Eskom	Scope of Work	Engineering

Title: **Maintenance of Hazardous locations and Earth Mat Systems**

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.....	.....	.....
Elliot Mamba	**Andile Nqayane**	**Maila Mamoleka**
System Engineer	Electrical Engineering Manager	Engineering Manager
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CONTENTS

Page

1. INTRODUCTION

The Occupational Health and Safety Act enjoin employers to be committed in providing safe and healthy working conditions for its employees.

In terms of the Occupational Health and Safety Act 85 of 1993 (OHS Act), Electrical Machinery Regulation Section 9, all equipment installed in hazardous (flammable liquid and dust) locations shall comply with the minimum requirements of the relevant standards.

A hazardous location is regarded as different to other locations due to the possibility of explosions, fire or damage to plant and injuries to people due to electrical sparks, flammable gases, dust, vapours or mists, fibres suspended in the air, lighting, and heat generated in conductors and equipment, static power, friction and generation of toxic or explosive gasses.

There are several areas that are deemed to be hazardous locations at Duvha Power Station. These locations consist of electrical installation that requires to be maintain in compliance with the requirements of SANS 10108 and OHS Act 85.

A Contractor is required to conduct Identification, Classification, Selection, Installation, and Maintenance of Hazardous Locations at Duvha Power Station. Perform earth mat tests to all Duvha Plant Systems include but not limited to Hazardous locations.

A Contractor is also required to Contractor to provide trainings to Duvha employees working for Engineering, Maintenance and Operating Departments.

2. SUPPORTING CLAUSES

2.1 SCOPE

The scope of this document captures the requirements as stated in the OHS Act, Electrical Machinery Regulations Section 9, regarding electrical machinery in hazardous locations for Eskom Holdings.

The Contractor conducts Identification, Classification, Selection, Installation, and Maintenance of Hazardous Locations at Duvha Power Station. Compile, submit and present professional report to Duvha Hazloc Committee.

The Contractor conducts Earth math continuity tests for all Electrical systems installed in units 1 to 6 and the outside plants including but not limited the substations. Compile, submit and present the professional report to Electrical Engineering.

2.1.1 Purpose

The aim of the document is to define scope of work for Identification, Classification, Selection, Installation, and Maintenance of Hazardous Locations at Duvha Power Station.

Conduct Earth Mat test to meet the safety requirements and rgulations

2.1.2 Applicability

This document shall apply to Duvha Power Station.

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] Occupational Health and Safety Act 85 of 1993, Electrical Regulations 9

[2] SANS 10086-1 The installation, inspection and maintenance of equipment used in explosive atmospheres Part 1: Installations including surface installations on mines

[3] SANS 10087-3 The handling, storage, distribution and maintenance of liquefied petroleum gas in domestic, commercial, and industrial installations Part 3: Liquefied petroleum gas installations involving storage vessels of individual water capacity exceeding 500 L

[4] SANS 10089-3 The petroleum industry Part 3: The installation, modification, and decommissioning of underground storage tanks, pumps/dispensers and pipework at service stations and consumer installations

[5] SANS 10108 The classification of hazardous locations and the selection of equipment for use in such locations

[6] SANS 10142-1 The wiring of premises Part1: Low Voltage Installations

[7] SANS 10142-2 The wiring of premises Part 2: Medium – Voltage installations above 11kV AC not exceeding 22 kV AC and up to and including 3 MVA installed capacity

[8] SANS 60079-0 Explosive atmospheres - Part 0: Equipment - General requirements

[9] SANS 60079-10-1 Explosive atmospheres Part 10-1: Classification of areas - Explosive gas atmospheres

[10] SANS 60079-10-2 Explosive atmospheres Part 10-2: Classification of areas - Combustible dust atmospheres

[11] SANS 60079-14 Explosive atmospheres Part 14: Electrical installations design, selection and erection

[12] SANS 60079-17 Explosive atmospheres Part 17: Electrical installations inspection and maintenance

[13] SANS 60079-19 Explosive atmospheres - Part 19: Equipment repair, overhaul and reclamation

[14] 240-103031952 Application of Certificate of Compliance (CoC) and Safety Clearance Certificate on Electrical Installations in Generating Power Plant Work Instruction

[15] 240-76619615 Classification of Battery Rooms Procedure

[16] 36-681 Generation Plant Safety Regulations

2.2.2 Informative

[17] 240-56536505: Hazardous Locations Standard

[18] ISO 9001 Quality Management System

[19] ISO 18001 Occupational Health & Safety Management System

[20] ISO 14001 Environmental Health & Safety Management System

[21] 240-53114026 Project Engineering Change Management Procedure

[22] 240-53114002 Engineering Change Management Procedure

[23] 240-53113685 Design Review Procedure

[24] 240-72100555 The Engineering Management Framework and Operating Model Guideline

