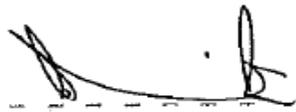


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Foreword

This document is in compliance with the General Supervision requirements of the Occupational Health and Safety Act 85 of 1993 and the General Machine Regulations incorporated under the Act.

Revision history

Date	Rev.	Clause	Remarks
Aug 2009	0		Compiled By: A J Krafft
		All	Requirement for these specifications identified by the Wires Business Committee
		All	New requirements defined.

Authorisation

This document has been seen and accepted by:	
Name	Designation
MN Bailey	Corporate Manager: Divisional Technology
E Kamffer	Distribution Network Operating Committee Chairperson
A Stramrood	Divisional Risk Manager

This standard shall apply throughout Eskom Holdings Limited, its divisions, subsidiaries and entities wherein Eskom has a controlling interest.

Development team

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Introduction

This document standardises and specifies the requirements for the supervision of people in hazardous electrical locations.

Keywords

Add document keywords here Supervision, close proximity, electrical hazards

1 Scope

This Standard set the requirements for the supervision of persons working on or near electrically alive apparatus on Eskom distribution networks.

2 Normative references

Parties using this Standard shall apply the most recent edition of the documents listed below:

Occupational Health and Safety Act 85 of 1993

General Machinery Regulations incorporated under the Occupational Health and Safety Act 85 of 1993

ESKPVAEY6: Operating Regulations for High Voltage Systems

SCSASABU3 (34-1461): High Voltage Live Work Training Requirements

34-146: Authorisation Procedure for Operating on High Voltage Systems

3 Informative Reference

NRS 060 Code of Practice for clearances for electrical systems with rated voltages up to and including 145 kV, for the safety of persons

4 Definitions and abbreviations

4.1 Definitions

Authorise or Authorised: Refers to the giving of permission in writing to perform specific duties and responsibilities in terms of the Operating Regulations for High Voltage systems.

Close Proximity: If work is of such a nature that a person, machine or object could inadvertently encroach on the minimum safe working clearance according to the table provided in ESKPVAEY6 (5.03.6.3 (f)) then this is interpreted as close proximity.

Competent Person: General Machinery Regulation 1: competent person (a) "In relation to machinery, means any person who has served an apprenticeship in an engineering trade which included the operations and maintenance of machinery, or has had at least 5 years' practical experience in the operation and maintenance of machinery, and who during or subsequent to such apprenticeship or experience, as the case may be, has had not less than one year's experience in the operations and maintenance appropriate to the class of machinery he is required to supervise".

Person incharge of live work: .Person who have been specifically authorised to be in charge of live work shall take over live apparatus for live working and issue a live work declaration form.

Minimum Electrical Safety Clearance: Is a specified clearance for a specific nominal voltage range as tabled in the Electrical Machinery Regulation 15 (second column). This is the absolute minimum voltage and any approach closer than this will result in an electrical flash-over with potential catastrophic consequences.

NOTE: These persons will be deemed shift man as anticipated in the General Machinery Regulation 5(1).

Minimum Safe Working Clearance: Is the distances tabled in ESKPVAEY6 (5.03.6.3 (f)) from which work can be performed in the proximity of electrical alive apparatus when no inadvertent contact with the live apparatus is possible.

Notes:

- a) This distance will not be deemed "near moving or electrically alive machinery" as anticipated in the General Machine Regulation 5(1).
- b) Minimum Safe Working Clearances are clearances that extend the Electrical Machinery Regulation 15 to a practically safe working clearance for every nominal voltage to ensure a safety factor of at least 1.6.

Responsible Person: means a person, whether an employee or a non employee, who has been authorised to be responsible for ensuring that the work on the apparatus covered by a work permit can be carried out safely and within the terms of the Operating Regulations for High Voltage (ESKPVAEY6).

Supervise or Supervision: refers to the overseeing of the actions of a person or persons so as to prevent any act that could be dangerous or in contravention of these regulations

Work or Working or Worked: refers to all physical activities in connection with apparatus, excluding operating and any other non-dangerous activities that will not affect the health and safety of workers or the safe operation of apparatus.

