the Selection of Equipment for Use in Such Locations

[44] SANS 10142: South African Code of Practice for all Low Voltage Wiring within Buildings

[45] NFPA 72: National Fire Alarm and Signalling Code

[46] NFPA: 850 Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations

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[47] EN 54-18: Fire Detection and Fire Alarm Systems Part 18: Input / Output Devices
[48] EN 54-22: Part 22 Fire Detection and Fire Alarm Systems: Line Type Heat Detectors
[49] EN 54-23: Fire Detection and Fire Alarm System: Fire Alarm Devices – Visual Alarm Devices
[50] IEC 60529: IP Rating (Ingress Protection)
[51] IEC 61000-4-1: Basic EMC Publication
[52] IEC 61000-4-2: Electrostatic Discharge Immunity Test
[53] IEC 61000-4-3: Radiated, Radiofrequency, Electromagnetic Field Immunity Test
[54] IEC 61000-4-4: Electrical Fast Transient/burst Immunity Test
[55] IEC 61000-4-5: Surge Immunity Test
[56] IEC 61000-4-6: Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields
[57] IEC 61000-4-8: Power Frequency Magnetic Field Immunity Test
[58] IEC 61000-4-11: Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests
[59] IEC 62040-1: Uninterruptible Power System (UPS) – Part 1: General and Safety Requirements for UPS

2.3 Abbreviations

Table 1: Abbreviation

Abbreviation	Explanation
C&I	Control and Instrumentation
ECM	Engineering Change Management
FDIA	Fire Detection Installers Association
FDS	Fire Detection System
HVAC	Heating, Ventilation and Air Conditioning
LAN	Liquid Crystal Display
LED	Light Emitting Diode
LHDC	Linear heat detection Cable
MCP	Manual Call Point
NFPA	National Fire Protection Association

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OEM	Original Equipment Manufacturer
OPCR	Outside Plant Control Room
PM	Preventative Maintenance / Proactive Maintenance
SANS	South African National Standard
SAQCC	South African Qualification and Certification Committee for the Industry

2.4 Roles and Responsibilities

2.4.1 C&I Engineering

Responsible for:

- Compiling Scope of work and technical evaluation criteria
- Conducting quality checks
- Reviewing and accepting the report from the contractor after the execution of the works

2.4.2 C&I Maintenance

Responsible for:

- Supervising the execution of the works and ensuring that the contractor works safe at all times.
- Making arrangements with Operating for the availability of the plant for the work to be performed.
- Applying and taking of permit to work for the works.

2.5 Process for Monitoring / Operating

Responsible for:

- Ensuring proper isolations are done prior to working in the plant where required
- Ensuring that the plant is available upon notification of the intent to execute the work
- Testing of the plant after the work has been executed and
- Accepting and returning the plant to operation.

2.6 Related/Supporting Documents

Not Applicable

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3. Scope of work and requirements

3.1 Specification and Description of the Services

The Contractor shall perform Maintenance Work and minor system modifications as required on the Fire Detection and Gas Suppression Systems. Personnel servicing the fire detection system must have a valid certification with SAQCC (Fire). The certification must be valid for the duration of the contract (five years). Maintenance personnel must be Original Equipment Manufacturer (OEM) trained on all the systems under fire detection and gas suppression systems onsite.

Two Servicemen registered with SAQCC are required for maintenance of the fire detection and gas suppression systems. Both authorised personnel shall be permanently based on site for the duration of the contract.

3.1.1 The Contractor shall carry out the following duties amongst others:

- Execute all weekly PMs (planned maintenance) on the fire detection and gas suppression systems. SAQCC certified Servicemen are required to be onsite when weekly PMs are executed.
- Execute all monthly PMs (planned maintenance) on the fire detection and gas suppression systems.
- Repair any faults on the fire detection and gas suppression systems. SAQCC certified Servicemen are required to be onsite when weekly PMs are executed.
- Replace pressure and flow switches on the interface between fire detection and protection systems as and when required.
- Replace gas cylinders as and when required (Pyroshield, Inergen, CO2).
- Conduct monthly inspections and testing on the fire detection and gas suppression systems.
- Download event log of the fire detection system from all fire alarm panels on a weekly basis and submit a weekly report on the system health performance.
- Compile and submit a monthly report on the fire detection and gas suppression system health performance. This report must indicate the number of faults, alarms and defects on the system and how the faults were fixed, a user-friendly spreadsheet with trends/ graphs is preferred.
- Perform annual testing and inspection on all fire detection systems onsite and produce a detailed report indicating the systems that were tested, testing procedure used, test results and recommendations on how to fix the faults if there are any.
- Test the functionality of the interface between fire detection system and gas suppression system (annually and when required) and produce a detailed report.
- Test the functionality of the interface between the fire detection system and HVAC system (annually and when required) and produce a detailed report.
- Response to all callouts is one (1) hour.
- Keep an event logbook for the fire detection system in accordance with SANS 10139.

