

 <b>Eskom</b>	<b>Standard</b>	<b>Technology</b>
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## **1. Introduction**

This specification covers the manufacture, testing at works, user documentation, supply and delivery to Eskom's sites and off-loading of Optical Distribution Frames or Patch Panels/Boxes.

## **2. Supporting clauses**

### **2.1 Scope**

#### **2.1.1 Purpose**

This specification defines Eskom's requirements for Optical Distribution Frames / Patch Panels/ Patch Boxes, for:

- Option A: Patch panel for mounting in 19 inch cabinets, for the terminating of 12, 24 or 48 single mode fibre cables,
- Option B: Patch panel for the mounting in 19 inch cabinets for the terminating of 12 or 24 core multimode cables,
- Option C: Patch box for mounting on walls or in other cabinets with a din rail for 6 core single mode cables.
- Option D: Patch box for mounting on walls or in other cabinets with a din rail for 12 core multimode cables.

An enquiry based on this specification will call for the manufacture, testing at works, delivery to site, off-loading of the ODF/Patch Panel or Box at Eskom installations. The equipment is to be installed into 19" or other cabinets and enclosures provided by Eskom.

#### **2.1.2 Applicability**

This document shall apply throughout Eskom Transmission and Distribution Divisions.

## **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] 240-75655504: Corrosion protection standard for new indoor and outdoor Eskom equipment, components, materials and structures manufactured from steel
- [2] 0.54/09000: Fibre Patch Panel Drawing
- [3] 0.54/09002: Fibre Patch Box Drawing
- [4] 240-46264031: Fibre-Optic Design & Installations - Substations

### **2.2.2 Informative**

- [5] QM 58 – Supplier Contract Quality Requirements Specification
- [6] 240-60725641 Specification for Standard (19 inch) Equipment Cabinet

## 2.3 Definitions

### 2.3.1 General

Definition	Description
Technical Terms	For the purpose of this specification, technical terms used shall be as defined in the documents listed in clause 2.2.1 (Normative References)

### 2.3.2 Disclosure classification

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

## 2.4 Abbreviations

Abbreviation	Description
APC	Angle Polished Connector
GRP	Glass Reinforced Plastic
LC	Lucent Connector
mm	millimetre
ODF	Optical Distribution Frame (or Patch Panel)
SANS	South African National Standards
SC-APC	Standard Connector – Angled Polished Connector
µm	micrometre

## 2.5 Roles and responsibilities

Acceptance testing is to be performed by either Transmission Telecoms, Works Planning and Centralised Services Department or as otherwise specified.

## 2.6 Process for monitoring

Not applicable.

## 2.7 Related/supporting documents

Not applicable.

## 3. Optical Distribution Frame / Patch Panel Requirements

### 3.1 Option A: Mechanical Characteristics of 1U Patch Panel for Single Mode fibre optic cables

- The ODF shall be of an enclosed metal or mild steel outer case with a hard plastic organiser and shall be capable of being mounted in a 19" cabinet.
- The depth of the ODF shall not be greater than 260mm.
- The ODF shall adhere to 240-75655504 Eskom's Corrosion Protection Standard.
- The unit shall be maximum 1U high for 12 to 48 fibre cores. A 1U brush tray (same dimensions as 19" patch panel) can be used for storage of the leads, if necessary and shall have adjustable mounting brackets to install at various depths into the cabinet.

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- e) The casing shall allow for mounting of adjustable brackets (especially midway of the ODF), if necessary, so that the ODF can be mounted at various depths into a cabinet. There should also be brackets provided to mount the ODF in a 21" cabinet.
  - f) The ODF shall provide a facility for splice organization or a splice cassette of dimensions of reasonable proportions to accommodate the number of cores to be spliced.
  - g) The casing shall have a swivel tray that can move out of the main bracket (but not totally detached from it) for easy access to the fibres and shall not disturb the other patch leads.
  - h) Two 1U ODFs shall be able to be mounted one below the other with full access to the fibres with the swivel tray function.
  - i) The ODF unit shall also have built-in pigtail guides in the swivel portion of the case.
  - j) A cable terminating clamp shall be fixed to the rear of the non-movable portion of the ODF.
  - k) The clamping device shall also come with a jubilee clamp, a strain relief clamp (for the GRP-strength member) and a sealing rubber piece, or any other similar means for firmly securing the duct fibre cable of varying diameters.
  - l) Transport tubes shall be provided for protecting the fibre from the clamping device to the splice organiser.
  - m) The splice cassette shall be mounted with sufficient space to access the mid couplers for removal. Sufficient splice protectors to fit the splice cassette shall be provided together with 2 spare splice protectors.
  - n) The spacing of the holes on the faceplate shall be such that there is enough space to connect or disconnect the pig-tails to the mid couplers.
  - o) The casing finish shall be smooth enough such that the utilisation of adhesive labels for all labelling purposes might be facilitated.
  - p) Mid couplers shall be of high quality, suitable for reliable single mode connections as per 240-46264031. Details of connectors shall be submitted to Eskom for approval.
  - q) The faceplate shall be supplied with the full complement of SC-APC D-hole mounting mid couplers (ceramic insert type) fitted (single mode) - all to be supplied with installed dust caps.
  - r) The patch panel shall be supplied with SC-APC single mode pigtails.
  - s) Velcro straps or Velcro cable ties, appropriate for bundling patch leads, should be provided with the patch panel.