5 Requirements

5.1 Criteria for the selection of the appropriate level of supervision:

- a) The safe distance between persons, construction equipment, vehicle mounted cranes and aerial devices working on electrical alive apparatus, to dangerous touch or step potential, and
- b) The restrictions put in place to restrict inadvertent electrical contact in the work place. This could include:
 - placement of physical barriers between persons and possible points of electrical contact
 - introduction of barricades in the form of temporary fences or shark nets with danger labels
 - issuing of permits and/or Workers Registers stating activity and access exclusions and no-go zones
 - the required level of supervision to prevent unsafe acts
 - instructing persons not to employ pole and structure access equipment like climbing shoes, ladders or scaffolding that could allow hazardous activities

5.2 Levels of Supervision

5.2.1 Direct Supervision and physical control

5.2.1.1 Direct supervision and physical control is required when any inadvertent contact can be made with live electrical apparatus from ground level, or platform, see (a) & (b) below:

- a) Where unauthorised persons are given "access under supervision" to energised live chambers like low profile or exposed busbar chambers
- b) Where unauthorised persons are given "access under supervision" to open air substations that qualify as live chambers

5.2.1.2 Direct supervision and physical control requires:

- a) The person conducting the supervision shall take up a position in the work area between the energised apparatus and the persons being supervised, so that he can be heard and understood through normal conversation (not having to shout) at all times.
- b) The person conducting the supervision shall take up a position in the work area, so that all persons being supervised can be physically prevented from performing an unsafe act.
- c) That both the person/s being supervised and controlled and the person performing the supervision and control agree up-front the nature of the physical contact that will be deemed by both parties as appropriate in order to restrain the person being supervised from hazardous activity. That the person being supervised understands that any resistance to such contact can jeopardise the health and safety of both parties, in which case access will be denied.

5.2.2 Direct supervision

5.2.2.1 Direct Supervision is required where work is performed in the following locations:

- a) On structures where power line phases are selectively earthed.
- b) On the opened, isolated, earthed and handed out line on dual circuit structures and where the other line is energised.
- c) In close proximity as anticipated in the Operating Regulations for High Voltage Systems ESKPVAEY6 (5.03.6.3).
- d) While Live Work covers are applied and a second point of contact (touch potential) exists
- e) Safe working clearance cannot be guaranteed and no other measures but supervision is available to restrict inadvertent access to close proximity.

5.2.2.2 Direct supervision requires:

- a) Uninterrupted and continuous observation and control of persons for the full duration that the people being supervised are within the potentially dangerous zone.
- b) The person conducting the supervision will take up such a position and should assure such circumstance or situation as may be required to control any potential dangerous activity within a reasonable response time for persons exposed to electrical hazards.
- c) An un-obscured line of sight between the people working near the energised plant and the energised plant.
- d) In the case of Live Work, the person conducting the supervision shall be an authorised as a person in charge of Live Work
- e) In the case of work on opened, isolated and earthed apparatus, the person performing the supervision shall be an authorised Responsible Person or a fully authorised person.
- f) In the case of close proximity work, the person performing the supervision shall be specifically authorised to "supervise close proximity work".

5.2.3 Indirect Supervision

5.2.3.1 Indirect supervision is required for work in Prohibited areas and Live Chambers on opened isolated and earthed apparatus where:

- a) The nature of work and spatial separation of live apparatus can not lead to direct or indirect inadvertent contact and/or
- b) Access to alive apparatus is restricted by means which include but is not limited to: barriers or barricades indicating the dangerous areas
- c) Live Work gloving is in progress on lines where a second point of contact (touch potential) is eliminated by appropriate isolation like live work covers

5.2.3.2 Indirect supervision requires:

- a) Frequent observation and control of the person being supervised.
- b) Occasional line of sight between any person and the energised plant.
- c) Frequent inspection of barriers, live work covers and staff working positions and control of staff movement.
- d) Clear written instruction or live work declaration to people at the work site as required by the Operating Regulation for High Voltage Systems and Pre-task risk analysis standards of Distribution on where the no-go areas are.