[25] SANS 1020 Power-operated dispensing devices for flammable liquid fuels

[26] SANS 10086-3 The installation, inspection and maintenance of equipment used in explosive atmospheres Part 3: Repair and overhaul of equipment

[27] SANS 10087-1 The handling, storage, distribution and maintenance of liquefied petroleum gas in domestic, commercial, and industrial installations Part 1: Liquefied petroleum gas installations involving gas storage containers of individual water capacity not exceeding 500 L and a combined water capacity not exceeding 3 000 L per installation

[28] SANS 10087-8 The handling, storage, distribution and maintenance of liquefied petroleum gas in domestic, commercial and industrial installations Part 8: Filling containers for LP gas operated fork lift vehicles in-situ

[29] SANS 10123 The control of undesirable static electricity

[30] SANS 10199 Reduction of explosion hazards presented by electrical equipment - Segregation, ventilation and pressurization

2.2.3 Disclosure Classification

Controlled disclosure: controlled disclosure to external parties (either enforced by law, or discretionary).

2.1 ABBREVIATIONS

Abbreviation	Description
A	Accountable
AC	Alternating Current
BU	Business Unit
C	Consulted
CoC	Certificate of Compliance
CoE	Centre of Excellence
DMR	Department of Mineral Resources
DoL	Department of Labour
FRF	Fire Resistant Fluid
HAZLOC	Hazardous Locations
I	Informed
IEC	International Electro technical Commission
kPa	Kilo Pascal
kV	Kilo Volt
LEL	Lower Explosive Limit
LPG	Liquid Petroleum Gas
MIE	Master Installation Electrician
MVA	Mega Volt Amp
O & M	Operating and Maintenance
OHS Act	Occupational Health and Safety Act 85 of 1993
PLCM	Project Life Cycle Model
R	Responsible
UEL	Upper Explosive Limit

2.2 DEFINITIONS

Definition	Description
Certificate of Compliance	a) A certificate with unique number obtainable from the chief inspector, or a person appointed by the chief inspector, in the form Annexure1 of Electrical Installation Regulation, and issued by registered person in respect to an electrical installation or part of an electrical installation. b) A certificate of compliance issued under Electrical Installation Regulations, 1992.
Competent Person According to SANS 10108	The definition of "Competent Person" as per SANS 10108 [5] reads as follows: Person who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.
Explosive Atmosphere	Mixture with air, under atmospheric conditions, of flammable substances in the form of gas or vapour or mist or dust or fibre (or a combination of these) in which, after ignition, combustion spreads throughout the whole mixture. **Note –** Although a mixture which has a concentration above the upper explosive limit (UEL) is not an explosive gas atmosphere, it can readily become so and, in certain cases for area classification purposes, it is advisable to consider it as an explosive gas atmosphere.
Explosive Limits	**Lower explosive limit (LEL)** – The concentration of flammable gas or vapour in air below which the gas atmosphere is not explosive. **Upper explosive limit (UEL)** – The concentration of flammable gas or vapour in air above which the gas atmosphere is not explosive.
Flammable Gas or Vapour	Gas or vapour which, when mixed with air in certain proportions, will form an explosive gas atmosphere.
Flammable Liquid	A liquid capable of producing a flammable vapour under any foreseeable operating conditions.
Flammable Material	A material which is flammable of itself, or is capable of producing a flammable gas, vapour or mist.
Flammable Mist	Droplets of flammable liquid, dispersed in air so as to form an explosive atmosphere

Hazardous Location / Area (dust)	Area in which combustible dust, in the form of a cloud is present, or may be expected to be present, in quantities such as to require special precautions for the construction, installation and use of equipment NOTE 1 - Hazardous areas are divided into zones based upon the frequency and duration of the occurrence of explosive dust atmospheres. NOTE 2 - The potential of creating an explosive dust cloud from a dust layer also needs to be considered.
Hazardous Location / Area (on account of explosive gas atmospheres)	An area in which an explosive gas atmosphere is or may be expected to be present, in quantities such as to require special precautions for the construction, installation and use of equipment.
Ignition Source	Any part or process that is able to cause an ignition of an explosive atmosphere.
Employer	Duvha Power Station – Electrical and Maintenance Department.
Contractor	A company that is appointed to implement this Scope of Work.