### **3.2 Option B: Mechanical Characteristics of 1U Patch Panel for Multimode fibre optic cables**

- a) The ODF shall be of an enclosed metal or mild steel outer case with a hard plastic organiser and shall be capable of being mounted in a 19" cabinet.
- b) The ODF shall adhere to 240-75655504 Eskom's Corrosion Protection Standard.
- c) The functional specifications shall adhere to Eskom document 0.54/09000: Fibre Patch Panel Drawing.
- d) The unit shall be maximum 1U high for 12 to 24 fibre cores.
- e) The casing shall allow for mounting of adjustable brackets, if necessary, so that the ODF can be mounted at various depths into a cabinet.
- f) The ODF shall provide a facility for splice organization/s or a splice cassette/s of dimensions of reasonable proportions to accommodate the number of cores to be spliced.
- g) The casing shall have a swivel tray that can move out of the main bracket (but not totally detached from it) for easy access to the fibres and shall not disturb the other patch leads.

- 
- h) Two 1U ODFs shall be able to be mounted one below the other with full access to the fibres with the swivel tray function.
  - i) The ODF unit shall also have built-in pigtail guides in the swivel portion of the case.
  - j) A cable terminating clamp shall be fixed to the rear of the non-movable portion of the ODF.
  - k) The clamping device shall also come with a jubilee clamp, a strain relief clamp (for the GRP-strength member) and a sealing rubber piece, or any other similar means for firmly securing the duct fibre cable of varying diameters.
  - l) Transport tubes shall be provided for protecting the fibre from the clamping device to the splice organiser.
  - m) The splice cassette shall be mounted with sufficient space to access the mid couplers for removal. Sufficient splice protectors to fit the splice cassette shall be provided together with 2 spare splice protectors.
  - n) The spacing of the holes on the faceplate shall be such that there is enough space to connect or disconnect the pig-tails to the mid couplers.
  - o) The casing finish shall be smooth enough such that the utilisation of adhesive labels for all labelling purposes might be facilitated.
  - p) Mid couplers shall be of high quality, suitable for reliable multimode connections as per 240-46264031. Details of connectors shall be submitted to Eskom for approval.
  - q) The faceplate shall be supplied with the full complement of duplex LC mid couplers (multimode) - all to be supplied with installed dust caps.
  - r) The patch panel shall be supplied with LC multimode pigtails.
  - s) The multimode patch panel shall have an M6x15 earthing stud to allow for earthing to the earth bar, refer to Eskom approved drawing 0.54/09000 for specific requirement.