5.2.4 General Supervision

5.2.4.1 General supervision is required where:

- a) Work is conducted near energised power lines or specific ground level work in prohibited areas.
- b) Safe working clearance can be guaranteed and the reasonable person performing the supervision does not foresee a potential for direct or indirect electrical contact.

5.2.4.2 General supervision requires:

- a) Casual observation and control of the person being supervised from time to time.
- b) Occasional line of sight between the people working near the energised plant and the energised plant.
- c) Clear written instruction to people at the work site as required by the Operating Regulation for High Voltage Systems and Pre-task risk analysis standards of Distribution on where the no-go areas are.

5.3 Authorisation of staff to conduct supervision

5.3.1 Selection requirements

The following consideration must inform the selection appointment and authorisation of staff to supervise work in electrical hazardous environments.

- a) The safe working clearances specified are multiples of the safe minimum clearance, providing a safety factor and a large margin for error.
- b) Only staff with a good basic understanding of electricity is authorised to supervise people in electrical hazardous locations.
- c) Only staff that can muster the appropriate level of personal control over their peers are appointed in these supervision roles.
- d) All staff that conducts supervision must have good knowledge of the required safety clearances specified by Eskom and applicable legislation.
- e) Only staff that demonstrated knowledge of the applicable design and construction clearance of conductors at the various nominal voltage is appointed.

5.3.2 Supervisor Authorisation process

5.3.2.1 Persons in charge of live work

Persons in charge of live work, referred to by the General Machinery Regulation as “Shiftsman”, will be trained, assessed and authorised in accordance with SCSASABU3/34-1461: High Voltage Live Work training Standard

5.3.2.2 Responsible Persons and persons authorised to supervise “Close Proximity Work”, work on selective earthed systems or dual circuit power lines

These persons will be trained, assessed and authorised in accordance with 34-146: Authorisation Procedure for Operating on High Voltage Systems

5.4 Supervision Techniques

5.4.1 Maintaining Safe Working Clearances

Maintaining a safe working clearance between the live apparatus and the persons working near it, is most critical. Observing this clearance could be difficult due to the three dimensional spacing of electrical conductors in the work situation. To mitigate this risk, the following control mechanisms should be implemented:

- a) Use the known phase and earth clearances between conductors on the line to estimate the safe electrical clearance required.
- b) Identify markers on conductors, ladders and structures to control the movement of staff in the proximity of electrical conductors.
- c) Where possible, establish measured markers on the ground and take positions on top of it to measure vertical no go zones.
- d) Enquire frequently from the staff in proximity of electrical conductors their estimates of safe working clearance.
- e) Avoid parallax errors when assessing safe working clearances on the job site.

5.4.2 Conditions that may lead to close proximity situations

- a) The person being supervised can slip or lose their balance while standing on an uneven or uncomfortable surface, or due to excessive windy condition.
- b) Handling any conductive object that can encroach into the minimum safe work clearance
- c) A person that can be bumped or pushed into close proximity of live conductors by construction vehicle parts.
- d) Where energised conductors are not secure and can swing into and compromise the safe work clearance

5.4.3 Observation and Control

The person performing the supervision shall:

- a) Identify possible touch and step potentials at the work site and,
- b) Consider the criteria for the selection of the level of supervision (paragraph 5.1) required on every job.
- c) Plan the work in phases and allocate work areas for each person on the work site.
- d) Select and occupy preferred or marked observation points that allow the maximum field of view from where the appropriate level of supervision is conducted.
- e) Control the movement of all staff in accordance with the work plan
- f) Where observations points are obscured or where communication is inhibited, appoint other persons which are authorised to assist in the supervision function. The principal of "I am my brothers keeper" should be extensively practiced in large teams.
- g) Use Voice Operated Radio Communication between team members where communication is restricted in case of direct and in-direct supervision types.
- h) Use approved hand signals to communicate with a crane operator or a person operating an elevated working platform some distance away or who's hearing is constraint by noise.
- i) Not be distracted by any other person,

5.5 Conditions under which “direct supervision” work must be stopped

The person conducting the supervision shall suspend all work and withdraw people from the work near the electrically alive conductors:

- a) When communication is compromised
- b) When a member of the team or individual being supervised does not respond to the control measures of the person in charge of live work, specifically authorised or responsible person
- c) Where the line of sight of the authorised person between the live plant and the person near electrical alive apparatus is obscured to the point where the electrical safe work clearances can not be assured.
- d) When disturbed by any outside agent like cell phone calls, a third person, explosions in the vicinity of the work place or distracting events in the vicinity of the work site.
- e) Direct supervision work will not be performed at night time or when light conditions deteriorate to the extent that safe working clearances cannot be observed.