2.3 ROLES AND RESPONSIBILITIES

Role	**Key Differentiators**	**Definition**
Engineering Practitioner	deliver according to design quality assurance, project from construction to finalisation	engineering team and participates in conjunction with other team members of all disciplines in order to assure the technical integrity of a fully functional and operational plant that meets the user requirement and Eskom Engineering expectations and requirements. The Site Construction Engineering role is a key link to facilitate and ensure that the plant, is built and commissioned, is fully aligned with the Design Base, Operating Technical Specifications and the Maintenance Base. The role provides an assurance function.
O&M Engineering	Production focused, incident investigations, advisory role, direct interface with O & M, ensure the asset is operated and maintained within the design base, identify deficiencies within the production place.	The primary role is to review and ensure that the asset is operated and maintained within the design base. i.e. the assets are operated and maintained in line with the OTS and maintenance base to ensure the technical integrity of the asset. He/she shall comply with Engineering strategies, policies and standards. The engineering role will

		define the requirements for plant design changes and do design when authorised to do so. The engineering role will play a leading role in Plant Occurrences and incident investigations. The engineering role also plays a key role updating the technical plan and asset life cycle plan.
GMR2 / Compliance Management	Appointed	The GMR2 of each Eskom site is accountable for the compliance to the Electrical Machinery Regulations, Section 9 with regards to documentation, inspection, testing and maintenance of electrical equipment in hazardous locations on existing sites.
Risk and Assurance Manager	Appointed	The Risk and Assurance Manager of each Eskom site is accountable to ensure all administrative aspects required by the OHS Act is in place and available.
MIE	Appointed	The appointed MIE for the BU is accountable to issue COC's for all applicable areas at the BU. Verification of all HAZLOC areas must also be done.
Hazardous Location Committee and Chairperson	Appointed and BU based	The Hazloc committee mainly focuses on: □ Verification of all Hazloc areas. □ Compile files for each Hazloc area with all relevant records and information (which includes demarcation drawings) □ Review Statutory PM's on SAP for Visual Inspection Close Inspection and Detailed inspections (2 yearly inspections) The Hazardous Locations Committee and Chairperson make recommendations, in the best interests of the BU, on items in accordance with the Electrical Machinery Regulations 9 of the Act for Electrical Machinery in Hazardous Locations. Ensuring that in addition to the Electrical Machinery Regulation all applicable sections of Plant Safety Regulations, Electrical Installation Regulation, applicable Eskom and applicable SANS are complied with.
Electrical Maintenance	Appointed and BU based	Manage and supervise implementation and execution of this scope of work.

3. SCOPE OF WORK

3.1 GENERAL

The OHS Act [1] states that no person may use electrical machinery in locations where there is a danger of a fire or explosion owing to the presence, manufacturing, handling or storage of flammable gas, vapours or dust unless the locations where the flammable gas, vapours or dust are classified in accordance with SANS 10108 [5] and the electrical equipment installed in these locations complies with the classification of the locations.

In South Africa, the following legislation and authorities are responsible for the control of hazardous locations:

a) the Mine Health and Safety Act, 1996 (Act No. 29 of 1996), administered by the Chief Inspector of Mines, of the Department of Mineral Resources and Department of Energy;

b) the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993), administered by the Chief Inspector of Occupational Health and Safety, of the Department of Labour;

c) the Explosives Act, 2003 (Act No. 15 of 2003), administered by the Chief Inspector of Explosives, of the Department of Labour.

For Eskom the OHS Act is applicable and SANS 10086-1 [2] gives an overview of the requirements to be complied with in terms of the relevant national legislation for installations in explosive atmospheres.

Earth math continuity tests must be conducted in all Electrical systems installed in units 1 to 6 and the outside plants including but not limited the substations. Inspection must be conducted, coorective actions be taken and tests report be saved and stored.

Requirements in Accordance with the Relevant National Legislation

This Eskom standard will document the 5 steps as indicated in Figure 1 to guide all persons responsible for the specification, design, construction, commissioning, operating, maintenance and modification of electrical equipment in areas classified as hazardous locations. The hazardous location steps shall be followed for any new plant, additions to plant, changes or modification to existing plant areas that could be a possible hazardous area.