### **3.3 Option C: Mechanical Characteristics of Single Mode Side/Wall Mount Patch Box**

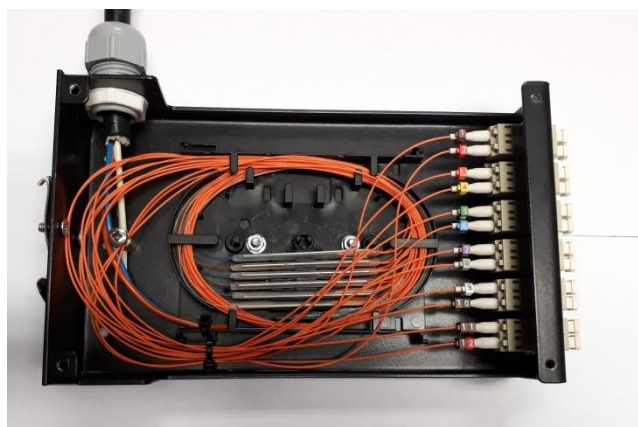
- a) The patch box shall be a closed mild steel case with a slide out cover and similar as per the Eskom approved drawing 0.54/09002 and shall adhere to 240-75655504 Eskom's Corrosion Protection Standard.
- b) It should have a maximum size of 200 mm x 120mm x 45mm.
- c) The casing shall allow for mounting on a wall or on the side panel of a cabinet with a din rail facility.
- d) The patch box shall have accessories for securing and organising the fibre and splice cassette.
- e) The splice cassette with an approximate size of 120mm x 100mm x 10mm shall have a cover that can be snapped on and off.
- f) The patch box shall be supplied with 6 x SC/APC pigtails for single mode cable.
- g) The box shall provide a mounting plate with 6 single SC/APC mid couplers for single mode.
- h) The patch box shall allow for a suitable gland to secure the unarmoured cable entering the patch box.
- i) The patch box shall also provide a strain relief clamp to secure the Glass Reinforced Plastic strength member.
- j) The casing finish shall be smooth enough such that an adhesive label can be attached for labelling.

### 3.4 Option C: Mechanical Characteristics of Multimode Side/Wall Mount Patch Box

- a) The patch box shall be a closed mild steel case with a slide out cover as per the Eskom approved drawing 0.54/09002 and shall adhere to 240-75655504 Eskom's Corrosion Protection Standard.
- b) It should have a maximum size of 200 mm x 120mm x 45mm.
- c) The casing shall allow for mounting on a wall or on the side panel of a cabinet with a din rail facility.
- d) The patch box shall have accessories for securing and organising the fibre and splice cassette.
- e) The splice cassette with an approximate size of 120mm x 100mm x 10mm shall have a cover that can be snapped on and off.
- f) The patch box shall be supplied with 12 x 50/125µm multimode LC pigtails for multimode cable.
- g) The box shall provide a mounting plate with 6 duplex LC mid couplers installed on it for multimode.
- h) The patch box shall allow for a suitable gland to secure the unarmoured cable entering the patch box.
- i) The patch box shall also provide a strain relief clamp to secure the Glass Reinforced Plastic strength member.
- j) The casing finish shall be smooth enough such that an adhesive label can be attached for labelling.
- k) The patch box shall have an M6x15 earthing stud to allow for earthing to the earth bar.
- l) The drawings below give an indication of what the patch box shall look like.



**Figure 1: Empty Closed Patch Box**



**Figure 2: Equipped Patch Box**

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### 3.5 Additional Requirements

- a) The Supplier shall provide a sample of the patch panel and or the patch box for evaluation and acceptance.

### 3.6 Documentation

- a) The following documentation shall be supplied:
- 1) All outline drawings and details of construction of ODF/Patch panel and Patch box.
  - 2) Details of splice organisers.
  - 3) Installation instructions.
  - 4) All specifications of mid couplers

## 4. Authorization

This document has been seen and accepted by:

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## 5. Revisions

Date	Rev	Compiler	Remarks
April 2023	4	V Naidu	Single mode ODF changes for midway and 21” adjustable brackets
Aug 2022	3	V Naidu	Minor revision of wording. Removal of Statement of Compliance.
Feb 2018	2	V Naidu	Including of referencing to Eskom specific drawings of the 1U patch panel and patch box.
March 2015	1	V Naidu	Including patch box requirements Formatted to S C O T-New Standard Template_20 August 2013. Correction of typing errors Document number changed
April 2010	1	V Naidu	Change of document layout. Change ST to SC-APC midcouplers.
Dec 2006	0		Renumbering of old specification TRMSC0015

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## **6. Development team**

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

- T Gosai

## **7. Acknowledgements**

Not applicable.

