

 Eskom	Guideline	Distribution
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Title: **FIBRE OPTIC CABLE AND
HARDWARE SPARES
GUIDELINE**

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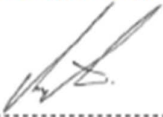
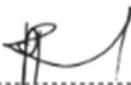
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Compiled by	Approved by	Authorized by
		
Lesiba Buthane	Thull Tladi	Judith Malinga
Senior Advisor M&O (Telecoms)	Middle Manager Distribution Telecoms	Senior Manager PTM&C Engineering
Date: 31/10/2025	Date: 05/11/2025	Date: 05/11/2025
Supported by SCOT/SC		
		
Mondli Shabalala		
SCOT/SC Chairperson		
Date: 05/11/2025		

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Executive Summary

Eskom has an extensive fibre network which is strung on their HV power lines. The network comprises of OPGW, ADSS, DUCT & AD-Lash. This also includes the dark fibres which are in substations. These dark fibres offer significant potential for future telecommunications capacity and can be activated as needed to support internal operations or leased to third-party service providers. This infrastructure enables wide-area connectivity across the country, enhancing Eskom's ability to monitor and control their grid, support smart grid technologies, and contribute to the broader national broadband strategy.

It is essential that Eskom has critical spares that are strategically stored in central inventory to ensure the continuous and reliable operation of vital systems or infrastructure. These fibre spares are to ensure that if fibres were to fail, it would be possible to significantly reduce any downtime, safety risks, and financial losses that would result due to this failure. By having critical spares readily available, Eskom can drastically reduce response times for repairs, maintain operational resilience, and avoid costly interruptions. This proactive approach also supports regulatory compliance and helps maintain customer trust by ensuring service reliability even in emergency or high-demand conditions.

1. Introduction

This document covers the reasoning behind the allocation of strategic spares for Fibre Optic Cable Systems within Eskom. These systems may consist of Optical Ground Wire (OPGW), All Dielectric Self Supporting (ADSS), Externally Attached Cable, Duct Cabling or a combination of the above.

2. Supporting clauses

2.1 Scope

This guideline outlines the processes and criteria for identifying, managing, and maintaining critical strategic spares to ensure operational continuity and risk mitigation across the fibre optic network. It aims to establish a standardized approach for inventory control, lifecycle planning, and availability of key components to support timely and effective fibre optic network restoration.

2.1.1 Purpose

The purpose of this document is to detail the requirements for spares for fibre optic cables. This document defines fibre optic cables spares requirements within all Eskom entities. This encompasses the critical and strategic spares levels required for emergencies. These are necessary to cater for single and multiple contingencies to maintain continuity of supply in the event of an emergency.

2.1.2 Applicability

This document shall apply throughout Eskom Holdings and its subsidiaries.

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] 240-120055534 Distribution strategic and critical spares standard.
- [3] 240-70240749 Strategic and Critical Spares Policy.
- [4] 240-120382558 Emergency tower response.
- [5] 240-47172520 The standard for the construction of Overhead Power Lines.
- [6] NRS 061-2 Specification for Overhead Ground Wire with Optical Fibre – Part 2: Installation Guidelines
- [7] NRS 078-2 ADSS Specification for All Dielectric Self-Supporting Fibre Optic Cable - Part 2 Installation Guideline
- [8] NRS 088-2 Duct or directly buried underground optical-fibre cable: Part 2: Installation Guidelines

2.2.2 Informative

None

2.3 Definitions

2.3.1 General

None

2.3.2 Disclosure classification

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

2.4 Abbreviations

Abbreviation	Description
OPGW	Optical Ground Wire
AD-Lash	All-Dielectric Lashed
ADSS	All-Dielectric Self-Supporting
NTCSA	National Transmission of South Africa
Dx	Distribution

2.5 Roles and responsibilities

Installation or repair work required may need emergency strategic spares. It is the responsibility of the asset owner to have the correct spares available. All spares shall be issued to the contractor to effect repair work.

2.6 Process for monitoring

Not applicable.

2.7 Related/supporting documents

Not applicable.

3. Fibre Optic Cable Repair Work Requirements

It must be noted that the area at which fault occurs and type of fibre fault influences the repair scope and design. Some repairs may be permanent, and some may be temporary.