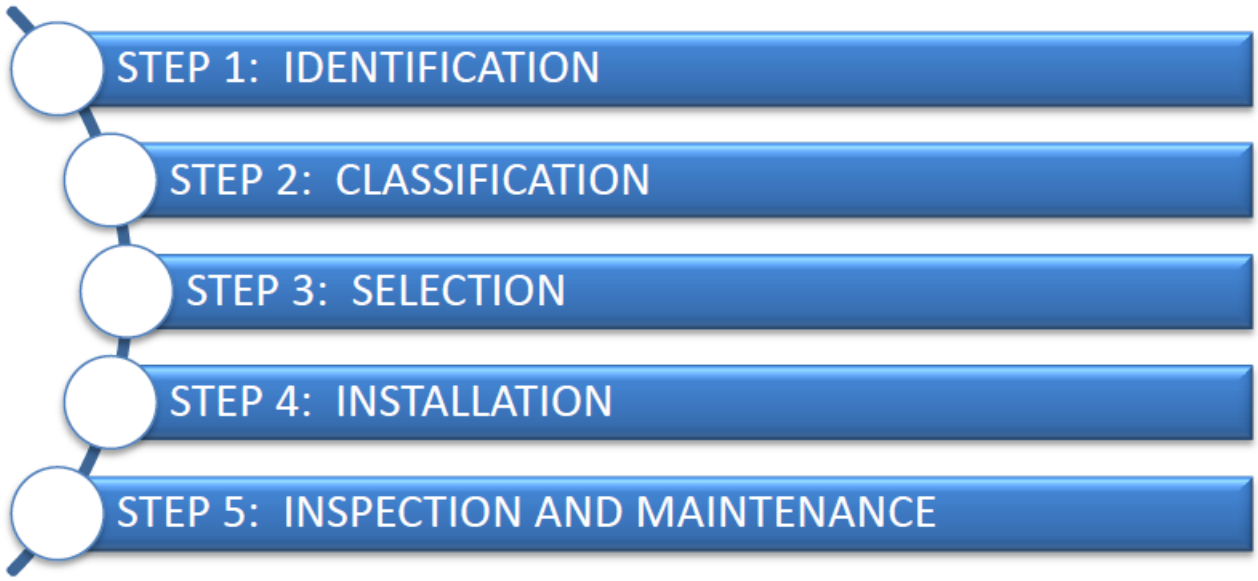

Figure 1: HAZLOC Steps

The Contractor conducts Identification, Classification, Selection, Installation, and Maintenance of Hazardous Locations at Duvha Power Station.

The Contractor Conduct yearly earth mat tests in all Duvha Plant systems include but not limited to Hazardous locations. Provid, present and submit protectional report to Electrical Engineering Duvha Hazloc committee.

The Contractor provides all tool(s), equipment, material(s) and spare(s) required to execute and implement the tasks and responsibilities detailed in this document.

The Contractor supplies and delivers spares required for the repairs or installation. The Contractor will then be liable until handing the plant back to Eskom after the repair or installation is completed and handover certificate has been signed.

The Contractor provides any labour, personnel, travel and accommodation or that might be required to execute and implement the tasks and responsibilities detailed in this document.

The Contractor submits data sheet for any equipment to the Employer for acceptance before installation. It is the Contractor's responsibility to confirm that equipment provided for any installation is accepted (signed) by the Employer prior to installation.

The Contractor remains liable for all works conducted as per the requirements of this document.

The Contractor submits a fully detailed Method Statement and Quality Control Plan (QCP) to the Employer in two weeks' time prior commencing of work, for review and acceptance.

Identification and Classification of hazardous areas or locations shall be carried out by a qualified and competent person who is familiar with the process and equipment, as well as with the safety, electrical, operating and mechanical processes.

Any discrepancy or ambiguity between the Employer's specification or scope of works is immediately brought to the attention of the Employer by the Contractor for clarification

3.2 IDENTIFICATION OF HAZARDOUS LOCATION

Potentially hazardous areas shall be identified for all Eskom assets in which fires or explosions can occur owing to the presence of flammable gases, vapours or mists, dusts, or fibres suspended in the air. Any identified potential hazardous area must be classified to determine if it is indeed a hazardous location. Each Business Unit shall identify and compile a list of its particular hazardous locations, both permanent and temporary.

Dusts, as defined in SANS 60079-10-2, are hazardous because when they are dispersed in air by any means, they form potentially explosive atmospheres. Furthermore, layers of dust may ignite and act as ignition sources for an explosive atmosphere. SANS 60079-10-2 gives guidance on the identification and classification of areas where such hazards from dust can arise.

Hazardous locations shall be identified at each Business Unit and the necessary measures shall be taken to ensure that no health or safety concerns arise from such hazardous locations.

The Contractor shall perform identification in all Hazardous location and submit present professional report to Duvha Hazloc Committee.

