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SYSTEMS FOR SUBSTATIONS
AND TELECOMS HIGH SITES**

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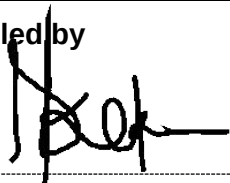
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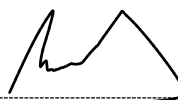
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Executive Summary

The increasing threat to the safety and security of people, information and assets at Eskom substations is impacting Eskom operations and its ability to deliver the required level of service. The safety of people and the integrity of assets is a key priority to Eskom.

This specification details the public address system for security purposes only. If the public address system is to be utilised for emergency safety and fire requirements, then the specification 240-64720986 shall be used.

1. Introduction

A surge in crime-related incidents at Eskom sites has prompted a requirement to initiate security projects that would interface with a centralised management system. The increasing threat to the safety and security of people, information and assets is impacting Eskom operations and its ability to deliver a world class service. The safety of people and the integrity of information and assets is a key priority in Eskom.

This specification details the public address system for security purposes only. If the public address system is to be utilised for emergency safety and fire requirements, then the specification 240-64720986 shall be used.

2. Supporting Clauses

2.1 Scope

The document details requirements for the public address system for security requirements only.

2.1.1 Purpose

The purpose of the document is to provide the requirements of a public address system that can integrate with the site security system.

2.1.2 Applicability

This document shall apply to Substations and Telecoms High sites.

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] 240-64720986 – Emergency Preparedness Public Address System
- [3] 240-60725641 – Specification for Standard (19 inch) Equipment Cabinets
- [4] 240-64720986 – Emergency Preparedness Public Address System
- [5] 240-91190294 - DC and Auxiliary Supplies Philosophy
- [6] 240-118870219 - Standby Power Systems Topology and Autonomy for Eskom Sites
- [7] 240-56360086 - Stationary Vented Nickel Cadmium Batteries Standard
- [8] 240-56360034 -Stationary Vented Lead Acid Batteries Standard
- [9] 240-51999453 - Standard Specification for Valve-Regulated Lead Acid Cells
- [10] 240-53114248 - Thyristor and Switch Mode Chargers, AC/DC to DC/AC Converters and Inverter/Uninterruptible Power Supplies Standard
- [11] 240-64139144 - AC Boards and Junction Boxes for Substations
- [12] 240-76628687 - AC/DC Reticulation Equipment for Breaker-and-a-Half Substations
- [13] 240-75658628 - Distribution Group Specific Requirements for AC/DC Distribution Units
- [14] 240-170000086 Roles and Accountabilities for Lifecycle Management of Physical Security Systems in the Transmission Division

2.2.2 Informative

- [15] SANS 7240-16 – Fire detection and alarm systems Part 16: Sound system control and indicating equipment

2.3 Definitions

2.3.1 General

Definition	Description
PSIM	PSIM (Management System) is a category of software that provides a platform and applications created by middleware developers, designed to integrate multiple unconnected security applications and devices and control them through one comprehensive user interface.

2.3.2 Disclosure classification

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

2.4 Abbreviations

Abbreviation	Description
A	Ampere
AC	Alternating Current
IP	Internet Protocol
LAN	Local Area Network
PA	Public Address
PSIM	Physical Security Information Management
SLA	Service Level Agreement
SPL	Sound Pressure Level

2.5 Roles and responsibilities

The Security Systems Care Group which operates under the DC and Auxiliary Supplies Study Committee shall ensure that the technology developed is adequate for application across Eskom sites where it will be utilised.

2.6 Process for monitoring

The Security Systems Care Group will determine the effectiveness of this standard.

2.7 Related/supporting documents

This document is based on the standard, 240-64720986 – Emergency Preparedness Public Address System

3. Public Address System Requirements

3.1 Type approval

- a) The PA system and the related telecommunications equipment (e.g. modems, routers, switches, etc) shall be ICASA approved.

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3.2 Equipment housing

- a) All system equipment shall be housed in 19 inch equipment cabinets as specified in the Eskom standard, 240-60725641.