3.1 Pros and Cons of the Various approved fibre optic cables

Table 1: Approved Fibre Optic Cables

	OPGW	ADSS	DUCT	Externally Attached
PROS	Mature technology Very robust Available from many sources Most reliable aerial optic cable solution	Easy to install Independent of power conductors Total galvanic isolation Available from many local sources	Independent of power conductors (only non-shielded cables) Available from many local sources	Can be used on all line voltages Easy to install with fast roll-out (10 – 20 km per day) Minimal additional loading on towers Total galvanic isolation Live-line installation possible on certain tower types

	OPGW	ADSS	DUCT	Externally Attached
CONS	Tower loading considerations (I²t product vs diameter) Live line retrofitting appears impossible with current Eskom tower designs Most expensive aerial optic cable solution Long lead time (overseas) Relatively low roll-out rate (2 to 4 km per week)	Only used on lines operating below 150 kV (dry band arcing) Ground clearance problems Vulnerable to veld fires/vandalism May require additional pole towers for installation	Requires trenches Expensive to dig (terrain dependent)	Can suffer from dry-band arcing in the vicinity of insulated earth wire towers Limited fibre count (24/48 max) Only few suppliers Fairly vulnerable with possibly lower service life expectancy Only available in a relatively short drum length (2/5 km) Very expensive

From the list, the only viable options for spares are OPGW, DUCT and ADSS fibre optic cables.

3.2 Repair Scenarios

The requirement for the repairs differs based on the type of damage that has occurred. Analysis of this gives rise to quantity, types of cable and hardware that is required for spares.

- Aerial Fibre cable damaged (fibre cores compromised)
- Towers Structure (with aerial fibre cable) has fallen
- OPGW or ADSS Hardware failure

During each of these scenarios, the following shall also be considered:

- Is it a rural area?
- It is a built-up, highly congested area?
- What are the outage constraints?

When considering these situational scenarios, it is found that only certain spares are required due to the different applications. These are as listed in the next sections.

3.3 Spares required

The spares should be stored per Grid or Cluster as required.

3.3.1 OPGW Cable

Application of OPGW cable is for permanent solutions and when an outage that is sufficient in duration is allowed. A drum of 5km of either 48 cores 16kA or 12kA should be stored per Grid or Cluster, dependent on what is utilised most in each Grid or Cluster.

Type Cable	Drum Length	NTCSA per GRID	Dx per Cluster
OPGW	5000m	X	X

3.3.2 ADSS Cable

ADSS cable is used for temporary (in NTCSA for a period not exceeding 12 months) and in Distribution ADSS will be used for permanent solution when replacing like for like. A drum of 5km long-span 48 cores ADSS cable should be sufficient per Grid or Cluster.

Type Cable	Drum Length	NTCSA per GRID	Dx per Cluster
ADSS	5000m		X

3.3.3 Hardware

Hardware shall be demarcated as below taking into consideration the type of network, i.e. NTCSA & Dx.

The OPGW hardware requirements for a 5km drum, with the line span length at 500m (for NTCSA) will equal to 11 towers and at 250m spans (Distribution) will equal to 20 towers. The allocation of Strain and Suspension hardware should be done as follows, 30% of towers will be Strain and 70% of towers will be Suspension, 2 joint boxes and slack brackets to be included.

Table 2: OPGW Hardware

Type	NTCSA per GRID Quantity	Dx per Cluster Quantity
Strain attachment	3	6
Suspension attachment	7	12
Joint box	2	2
Slack bracket	2	2

NB: Note that additional insulated assembly per type to be ordered per the above quantities

The ADSS hardware requirements for a 5 km drum with the line span length at 250m equal 20 towers. The allocation of Strain and Suspension hardware should be done as follows, 30% of towers will be Strain and 70% of towers will be Suspension. 2 joint boxes and slack brackets to be included.

Table 3: ADSS Hardware

Type	NTCSA per GRID Quantity	Dx per Cluster Quantity
Strain attachment		6
Suspension attachment		12
Joint box		2
Slack bracket		2

Most common faults: OPGW hardware Shackles & links that break; Eyebolts; Joint boxes (vandalism)

3.3.4 Duct Cable

A maximum of two 3km drums, 48 core duct fibre optic cable should be stored per Grid and Cluster.

Type	Drum length	NTCSA per GRID	Dx per Cluster
Duct	3000m	X	X

3.3.5 AD-lash cable

This technology has been discontinued and any faults on this type of network shall be replaced with either ADSS or OPGW depending on the feasibility.

4. Authorization

This document has been seen and accepted by:

Name and surname	Designation
Tshepiso Moloisane	Telecoms Design- Distribution Technology & Engineering
Thuli Tladi	Telecoms Middle Manager- Distribution Technology & Engineering
Mondli Shabalala	Telecoms Chief Engineer- Distribution Technology & Engineering
Jaco Badenhorst	Senior Advisor – Fibre Optic Network (NTCSA)
Judith Malinga	Senior Manager PTM&C Engineering

5. Revisions

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Jan 2026	1	L Buthane	First Issue

6. Development team

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

- Lesiba Buthane
- Thuli Tladi
- Tshepiso Moloisane
- Jaco Badenhorst

7. Acknowledgements

Not applicable.