3.3 CLASSIFICATION OF HAZARDOUS LOCATION

Once the potentially hazardous areas are identified, the OHS Act, Electrical Machinery Regulation Section 9 requires the employer to classify these potentially hazardous locations.

The area classification for new plant areas should be carried out when the initial process, instrumentation line diagrams and initial layout plans are available and confirmed before plant start-up. All relevant and available information for existing plant areas shall be used to do the area classification when required.

Classification of hazardous areas or locations shall be carried out by either a qualified engineer, or a competent person who is familiar with the process and equipment, as well as with the safety, electrical, operating and mechanical processes.

Area classification is a method of analysing and classifying the environment where explosive gas, vapours, dusts or fibres atmospheres may occur so as to facilitate the proper selection and installation of apparatus to be used safely in the environment, taking into account gas groups and temperature classes.

Following the initial hazardous area classification, means to improve the area classification (through arrangement design changes, system design changes, ventilation design, location of electrical equipment etc.) needs to be investigated and if feasible implemented.

The Contractor provide, submit and present professional hazloc area classification report to Electrical Engineering and Duvha Hazkoc committee.

3.4 SELECTION OF EQUIPMENT FOR HAZARDOUS LOCATION

3.4.1 Equipment Selection

Once potential hazardous areas have been identified and classified in accordance with the standard requirements the equipment selection can be done.

Equipment selection shall be done in accordance with SANS 10108 [5] and SANS 60079-14 [11].

In order to select the appropriate electrical equipment for hazardous areas, the following information is required:

a) Classification of the hazardous area including the equipment protection level requirements where applicable;

b) Where applicable, gas, vapour or dust classification in relation to the group or subgroup of the electrical equipment;

c) Temperature class or ignition temperature of the gas or vapour involved;

d) Minimum ignition temperature of the dust cloud and minimum ignition temperature of the Dust layer; Intended application of the equipment;

g) External influences and ambient temperature.

It is recommended that the equipment protection levels (EPL) requirements are recorded on the area classification drawing.

3.4.2 Equipment Certification

Equipment certification requirements shall be done in accordance with SANS 10108 [5].

Product conformity for explosion-protected equipment is established through testing and certification by means of

a) Type testing (compulsory for all equipment), and either

b) Batch testing the production units, or

c) Producing production units under an approved product certification scheme.

Department of Mineral Resources (DMR) and / or Department of Labour (DoL) can be contacted to provide all the compliance requirements related to the following aspects:

a) Regulatory requirements for explosion-protected equipment

b) Approved standards, test laboratories and certification bodies

c) Validity of certification

d) Other certification schemes — Operation and acceptability of certificates

e) Apparatus marking

The Contractor selects the equipment for the installation in each classified hazardous location in accordance with Eskom Standard 240-56536505 and SANS 10108 and SANS 60079-14.

The Contractor records the equipment protection levels (EPL) requirements on the area classification drawing. The Contractor creates and provides the area classification drawing.

The Contractor provides the equipment certification requirements in accordance with Eskom Standard 240-56536505 and SANS 10108.

3.5 INSTALLATION OF EQUIPMENT FOR HAZARDOUS LOCATION

Equipment installation shall be done in accordance with SANS 10086-1 [2], SANS 10142-1 [6] and SANS 60079-14 [11].

Electrical installations in hazardous areas shall also comply with the appropriate requirements for electrical installations in non-hazardous areas. However the requirements for non-hazardous areas are insufficient for installations in hazardous areas.

It is necessary to ensure that any installation complies with the relevant equipment certificate as well as with this standard and any other requirements specific to the plant on which the installation takes place.

Where there is a possibility of static build-up under working conditions, the user shall ensure that all electrical equipment and metal parts are earthed in such a way that all static build-up will be conveyed to the earth mass effectively.

In order to correctly install or extend an existing installation, the following information, additional to that required for non-hazardous areas, is required, where applicable:

Information available at the Business Unit -

a) area classification documents (see SANS 60079-10-1 [9] and SANS 60079-10-2 [10]) with plans showing the classification and extent of the hazardous areas including the zoning (and maximum permissible dust layer thickness if the hazard is due to dust);

b) optional assessment of consequences of ignition;

c) where applicable, gas, vapour or dust classification in relation to the group or subgroup of the electrical equipment;

d) temperature class or ignition temperature of the gas or vapour involved;

e) where applicable, the material characteristics including electrical resistivity, the minimum ignition temperature of the dust cloud, minimum ignition temperature of the dust layer and minimum ignition energy of the dust cloud;

f) external influences and ambient temperature.