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- Conduct a Two (2) yearly testing, calibration and certification of pressure switches and gauges on all interfaces between fire detection and protection systems. Calibration and testing of pressure switches and gauges shall also be conducted as and when required
- Modify panels/junction boxes when required.
- Ensure that all fire detection and gas suppression systems are always functioning correctly.
- Ensure that the fire detection and gas suppression systems are always available.
- Clean and calibrate detectors as and when required.
- Test at least one MCP point per week. (location of the MCP point tested must be recorded in the logbook)

3.1.2 All spares shall be supplied by the Employer. Should the employer run out of spares, the contractor may supply the immediate/emergency spares to always keep the fire system active.

NOTE: Eskom shall supply consumables when needed and permission for the contractor to supply immediate spares must be granted by the employer prior to each spare to be supplied.

3.1.3 All testing and programming equipment or tools to be supplied by the Contractor and will remain as Eskom assets after the contract has expired.

3.1.4 The Contractor shall fulfil all legal and insurance requirements with regards to the fire detection and gas suppression system maintenance.

3.1.5 The Contractor shall adhere to normal working hours daily (for two labourers who will be permanently based on site).

NOTE: No work shall be done without a permit.

3.1.6 The Contractor shall complete all PMs on the fire detection and gas suppression systems and react immediately to and rectify faults on any of the fire detection and gas suppression systems.

3.1.7 **The Contractor shall assist other departments with the execution of additional PMs requiring multi-disciplines, e.g., Mechanical Department (HVAC/Fire Protection), Operating Department and Fire Station.**

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3.1.8 The Contractor shall maintain and update system drawings and liaise with System Engineer with regards to any changes made on the fire detection and gas suppression systems. Engineering Change Management (ECM) process shall be followed for any changes made to the fire detection and gas suppression systems.

3.1.9 The Contractor must have at least two workers who are authorized for FDS Plant Safety Regulations to enable the Contractor/ worker to take out a permit to work. Safety file needs to be completed and submitted to the Safety Department prior to conducting any work onsite.

3.1.10 The Contractor shall assist in all internal and external Eskom and insurance audits on the fire systems as deemed necessary.

3.1.11 The Contractor must have all necessary test equipment and programmers for individual systems.

3.1.12 The Contractor must have their own transport (vehicle) to access remote areas around the station.

3.1.13 The Contractor shall adhere to all Fire Detection System Lawful Requirements and comply to the latest standards and code of practice governing fire detection and gas suppression systems, most importantly:

- Requirement of Department of Labour – Compliance with OHSA, SAQCC (Fire) registered
- SANS 10139: Fire Detection and Alarm Systems for Buildings – System Design, Installation and Servicing
- SANS 10400: National Building Regulations
- SANS 246: Code of Practice for Fire Protection for Electronic Equipment Installations
- SANS 369-1: Code of Practice for the Operation of Fire Protection Measures – Part 1: Electrical Actuation of Gaseous Total Flooding Extinguishing Systems
- NFPA 72: National Fire Alarm and Signalling Code

3.1.14 Registration of authorized persons: Two areas of responsibility is required with various levels to ensure compliance with SANS 10139 and Eskom regulations:

- Fire Detection, SAQCC Certification Level – Servicemen.
- Actuation of gas suppression system Level – Servicemen.

3.1.15 List of Fire Detection and Gas Suppression Systems installed at Kendal Power Station:

- Aritech FP2000 (11 Panels with +/- 3000 detection points) – Weekly PMs (Unit 1-6 and Outside Plant)
- VESDA System (Unit 1 -6): Unit Equipment Rooms – Monthly PMs

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- Linear Heat Detection System (Unit 1 - 6): Generator/Turbine Exciters/ BFPs – Monthly PMs
- Hydrogen Gas Crowcon (x1): Main Hydrogen Plant – 6 Monthly PMs
- Pyroshield System (x12): Unit Equipment Rooms/ SSB Document Centre/ SSB Archives/ Simulator/ Library/ IT Server Room – Monthly PMs
- Enviro-shield System (x1): Zone "E" stores – Monthly PMs
- CO2 System (x6): Unit Gen/Turbine exciters – Monthly PMs

3.1.16 Maintenance, Testing and Inspection of the Fire Detection and Gas Suppression Systems shall be conducted in accordance with SANS 10139&369 and Eskom RBO Strategy for Fire Detection and Gas Suppression Systems. The Contractor shall also refer to the recommended OEM strategy. Amendments to the Maintenance Strategy shall be made based on valid reason(s) substantiating the change is provided by the Contractor or Employer. Execution/ implementation of these changes can only be made post to the Employer's formal agreement.

