Eskom	Standard	Transmission

Title: **STANDARD FOR LABELLING OF FIBRE-OPTIC CABLES**

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	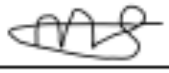	
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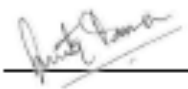

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Content

1. Introduction

Eskom's vision to migrate to substation automation system for all Transmission and Distribution substations entails the use of fibre optic cables within the control room as well as from the control room to the Diameter Marshalling Kiosk (DMKs) in the case of stations where the Breaker and a Half is deployed. This document is therefore necessary in order to standardise the way these fibre optic cables are labelled.

2. Supporting clauses

2.1 Scope

This standard is required to cater for all Transmission and Distribution substations application where fibre optic cables need to be installed for substation automation, telecommunication as well as teleprotection purposes

2.1.1 Purpose

This standard aims to define the convention to be used when labelling fibre optic cables

2.1.2 Applicability

This document shall apply throughout Eskom Transmission.

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.

2.2.2 Informative

[1] Insert informative document references here.

[2] 240-46264031: Fibre Optic Cable Design standard

[3] 240-70732888: Fibre Optic Cable System Acceptance Testing Standard

[4] 41-1069: IEC61850 Fibre Optic Standard

[5] TST41-115: Substation Fibre Optic Cable Installations

2.3 Definitions

2.3.1 General

Definition	Description
Approved by	The accountability of the Approver of the document is equivalent to the specified role of Functional Responsible/Owner as identified in 240-53114186 and 32-6 for Documents and Records Management.
MA	Naming system for the diameter. M stands for 765 kV and A is the first diameter. The second would be MB, third MC, etc.
TA1	Auxiliary Transformer 1
TIE	The breaker that is shared between Bay 1 and Bay 2

2.3.2 Disclosure classification

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

2.4 Abbreviations

Abbreviation	Description
B1	Bay 1
B2	Bay 2
BCA	Bus Couple A
BR	Busbar Reactor
BZ	Bus Zone
CEP	Common Equipment Panel
DIP	Diameter Interface Panel
DMK	Diameter Marshalling Kiosk
DR	Data Recorder
EWS	Engineering Work Station
FD	Feeder panel
FP	Fibre patch panel
FR1	Feeder 1 Reactor
FS	Fibre Switching Panel
GW	Gate Way
HMI	Human Machine Interface
JB	Junction Box
MEAS	Measurements panel
PTM&C	Protection, Telecoms, Metering and Control
RTU	Remote Terminal Unit
RX	Reactor
SDS	Serial Device Server
SRTU	Station RTU
TB	Tie Bay
TCP	Tap Changer Panel
TR	Transformer

2.5 Roles and responsibilities

It is the responsibility of Telecontrol applications department to ensure compliance to requirements as captured in this document

2.6 Process for monitoring

Not Applicable

2.7 Related/supporting documents

Not Applicable

3. Substation Automation Fibre Labels

Fibre Optic systems are used extensively throughout the Eskom power and telecommunications networks. These fibre systems are used to provide tele-protection, tele-control, substation automation (IEC 61850) and remote engineering which collectively ensure and enhance the performance of the power network. Furthermore, the fibre optic cable network constitutes an integral component of the Eskom telecommunications network and thereby supports the provision of bandwidth and reliable telecommunications services as required by Eskom's business systems.

Three fibre optic cabling scenarios exist for the substations where the Breaker and a half technology are being used, namely:

a) Intra-control room cabling

b) HV yard conventional

c) HV yard Breaker and a half

Labelling Convention

The reference for labelling the fibre cables shall be from the Yard (Junction Box) to the Control room. For naming of the fibre cables connected between the panels inside the control room the reference shall be from a higher voltage panel to a lower voltage panel.

Each fibre cable shall be labelled according to:

a) The prefix identifying the bay to which it is associated, followed by

b) A number denoting a voltage level of the bay,

c) The destination cabinet in which it will be terminated, and

d) The number representing main 1 or main 2 (where applicable).

The labelling convention can be summarized as:

(Originating panel).(Voltage Level).(Destination panel).(Main 1/2)

Where the number convention denoting voltage level is as follows:

Table 1: Voltage Levels Prefix

Voltage Level (kV)	Prefix
765	8
400	1
275 and 220	2
132	3
88, 66 and 44	4
33, 22, and 11	5

3.1 Fibre Optic Cable Labelling Examples

3.1.1 Intra-Control Room Labelling

a) If the cable is to be installed between the Fibre Optic Switching panel and the HMI/EWS/GW/CEP/D20/D400/BZ/MEAS/TC panel, the cable shall be numbered as: (Originating panel). (Voltage Level).(Destination panel)(Main 1/2)

Where,

Voltage Level represents the station/control room voltage and prefixed as per table 1 above.

Fibre switching panel is always considered the destination panel whenever a fibre cable is connected to any other panel.

Examples:

GW1.3.FS1.1 shall be used for labelling fibre optic cable connected between the gateway main 1 panel and the fibre switching panel 1 in then control room with station voltage of 132kV.

Where there's only 1 GW the number prefix falls off

D20.2.FS1.1 shall be used for labelling fibre optic cable number connected between the station RTU and the fibre switching panel 1 in the control room with station voltage of 275 kV.

MEAS.3.CEP.1 shall be used to label the fibre cable connected between main one 132 kV measurements panel and the common equipment panel.