3.3 Public address system architecture

- a) The system shall be scalable allowing for de-centralised components in different locations under a centralised control over an IP-based network.
- b) The system shall eliminate single points of failure as practically possible.
- c) The PA system manager shall be capable of monitoring all de-centralised zones centrally and logging all events.
- d) Control of the entire PA system must be software-driven using the Microsoft Windows™ operating system approved by Eskom.
- e) The operational tasks of the PA system should be done locally via a user interface or remotely via the management system (PSIM) interface.
- f) The system shall cater for an initial of two microphone and/or external line-level inputs which can be expandable.
- g) The PA system broadcast functionality shall be done locally, remotely and through the control centre. The manual broadcast shall take precedence over the automatic broadcast.
- h) The system shall be capable of broadcasting configurable security messages (e.g. different languages).
- i) The system shall be capable of controlling up to two control inputs and two control outputs.
- j) The system shall be modular and cater for a number of different zones.
- k) The system shall be capable of monitoring all faults on the system. The faults shall include power supply failures and any other critical alarms. The alarms shall be annunciating locally and remotely.
- l) The system shall be provided with all necessary software and licensing.
- m) The supplier to indicate whether there is any need for periodic licence renewals and if there are associated costs.
- n) The system shall have an Ethernet port to connect to a LAN for remote access as well as to connect locally to a service terminal.
- o) The system shall be capable of accommodating any related security equipment's external inputs and outputs.
- p) The system event log format must be able to be exported into MS® Excel as well as PDF formats.
- q) The system event log must be accessible remotely.

3.4 Microphones

- a) The system shall be able to accommodate local and remote requirements.
- b) The remote microphones must provide for selectable buttons that can be programmable by the system to select features such as zone select, alert signals, volume settings, custom functions, and any other input sources and must also be expandable.
- c) It shall be possible to assign a priority status to any microphone.
- d) The microphone shall also have a functionality of being able to effect an all call broadcast in the event of the failure of the system manager.

- e) All microphone unit(s) shall also have the capability of receiving fault indications in the form of flashing LEDs and buzzer feature(s) or equivalent and allow for such faults to be acknowledged on the microphone unit.
- f) All microphone unit(s) shall also be capable of acknowledging any emergency broadcasts.
- g) Each microphone must be able to be assigned a different priority level by the system.

3.5 Power supply and stand-by batteries

- a) The existing standby power systems at site shall be used as the primary standby power source, provided that the standby time (autonomy) requirements of the site are not adversely affected.
- b) In cases where the above is not possible, the standby power system requirements for security systems at Eskom sites shall comply with the following:
 - 1) The system design shall comply with the requirements of 240-91190294, *DC & Auxiliary Supplies Philosophy*.
 - 2) Security systems are required to ensure that the site is protected at all times, hence the standby time of these systems shall be in line with the overall required standby time for the site. The requirements of 240-118870219, *Standby Power Systems Topology and Autonomy for Eskom sites*, shall be adhered to.
 - 3) Standard or technically acceptable equipment shall be used. This equipment is available on Eskom National Contracts (ENCs) or recommended technically acceptable equipment lists.
 - 4) In the absence of ENCs for specific equipment or recommended technically acceptable equipment, the offered equipment shall comply with the technical standards as indicated in 1.

Table 1: Technical Standards for Standby Power System Equipment

Equipment	Technical Standard
Nickel Cadmium Batteries	240-56360086, Stationary Vented Nickel Cadmium Batteries Standard
Vented Lead Acid Batteries	240-56360034, Stationary Vented Lead Acid Batteries Standard
Valve Regulated Lead Acid Batteries	240-51999453, Standard Specification for Valve-Regulated Lead Acid Cells
Power Electronics	240-53114248, Thyristor and Switch Mode Chargers, AC/DC to DC/AC Converters and Inverter/Uninterruptible Power Supplies Standard
Low Voltage Protective Devices, Cubicles and Wiring	240-64139144, AC Boards and Junction Boxes for Substations 240-76628687, AC/DC Reticulation Equipment for Breaker-and-a-Half Substations 240-75658628, Distribution Group's Specific Requirements for AC/DC Distribution Units

3.6 Speakers

- a) The minimum SPL of speakers shall be as follows to reduce the required consumption wattage:
 - 1) Ceiling-mount and wall-mount speakers: 90dB - 94dB @ 1w @ 1m
 - 2) Projection speakers: 91dB - 97dB @ 1w @ 1m
 - 3) Horn speakers: 109dB @ 1w @ 1m
- b) Cabling may be of the indoor and outdoor use application and must have a minimum cross-sectional core of 1.5mm.
- c) Speakers that communicate using Ethernet IP based communications are preferred.

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- d) The speakers shall be weatherproof, environmental, UV resistant, corrosion and vandalism resistant.

3.7 Management system requirements

- a) On-site (local) management of the PA system will be via human interface through a computerised system.
- b) Hardware: Management platform shall comprise of a desktop computer and minimum 17" Flat Screen monitor to support rapid execution of maintenance and reporting routines.
- c) Software: Management/administrative software and licensing shall execute maintenance routines of the entire system, monitor the operational status of all components of the system (including speakers), and changing the configuration parameters of the system both on site and remotely.
- d) Event log database capable of recording all system faults as well as all controls effected through human interface.
- e) The system must be capable of accommodating an external voice activated recording device to record all announcements made via each of the microphones.
- f) All recorded data must contain date and time stamp information
- g) Access to an on-site management system service terminal must be password protected.
- h) The remote management must not require any specialised remote management platform to access the installed location/s remotely.
- i) List all the functionalities provided over remote access configuration.
- j) The remote management system shall generate status reports concerning all aspects of the respective EP/PA system and its components. Such reports shall be capable of being exported and transmitted electronically.
- k) Remote access to any of the installed sites must be password protected.