3.1.17 Annual testing of the fire detection system:

- Each component or device on the fire detection system shall be tested at least once a year according to the statutory requirements on the fire detection system.
- Testing of the interface between the fire detection system and HVAC (fire dampers) and fire protection systems to ensure correct of external interfaces.
- Annual testing of the fire detection system may be carried out over the course of two or more services during a 12-month period.
- The Contractor shall refer to the Procedure for Testing and Inspection of the Fire Detection System (*1030596).

3.1.18 Unplanned Site Visits Due to Breakdowns:

- In case of a fault/failure/breakdown of the analyser(s), the Contractor shall be available to rectify the problem on site.
- The Contractor shall be onsite within 24 hours after the Employer have notified the Contractor of the problem.
- These visits will only be made use when the Employer requires services from the Contractor out of normal working hours.

3.1.19 Allowable Downtime:

- The Contractor shall ensure that the system is available 100% of the time.
- The Contractor shall ensure that all the faults/defects on the system are fixed within 24 hours. The Contractor must report all the faults on the system by following the Eskom process of loading defects and by making use of a logbook as per SANS 10139.

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3.1.20 Participation of Employer's Personnel

- Maintenance Contract Supervisor shall be appointed by the Employer to oversee the maintenance of the fire detection and gas suppression systems.
- It is the responsibility of the Employer to ensure that the Maintenance Site Supervisor is present during the maintenance work.

3.1.21 Pre-Work Procedure

Upon arrival onsite, the Contractor shall report to the C&I Workshop Supervisor and C&I Engineer. During each service or maintenance intervention, the Contractor shall work under a Permit to Work (PTW). The PTW for each Kendal unit must be applied for by the C&I Workshop representative in the respective unit control rooms or Electrical Operating Department (EOD). The PTW will be taken out on the day before the day of the service. Prior to conducting maintenance, testing and inspection on the fire detection system, the following actions must be completed:

(a) Conduct a risk assessment.

(b) Advise Local Control Operator of the work that you are about to do.

(c) Obtain Permit to Work.

(d) Check the Global Panel in EOD for any faults and alarms.

(e) Record all the faults and alarms before proceeding with the tests.

(f) Download and save the event log for comparison of smoke readings during normal operation.

(g) Isolate any Plant or Systems as necessary prior to initiating fire alarm system (i.e. gas suppression systems).

(h) Pre-plan requires multi-disciplinary teams.

Please note that incorrect procedures may result in activation of gas suppression systems and/or deluge systems.

> **NOTE:** In accordance with the latest revision of the Eskom Plant Safety Regulation GGR 0992, a Risk Assessment and Pre-Work Check List must be completed before any work commences, all other relevant documentation as per the Plant Safety Regulation GGR 0992 must also be completed. All Documentation forms for Kendal Power Station can be obtained from your supervisor. The forms must be completed in duplicate. If the Paperwork is not correct or in place do not do the work. Additional information can be obtained from your Legislative Administrator.

3.1.22 Post Service Feedback and Reporting

- After each service, the Contractor shall report back to the C&I Workshop Supervisor and C&I Engineer on the status of the fire detection system and gas suppression system checks, findings, repairs as well as points of concern if applicable.

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- The Contractor shall handover the original log sheets to the C&I Workshop Supervisor. The log sheets must be signed off by the Contractor and C&I Workshop Supervisor or any C&I Workshop representative.
- The Contractor shall submit a report to the C&I Workshop Supervisor after every month providing all relevant details on the services provided and system health performance.

3.1.23 Contractor shall adhere to Eskom Safety, Health and Environmental Requirements.

3.1.24 All the work conducted by the Contractor shall be done under the supervision of Eskom personnel.

3.1.25 The following shall also be supplied provided as part of the scope:

- Plant and Equipment
- Mechanical Works
- Rigging
- Scaffolding

NOTE: The Contract shall be for a duration of 5 years.

3.2 Title to Site Materials

The Project Manager/Supervisor must approve all materials and spares supplied by the Contractor.