Annex A - Impact assessment

(Normative)

Impact assessment form to be completed for all documents.

1 Critical points

- 1.1 All staff currently authorised to conduct Supervision will have to be re-trained, re-assessed and re-authorised on approval of this standard.**
- 1.2 This standard respond to statutory and regulatory requirements and implementation is mandatory**
- 1.3 This standard aim to change behaviour and will not impact stock holding. It however impact the procurement of services already contained in the Distribution Safety Specification for Contractors.**

2 Implementation timeframe

- 2.1 Time period for implementation of requirements.**

Prior to re-authorisation staff must be retrained on Module 4 of the ORHVS

3 Buyers Guide and Power Office

- 3.1 Does the Buyers Guide or Buyers List need updating?**

Comment: No

- 3.2 What Buyer's Guides or items have been created?**

Comment: None

- 3.3 List all assembly drawing changes that have been revised in conjunction with this document.**

Comment: None

- 3.4 If the implementation of this document requires assessment by CAP, provide details under 5**

- 3.5 Which Power Office packages have been created, modified or removed?**

Comment:

4 CAP / LAP Pre-Qualification Process related impacts

- 4.1 Is an ad-hoc re-evaluation of all currently accepted suppliers required as a result of implementation of this document?**

Comment: Yes, contractor staff authorised for supervision must be retrained and assessed one year after approval of this standard

Annex A

(continued)

4.2 Is implementation of the provisions of this document required during the current supplier qualification period?

Comment: No

4.3 If Yes to 5.4, what date has been set for all currently accepted suppliers to comply fully?

Comment: Not applicable

4.4 If Yes to 5.4, have all currently accepted suppliers been sent a prior formal notification informing them of Eskom's expectations, including the implementation date deadline?

Comment: No

4.5 Can the changes made, potentially impact upon the purchase price of the material/equipment?

Comment: no

4.6 Material group(s) affected by specification: (Refer to Pre-Qualification invitation schedule for list of material groups)

Comment: Not applicable

5 Training or communication

6.1 Is training required?

Comment: Yes, all Eskom and Contractor staff authorised for Supervision

6.2 State the level of training required to implement this document. (E.g. awareness training, practical / on job, module, etc.)

Comment: Formal Training

6.3 State designations of personnel that will require training.

Comment: Line Managers and Supervisors, Technical Instructors, Assessors and Moderators

6.4 Is the training material available? Identify person responsible for the development of training material.

Comment: Distribution Technical Training Department to revise training material and release it in coordination with the implementation of this standard

6.5 If applicable, provide details of training that will take place. (E.G. sponsor, costs, trainer, schedule of training, course material availability, training in erection / use of new equipment, maintenance training, etc).

Comment: Regional Operating Regulations for High Voltage System Training

Annex A
(continued)

6.6 Was Technical Training Section consulted w.r.t module development process?

Comment: Yes – Carol Mposi

6.7 State communications channels to be used to inform target audience.

Comment: Formal Retraining and regional road shows

6 Special tools, equipment, software

6.1 What special tools, equipment, software, etc will need to be purchased by the Region to effectively implement?

Comment: None

6.2 Are there stock numbers available for the new equipment?

Comment: None

6.3 What will be the costs of these special tools, equipment, software?

7 Finances

7.1 What total costs would the Regions be required to incur in implementing this document? Identify all cost activities associated with implementation, e.g. labour, training, tooling, stock, obsolescence

Comment: Operating Regulations for High Voltage training is already provided for

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Impact assessment completed by:

Name: AJ Krafft

Designation: Senior Consultant Distribution Technology