3.8 PA system set-up, configuration and commissioning

- a) All components of the system must be installed and wired by the supplier in each equipment rack.
- b) The system shall also be configured as per end-user requirements and commissioned.

3.9 Factory Acceptance Testing (FAT)

- a) The supplier shall configure and setup the system in their premises for Factory Acceptance Testing by Eskom and the end-user prior to deployment to the installation site.
- b) All test procedures required to ensure the correct functioning shall be specified with a list of required test equipment and tools.

3.10 Installation and Site Acceptance Testing (SAT)

- a) The supplier shall install the system on site (including speakers, speaker cabling, and backbone cabling) inclusive of all interconnections between the de-centralised zones.
- b) The supplier shall avail themselves for Site Acceptance Testing at site after installation.
- c) All test procedures required to ensure the correct functioning shall be specified with a list of required test equipment and tools.

3.11 System manual(s), documentation and certificates

- a) Multiple copies of the system design and architecture, system components, user manuals and all other data sheets are to be supplied with the system.

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- b) The manuals, documentation and certificates must be made available in both hard and soft copy formats.

3.12 System life-cycle

- a) The minimum system life-cycle of the proposed product must be ten (10) years.
- b) The life-cycle of the product must be further supported in terms of spares availability for a minimum period of seven (7) years after discontinuation of the product.

3.13 Warranty and support

- a) The system shall carry a minimum local (South African) warranty of 36 months with on-site as well as telephonic support from date of the system being commissioned. Eskom shall thereafter have the option to access on-going support in terms of a subsequent agreement.
- b) The supplier must have a technician on call on a 24-hour basis for purposes of telephonic support.
- c) Supplier spares holding should include minimum replacement spares to restore service of the system in its entirety.
- d) All support shall also include all firmware upgrades of the initial system version installed over the operational life of the system.
- e) The support shall include first line level maintenance training.
- f) The supplier shall also provide operator training on site to the end-user.
- g) Product support must include national as well as international support through the local branch.
- h) The supplier shall be willing to enter into an SLA with Eskom
- i) The supplier should have a history of supplying products of this nature in South Africa for at least a minimum period of five (5) years.
- j) The supplier to provide a list of reference sites where the product on offer has been installed and the year of implementation.

4. Authorisation

This document has been seen and accepted by:

Name and surname	Designation
Barry Clayton	Middle Manager - Transmission
Sikelela Mkhabela	Senior Manager - Distribution
Machiel Viljoen	Senior Manager - Generation
Kashveer Jagdaw	DC & Auxiliary Supplies SC Chairperson
Prudence Madiba	Senior Manager – Electrical and C&I Engineering
Karen Pillay	Senior Manager- Security Solutions - Physical
Lenah Mothatha	Senior Manager – Transmission
Riaan Venter	Middle Manager – Civil and Structural COE

5. Revisions

Date	Rev	Compiler	Remarks
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Date	Rev	Compiler	Remarks
July 2020	1	D Moshoeshoe	Requirements from the business for security applications only

6. Development team

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

- Thomas Jacobs
- Tejin Gosai

7. Acknowledgements

Not applicable.

Annex A – Technical Schedules A & B

TECHNICAL SCHEDULES A & B FOR

SECURITY PUBLIC ADDRESS SYSTEMS FOR SUBSTATIONS AND TELECOMS HIGH SITES STANDARD IN
ACCORDANCE WITH ESKOM STANDARD 240-170000098

Schedule A: Purchaser's specifications

Schedule B: Guarantees, compliance and technical particulars of equipment offered

The following tabulated requirements emulate the sectional numbering of Standard 240-170000098:

	Description	Schedule A	Schedule B	Provide the location in the tender documentati on for evidence	Comments
3	Public Address System Requirements				
3.1	Type approval				
	a) Comply with clause 3.1(a) of this specification	Comply			
3.2	Equipment housing				
	a) Comply with clause 3.2(a) of this specification	Comply			
3.3	Public address system architecture				
	a) Comply with clause 3.3(a) of this specification	Comply			
	b) Comply with clause 3.3(b) of this specification	Comply			
	c) Comply with clause 3.3(c) of this specification	Comply			
	d) Comply with clause 3.3(d) of this specification	Comply			
	e) Comply with clause 3.3(e) of this specification	Comply			
	f) Comply with clause 3.3(f) of this specification	Comply			
	g) Comply with clause 3.3(g) of this specification	Comply			
	h) Comply with clause 3.3(h) of this specification	Comply			
	i) Comply with clause 3.3(i) of this specification	Comply			
	j) Comply with clause 3.3(j) of this specification	Comply			
	k) Comply with clause 3.3(k) of this specification	Comply			