3.2.1 Spares

- The Kendal Power Station Store contains spares mainly for the Aritech fire system. Should the Contractor require spare components during the service, the Contractor shall draw out the relevant component from the store with the assistance of the Employer's C&I Maintenance personnel.
- If the Contractor requires a spare component that is not a stock item in the Store, then it is the responsibility of the Contractor to supply the spare component and bill the Employer for the component.
- Tools and Equipment Required

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Table 2: Tools and Equipment Required

Quantity	Description	Size
30	Aerosol test gas	
4	Aerosol CO test gas	
4	Heat detector tester	
1	Extension pole and Gas holder	
1	Panel key	
2	Head screwdriver (for filter replacement)	"1" (length 90 mm minimum)
2	Head screwdriver (for removing detector covers)	"2"
1	Allen key	
1	Hand held programmer (for aspirating systems)	
1	Vacum cleaner	
1	Air compressor	
1	Fire Alarm Logbook	
4	2 Way Radios	
1	Ladder	

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3.3 Drawings / Documentation

Figure 1 below shows an overview of the entire Aritech Fire Detection System at Kendal Power Station. Other drawings/ documentation for the system shall be provided by the Employer upon request.

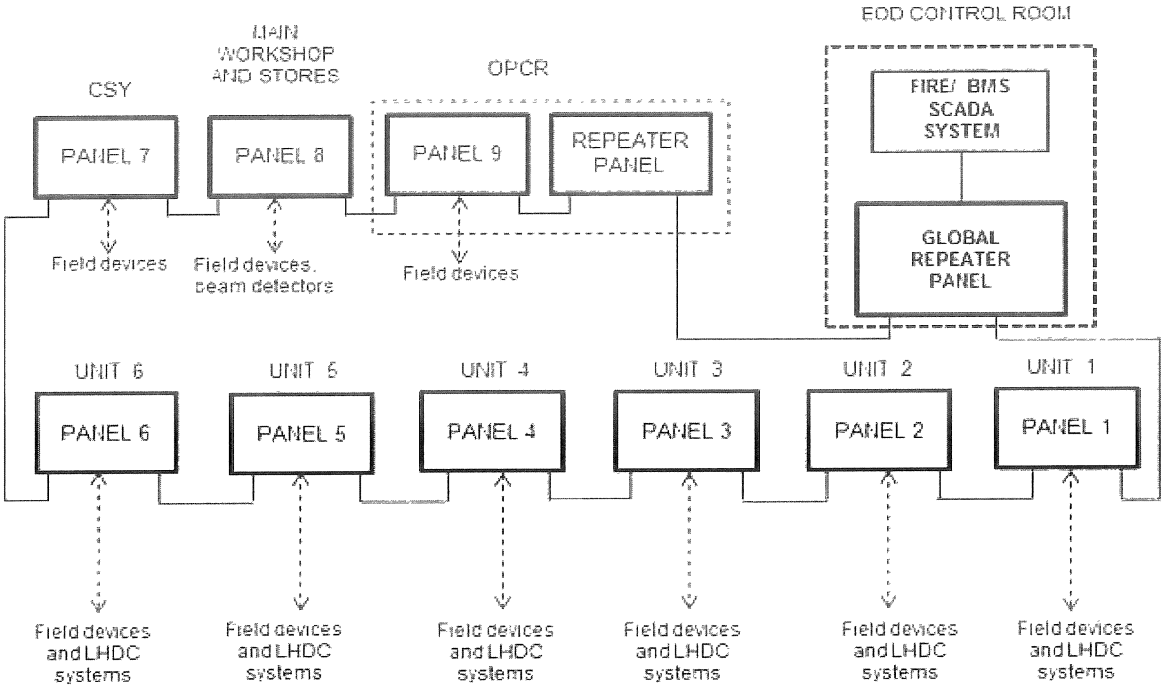


Figure 1: Kendal FDS Architecture (main Aritech fire system)

3.4 Working hours

The contractor shall be on site as per the following working ours:

- Monday-Thursday 07h15 – 16h30
- Fridays 07h15 – 12h15
- Standby (after working hours – 1 hour response time)

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4. Revisions

Date	Rev.	Compiler	Remarks
06/06/2023	1.0	K.C. Ngcobo	Scope of work
01/10/2026	1.1	K.C. Ngcobo	Scope of work

5. Development Team

- Langa Ngcobo
- Sazi Jele
- Thaba Mathebe
- Angie Motlatla

6. Acknowledgements

Not Applicable

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