Information available for the selected Equipment –

a) manufacturer’s instructions for selection, installation and initial inspection;

b) documents for electrical equipment with conditions of use, e.g. for equipment with certificate numbers which have the suffix “X”;

c) descriptive system document for the intrinsically safe system houses;

d) manufacturer’s/qualified person’s declaration.

Information available for the Installation -

a) necessary information to ensure correct installation of the equipment provided in a form which is suitable to the personnel responsible for this activity (see SANS 60079-0 [8], Instructions);

b) documentation relating to the suitability of the equipment for the area and environment to which it will be exposed, e.g. temperature ratings, type of protection, IP rating, corrosion resistance;

c) the plans showing types and details of wiring systems;

d) records of selection criteria for cable entry systems for compliance with the requirements for the particular type of protection;

e) drawings and schedules relating to circuit identification;

f) records of the initial inspection.

g) installer’s/qualified person’s declaration

NOTE: Records of inspection for assemblies or pre-installed items can be accepted as part of initial inspection records.

3.5.1 Certificate of Compliance

All hazardous locations installations shall be issued with Certificate of Compliance by a person registered as a Master Installation Electrician in terms of regulation 11(2) of Electrical Installation Regulations in OHS Act, for the verification and certification of the construction, testing and inspection of hazardous location installation.

Detailed requirements of a test report and CoC as well as the authority to issue a test report and a CoC is elaborated on in Section 8.8 and Annex P of SANS 10142-1 [6]. Also refer to 240-103031952 [14], The Eskom CoC Works Instruction for additional details.

3.6 INSPECTION AND MAINTENANCE

Regular inspections and maintenance of the various hazardous locations are to be carried out in accordance with the statutory requirements. Inspections are to comply with regulatory requirements SANS 10086-1 [2] as well as SANS 10086-3 [25]. Inspections and maintenance schedules captured in SANS 60079-17 [12] (Table 1, 2 and 3) are to be used for carrying out the inspections.

For the purposes of inspection and maintenance, up-to-date documentation including any modification records, of the following items shall be available:

a) zone classification of areas and, if included, the equipment protection level (EPL) required for each location (see SANS 60079-10-1 [9] and SANS 60079-10-2) [10],

b) for gases: equipment group (IIA, IIB or IIC) and temperature class requirements,

c) for dusts: equipment group (IIIA, IIIB or IIIC) and maximum surface temperature requirements,

d) equipment characteristics e.g. temperature ratings, type of protection, IP rating, corrosion resistance,

e) records sufficient to enable the explosion protected equipment to be maintained in accordance with its type of protection (see SANS 60079-14 [11]), (for example list and location of equipment, spares, certificates, technical information),

f) copies of previous inspection records,

g) copy of the additional initial inspection records as detailed in SANS 60079-14 [11].

Requirements for other documentation that may be necessary are provided in SANS 60079-14 [11] and SANS 60079-19 [13].

The inspection activity shall be sufficiently independent of any immediate demands of maintenance and/or other activities so as not to prejudice the reliability of any report findings from the inspection.

To ensure that the installations are maintained in a satisfactory condition for continued use within a hazardous area, either

a) regular periodic inspections, or

b) continuous supervision by skilled personnel,

and, where necessary, maintenance shall be carried out.

NOTE: In the case of dusts, fibres or flying's, housekeeping can influence the inspection and maintenance requirements.

The types of inspections include:

a) Initial inspections used to check that the selected type of protection and its installation are appropriate based on detailed inspections. The requirements are covered in IEC 60079-14 [11].

b) Periodic inspections which may be visual, close or detailed in accordance with SANS 60079-17 [12] Tables 1, 2, and 3, or modified tables, as appropriate.

c) Sample inspections which may be visual, close or detailed in accordance with SANS 60079-17 [12] Tables 1, 2, and 3, or modified tables, as appropriate. The size and composition of all samples shall be determined with regard to the purpose of the inspection.

Sample inspections should not be expected to reveal faults of a random nature, such as loose connections, but should be used to monitor the effects of environmental conditions, vibration, inherent design weakness, etc.

d) Continuous supervision utilizing the visual or close inspections in accordance with SANS 60079-17 [12] Tables 1, 2, and 3, or modified tables, as appropriate. Where the installation falls outside the capability for continuous supervision it shall be subject to periodic inspection.

The results of all inspections shall be recorded and retained, and may lead to a need for further actions.

It is Eskom's responsibility to ensure that the area classification remains up-to-date; either by reviews at regular intervals or as part of change management, to ensure that all modifications to the plant or mine that could affect the area classification are taken into account.