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	Description	Schedule A	Schedule B	Provide the location in the tender documentation for evidence	Comments
	l) Comply with clause 3.3(l) of this specification	Comply			
	m) Comply with clause 3.3(m) of this specification	Comply			
	n) Comply with clause 3.3(n) of this specification	Comply			
	o) Comply with clause 3.3(o) of this specification	Comply			
	p) Comply with clause 3.3(p) of this specification	Comply			
	q) Comply with clause 3.3(q) of this specification	Comply			
3.4	Microphones				
	a) Comply with clause 3.4(a) of this specification	Comply			
	b) Comply with clause 3.4(b) of this specification	Comply			
	c) Comply with clause 3.4(c) of this specification	Comply			
	d) Comply with clause 3.4(d) of this specification	Comply			
	e) Comply with clause 3.4(e) of this specification	Comply			
	f) Comply with clause 3.4(f) of this specification	Comply			
	g) Comply with clause 3.4(g) of this specification	Comply			
3.5	Power supply and stand-by batteries				
	a) Comply with clause 3.5(a) of this specification	Comply			
	b)i) Comply with clause 3.5(b)(i) of this specification	Comply, if required			
	b)ii) Comply with clause 3.5(b)(ii) of this specification	Comply, if required			
	b)iii) Comply with clause 3.5(b)(iii) of this specification	Comply, if required			
	b)iv) Comply with clause 3.5(b)(iv) of this specification	Comply, if required			
3.6	Speakers	Comply			
	a)i) Comply with clause 3.6(a)i) of this specification	Comply			

	Description	Schedule A	Schedule B	Provide the location in the tender documentation for evidence	Comments
	a)ii) Comply with clause 3.6(a)(ii) of this specification	Comply			
	a)iii) Comply with clause 3.6(a)(iii) of this specification	Comply			
	b) Comply with clause 3.6(b) of this specification	Comply			
	c) Comply with clause 3.6(c) of this specification	Comply			
	d) Comply with clause 3.6(d) of this specification	Comply			
3.7	Management System Requirements				
	a) Comply with clause 3.7(a) of this specification	Comply			
	b) Comply with clause 3.7(b) of this specification	Comply			
	c) Comply with clause 3.7(c) of this specification	Comply			
	d) Comply with clause 3.7(d) of this specification	Comply			
	e) Comply with clause 3.7(e) of this specification	Comply			
	f) Comply with clause 3.7(f) of this specification	Comply			
	g) Comply with clause 3.7(g) of this specification	Comply			
	h) Comply with clause 3.7(h) of this specification	Comply			
	i) Comply with clause 3.7(i) of this specification	Comply			
	j) Comply with clause 3.7(j) of this specification	Comply			
	k) Comply with clause 3.7(k) of this specification	Comply			
3.8	PA System set-up, configuration and commissioning				
	a) Comply with clause 3.8(a) of this specification	Comply			
	b) Comply with clause 3.8(b) of this specification	Comply			
3.9	Factory Acceptance Testing (FAT)				
	a) Comply with clause 3.9(a) of this specification	Comply			
	b) Comply with clause 3.9(b) of this specification	Comply			
3.10	Installation & Site Acceptance Testing (SAT)				
	a) Comply with clause 3.10(a) of this specification	Comply			
	b) Comply with clause 3.10(b) of this specification	Comply			
	c) Comply with clause 3.10(c) of this specification	Comply			
3.11	System manuals, documentation and certificates				

	Description	Schedule A	Schedule B	Provide the location in the tender documentati on for evidence	Comments
	a) Comply with clause 3.11(a) of this specification	Comply			
	b) Comply with clause 3.11(b) of this specification	Comply			
3.12	System Life Cycle				
	a) Comply with clause 3.12(a) of this specification	Comply			
	b) Comply with clause 3.12(b) of this specification	Comply			
3.13	Warranty and support				
	a) Comply with clause 3.13(a) of this specification	Comply			
	b) Comply with clause 3.13(b) of this specification	Comply			
	c) Comply with clause 3.13(c) of this specification	Comply			
	d) Comply with clause 3.13(d) of this specification	Comply			
	e) Comply with clause 3.13(e) of this specification	Comply			
	f) Comply with clause 3.13(f) of this specification	Comply			
	g) Comply with clause 3.13(g) of this specification	Comply			
	h) Comply with clause 3.13(h) of this specification	Comply			
	i) Comply with clause 3.13(i) of this specification	Comply			
	j) Comply with clause 3.13(j) of this specification	Comply			