TCP1.1.CEP1.1 shall be used to label the fibre cable connected between the 400 kV transformer Tap Change panel and the common equipment panel.

DIP.GA.FS1.2 shall be used for labelling fibre optic cable connected between the main one's 400 kV diameter marshalling panel and the fibre switching panel 1 in the control room.

b) If the cable is to be installed between the Fibre Optic switching panel and a Protection Scheme Interface Panel (FD, TR, FR, BC, BS, BZ, RX, CX, etc.) the cable shall be labelled as: **(Originating panel).(Voltage Level).(Destination panel).(Main 1/2)**

Where,

Voltage Level represented the bay voltage level and prefixed as per table 1

Fibre switching panel is always considered the destination panel wherever a fibre cable is connected between this panel and any other panel.

Example:

FD1.8.FS1.2 shall be used for labelling fibre optic cable connected between main two 765 kV Feeder 1 protection panel and fibre optic switching 1 panel in the control room

3.1.2 HV yard conventional labelling

a) If the cable is to be installed between the JB in the HV yard and the protection/interface panel in the control room, the cable shall be numbered accounting to:

- The prefix identifying the bay (as per station electric diagram) to which it is associated, followed by
  - A number denoting a voltage level of the bay, and
  - The destination panel in which it will be terminated,
  - And the number representing main 1 or main 2 (where applicable) The labelling convention can be summarized as:

(Originating panel). (Voltage Level).(Destination panel).(Main 1/2)

Example:

C1.3.FD3.1 shall be used to label the fibre cable connected between 132 kV Feeder 3 JB in the HV yard and the 132 kV feeder 3 protection panel main 1 in the control room.

Where, **C1** is a bay prefix for Feeder 3 as per the station electric diagram in this specific example.

E1.3.FD4.1 shall be used to label the fibre cable connected between 132 kV Feeder 4 JB in the HV yard and the 132 kV feeder 4 protection panel main 1 in the control room.

Where, **E1** is a bay prefix for Feeder 4 as per the station electric diagram in this specific example

G2.3.FD9.2 shall be used to label the fibre cable connected between 132 kV Feeder 9 JB in the HV yard and the 132 kV feeder 9 protection panel main 2 in the control room.

Where, **G2** is a bay prefix for Feeder 9 as per the station electric diagram in this specific example

3.1.3 HV yard Breaker and a half labelling

a) If the cable is to be installed between the JB in the HV yard and the diameter interface panel (DIP) in the control room, the cable shall be numbered as: **(Bay number/prefix).(Prefix Denoting Voltage).(Bay Number Destination panel).(Main 1/2)**

Where,

The HV breaker of the transformer is Bay 1 of the diameter but the MV breaker is an independent assigned with a bay prefix on the station electric

Example:

B2.GA.B2P.1 shall be used to label the fibre cable connected between 400kV FDR BRK PIU JB panel and main 1 Diameter GA bay 2 Relay panel in the control room.

TB.GA.DIP.1 shall be used to label the fibre cable connected between 400kV TIE bay BRK PIU JB panel and main 1 Diameter GA Relay panel in the control room.

B1.GA.B1P.1 shall be used to label the fibre cable connected between TRFR11 400kV BRK PIU JB panel and main 1 Diameter GA bay 1 Relay panel in the control room.

T11.GA.B1P.1 shall be used to label the fibre cable connected between TRFR11 400kV TRFR PIU JB panel and main 1 Diameter GA bay 1 Relay panel in the control room.

D1.3.GA.B1P.1 shall be used to label the fibre cable connected between TRFR11 135kV BRK PIU JB panel and main 1 Diameter GA bay 1 Relay panel in the control room.

Where, **D1** is a bay prefix for transformer 11 as per the station electric diagram in this specific example

T11.GA.TCP1.1 shall be used to label the fibre cable connected between TRFR11 400kV TRFR/Tap Change PIU JB panel and main 1 Tap change panel 1 in the control room.

T12.GA.TCP1.1 shall be used to label the fibre cable connected between TRFR12 400kV TRFR/Tap Change PIU JB panel and main 1 Tap change panel 1 in the control room.

3.1.4 Panel Labelling

a) Patch panels shall be labelled with the full description of the originating bay panel/cabinet.

Example:

132 kV Feeder 3: shall be used for naming patch panel were a fibre cable originating from the 132 kV feeder 3 is terminated.

Gateway 1: shall be used for naming patch panel with a fibre cable originating from gateway 1 panel

3.1.5 Patch Leads Fibre Cable Labelling

Labelling Convention

For the Labelling of the fibre cables between patch panels, switches and devices, each fibre patch lead) shall be labelled according to the following:

1) A prefix number for the voltage level of the originating bay, and

2) Then a prefix denoting an originating bay panel.

The labelling convention can be summarized as:

Voltage Level).(Originating panel) Examples:

3) FD3 shall be used to label the fibre patch lead for the fibre cable terminated from 132 kV feeder 3.

4. Authorization

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5. Revisions

Date	Rev.	Compiler	Remarks
Oct 2022	3	P Sekhoto	New Template used Updated the Applicability and purpose of the document to be in-line with the Transmission Division legal separation.
April 2018	2	MA Malapile	New Template used. Included naming convention for dual Control room and junction box to control room labelling convention used for new protection schemes
June 2012	1	R Hariram	First issue: Included Telecoms and Teleprotection requirements.

6. Development team

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

- Latti Molokomme
- Quinton Labuschagne
- Dumisani Gojela

7. Acknowledgements

- Latti Molokomme