3.7 DEMARCATION OF HAZARDOUS LOCATIONS

Hazardous locations shall be marked as per standard SANS 10108 [5] to indicate danger to personnel.

Hazardous locations shall to the greatest extent practical, be made secure from entry by unauthorised personnel, and access control implemented as necessary.

3.8 TRAINING

Table 3: Knowledge, Skills and Competencies Required for Electrical Installation Design, Selection and Erection

SANS 60079-14 Electrical Installations Design, Selection and Erection	
Role	**Knowledge, Skills and Competencies**
Responsible persons Such persons shall confine their involvement to the management of competent operatives conducting selection and erection duties and not engage themselves directly in the work without ensuring their practical skills at least meet the requirements given for Operatives / technicians (selection and erection).	Responsible persons who are responsible for the processes involved in the design, selection and erection of explosion protected equipment shall possess, at least, the following: a) general understanding of relevant electrical engineering; b) understanding and ability to read and assess engineering drawings; c) practical understanding of explosion protection principles and techniques; d) working knowledge and understanding of relevant standards in explosion protection; e) basic knowledge of quality assurance, including the principles of auditing, documentation, traceability of measurement and instrument calibration.

Operatives / technicians (selection and erection)	Operatives/technicians shall possess, to the extent necessary to perform their tasks, the following: a) understanding of the general principles of explosion protection; b) understanding of the general principles of types of protection and marking; c) understanding of those aspects of equipment design which affect the protection concept; d) understanding of content of certificates and relevant parts of this standard; e) general understanding of inspection and maintenance requirements of SANS 60079-17; f) familiarity with the particular techniques to be employed in the selection and erection of g) equipment referred to in this standard; h) understanding of the additional importance of permit to work systems and safe isolation in relation to explosion protection.
Designers (design and selection)	Designers shall possess, to the extent necessary to perform their tasks, the following: a) detailed knowledge of the general principles of explosion protection; b) detailed knowledge of the general principles of types of protection and marking; c) detailed knowledge of those aspects of equipment design which affect the protection concept; d) detailed knowledge of content of certificates and relevant parts of this standard; e) understanding of practical skills for the preparation and installation of relevant concepts of protection; f) detailed knowledge of the additional importance of permit to work systems and safe isolation in relation to explosion protection; g) detailed knowledge of the particular techniques to be employed in the selection and erection of equipment referred to in this standard; h) general understanding of inspection and maintenance requirements of SANS 60079-17.

Table 4: Knowledge, Skills and Competencies Required for Electrical Installations Inspection and Maintenance

SANS 60079-17 Electrical Installations Inspection and Maintenance	
Role	**Knowledge, Skills and Competencies**
Responsible persons and technical persons with executive function Such persons shall confine their involvement to the management of skilled personnel and competent operatives, conducting inspection and maintenance duties and not engage themselves directly in the work without ensuring their practical skills at least meet the requirements given for Operatives/technicians (inspection and maintenance).	Responsible persons and technical persons with executive function who are responsible for the processes involved in the inspection and maintenance of explosion protected equipment shall possess, at least, the following: a) general understanding of relevant electrical engineering; b) practical understanding of explosion protection principles and techniques; c) understanding and ability to read and assess engineering drawings; d) working knowledge and understanding of relevant standards in explosion protection, particularly SANS 60079-10-1, SANS 60079-10-2, SANS 60079-14 and SANS 60079-19; e) basic knowledge of quality assurance, including the principles of auditing, documentation, traceability of measurement and instrument calibration.
Operative/technician (inspection and maintenance)	Operatives/technicians shall possess, to the extent necessary to perform their tasks, the following: a) understanding of the general principles of explosion protection; b) understanding of the general principles of types of protection and marking; c) understanding of those aspects of equipment design which affect the protection concept; d) understanding of certification and relevant parts of this standard; e) understanding of the additional importance of permit to work systems and safe isolation in relation to explosion protection; f) familiarity with the particular techniques to be employed in the inspection and maintenance of equipment referred to in this standard; g) comprehensive understanding of the selection and erection requirements of SANS 60079-14; h) general understanding of the repair and reclamation requirements of SANS 60079-19.

Table 5: Knowledge, Skills and Competencies Required for Equipment repair, overhaul and reclamation

SANS 60079-19 Equipment Repair, Overhaul and Reclamation	
Role	**Knowledge, Skills and Competencies**
Responsible persons Such persons shall confine their involvement to overhaul, repair and reclamation in the nominated areas of competence and not engage themselves in modifications of explosion protected equipment without expert guidance.	"Responsible persons" who are responsible for the processes involved in the overhaul, repair and reclamation of specific types of explosion protection of explosion protected equipment, shall possess, at least, the following: a) general understanding of relevant electrical and mechanical engineering at the craftsperson level or above; b) practical understanding of explosion-protection principles and techniques; c) understanding and ability to read and assess engineering drawings; d) familiarity with measurement functions, including practical metrology skills, to measure known quantities; e) working knowledge and understanding of relevant standards in the explosion protection field; f) basic knowledge of quality assurance, including the principles of traceability of measurement and instrument calibration.
Operatives	Operatives shall possess, to the extent necessary to perform their tasks, the following: a) understanding of the general principles of types of protection and marking; b) understanding of those aspects of equipment design which affect the protection concept; d) ability to identify replacement parts and components authorized by the manufacturer; e) familiarity with the particular techniques to be employed in repairs referred to in this standard.

3.9 DOCUMENTATION

The Contractor submits a fully detailed Cabling Method Statement to the Employer for review and acceptance.

The Contractor submits a fully detailed Method Statemen and QCP to the Employer for review and acceptance.

The Contractor provides documentation that may be necessary are provided in accordance with Eskom Standard 240-56536505, SANS 60079-14 and SANS 60079-19.

The Contractor provides a detailed Inspection and Testing Sheet Templates to the Employer for review and acceptance.

The Contractor uses and completes the reviewed and accepted Method Statement, QCP, Inspection and Testing Sheet Templates during the implementation of the task.

The Contractor summits fully completed and signed QCP, Inspection and Testing Sheet Templates after the implementation of the task to the Employer for record keeping.

4. OTHER REQUIREMENTS

The Contractor must submit timesheets to the employer to substantiate the hours that must be compensated.

Compensation for hours spent attending to these activities will be compensated on hourly bases, as per quality assurance forms, corrective maintenance reports, and timesheets submitted to the employer. Compensation will be at the agreed hourly rate for normal time.

The Contractor is available to the Employer on a 24hr basis- with an option of alternating the staff on weekly basis. The response time of 1-hours and an additional hour to site is applicable. The Contractor must provide the Employer with contact telephone/cell numbers. Main and second contact telephone numbers are required for all the Contractor's personnel.

The Contractor is on site within 1 hour of receiving a call-out and to start.

All service-related travelling costs are included in the Hourly rates supplied by the Contractor.

Time spends by the Contractor on site, out of own choice, will not be compensated. Contractors will work same normal hours as Eskom maintenance personnel.

The Contractor ensures that his personnel have transport available at all times.

The Employer provides access to the Contractor to the site in order to perform his duties in accordance with this contract.

The Contractor updates the disaster recovery plan for the Hazloc system/s when requested to do so by the employer. As part of the disaster recovery plan, the Contractor indicates the time it will take to rebuild each Hazloc system. The Employer evaluates the disaster recovery plan in conjunction with the applicable risk assessment. After major changes as requested by the Employer, the disaster recovery plan must be updated.

The Contractor actively participates in the risk management of the Hazardous locations. The Contractor assesses all the risks related to the reliable and secure operation of the Systems installed in Hazardous location. The Contractor recommends mitigations to the risks identified.

Due to the criticality of the systems installed in Hazardous locations, the Contractor and the Employer needs to be assured that all necessary maintenance activities are carried out to the utmost quality standard, to ensure that the system is maintained to the optimum operating condition, thereby maximising the reliability, availability and security of the system.

In order to ensure that all maintenance activities are carried out as per the employer's quality standard, a quality assurance form must be completed for all preventive maintenance and administrative activities. The forms must be signed off by the Contractor and signed off by the employer's agent.

Forms are free issued to the Contractor, whereby the forms must be filled in by hand.

The Contractor must comply to the requirements of QM58

5. AUTHORISATION

This scope of works has been seen and accepted by:

Name & Surname	Designation
Maila Mamoleka	Engineering Manager
Andile Nqayane	Electrical Engineering Manager
Elliot Mamba	System Engineer
Sakhy Mnguni	System Engineer

6. DEVELOPMENT TEAM

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

- Elliot Mamba
- Sakhy Mnguni
- Calvin Khoza

7. REVISIONS

Date	Rev.	Compiler	Remarks
February 2014	0	Elliot Mamba	Initial Draft
February 2024	0.1	Elliot Mamba	Improved Document
February 2025	0.2	Sakhy Mnguni	Align to the Engineering template
June 2025	1	Elliot Mamba	Align to Eskom Hazloc Standard

8. ACKNOWLEDGEMENTS

- Electrical Maintenance Department