**Annex A – Schedule A/B – Single Mode Patch Panel 19”**

Clause No	Description of Clause	Schedule A	Schedule B (Tenderer's
		(Eskom's Requirement)	Compliance and Supporting Evidence)
Patch Panel 19' Single Mode		Single Mode	
Manufacturer Details - address/location		comply	
Specification/Device name		comply	
3.1 a)	Enclosed metal or mild steel case and hard plastic organiser	comply	
3.1 a)	Mounted in a 19" cabinet	comply	
3.1.b)	Depth <260mm	comply	
3.1.c)	Adhere to 240-75655504 Eskom's Corrosion Protection Standard	comply	
3.1 d)	1U high (for 12 - 48 fibre) including storage for patch leads.	comply	
3.1 d)	1U brush tray shall be used for storage of the leads required.	comply	
3.1 e)	Mounting of adjustable brackets at midway or ends of the ODF.	comply	
3.1 e)	Adjustable brackets provided for a 21" cabinet.	comply	
3.1 f)	Splice organization or a splice cassette of dimensions to accommodate fibre core splices of 12 to 48.	comply	
3.1 g)	Swivel tray that can move out of the main bracket.	comply	
3.1 h)	Two 1U ODFs should be able to be mounted one below the other with full access to the fibres with the swivel tray function	comply	
3.1 i)	Built-in pigtail guides in the swivel portion of the case	comply	
3.1 j)	A cable terminating clamp should be fixed to the rear of the non-movable portion of the ODF.	comply	
3.1 k)	Firmly able to secure the duct fibre cable with varying diameter.	comply	
3.1 l)	Transport tubes should be provided for protecting the fibre.	comply	
3.1 m)	Splice cassette shall be mounted with sufficient space.	comply	
3.1 m)	Splice protectors that fit the splice cassette shall be provided with 2 spare.	comply	

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Clause No	Description of Clause	Schedule A	Schedule B (Tenderer's Compliance and Supporting Evidence)
		(Eskom's Requirement)	
3.1 n)	Spacing of the holes on the faceplate - enough space to connect or disconnect the pig-tails	<i>comply</i>	
3.1 o)	Casing finish shall be smooth for adhesive labelling	<i>comply</i>	
3.1 p)	Mid couplers shall be of high quality. Provide mid coupler specifications.	<i>provide specification</i>	
3.1 q)	Full complement of SC-APC (12-48) D-hole mounting mid couplers	<i>Comply 6/12/24/48 simplex SC/APC single mode</i>	
3.1 r)	Supplied with SC/APC single mode pigtails	<i>comply</i>	
3.1 s)	Velcro Cable ties provided	<i>comply</i>	

**Annex B – Multimode Patch Panel 19”**

Clause No	Description of Clause	Schedule A	Schedule B (Tenderer's
		(Eskom's Requirement)	Compliance and Supporting Evidence)
Patch Panel 19' Single Mode			XXXXXXXXXX
Manufacturer Details - address/location		comply	
Specification/Device name		comply	
3.2 a)	Enclosed metal or mild steel case and hard plastic organiser	comply	
3.2 a)	Mounted in a 19" cabinet	comply	
3.2 b)	Adhere to 240-75655504 Eskom's Corrosion Protection Standard	comply	
3.2 c)	1U high (for 12 - 24 fibre) including storage for patch leads.	comply	
3.2 c)	1U brush tray shall be used for storage of the leads required.	comply	
3.2 d)	Mounting on adjustable brackets, if necessary.	comply	
3.2 e)	Splice organization or a splice cassette of dimensions to accommodate fibre core splices of 12 to 24. Provide drawing	provide specification	
3.2 f)	Swivel tray that can move out of the main bracket.	comply	
3.2 g)	Two 1U ODFs should be able to be mounted one below the other with full access to the fibres with the swivel tray function	comply	
3.2 h)	Built-in pigtail guides in the swivel portion of the case	comply	
3.2 i)	A cable terminating clamp should be fixed to the rear of the non-movable portion of the ODF.	comply	
3.2 j)	Firmly able to secure the duct fibre cable with varying diameter.	comply	
3.2 k)	Transport tubes should be provided for protecting the fibre.	comply	
3.2 l)	Splice cassette shall be mounted with sufficient space.	comply	
3.2 m)	Splice protectors that fit the splice cassette shall be provided with 2 spare.	comply	
3.2 n)	Spacing of the holes on the faceplate - enough space to connect or disconnect the pig-tails	comply	

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Clause No	Description of Clause	Schedule A	Schedule B (Tenderer's Compliance and Supporting Evidence)
		(Eskom's Requirement)	
3.2 o)	Casing finish shall be smooth for adhesive labelling	<i>comply</i>	
3.2 p)	Mid couplers shall be of high quality. Provide mid coupler specifications.	<i>provide specification</i>	
3.2 q)	Full complement of 6 or 12 duplex LC mid couplers fully fitted	<i>Comply 6/12 duplex LC mid couplers</i>	
3.2 r)	Supplied with 50/125µm multimode LC pigtails.	<i>comply</i>	
3.2 s)	Supplied with M6x15 earthing stud	<i>comply</i>	

**Annex C – Schedule A/B – Single mode Patch Box**

Clause No	Description of Clause	Schedule A  (Eskom's Requirement)	Schedule B (Tenderer's  Compliance and Supporting Evidence)
<b>Patch Box - Single mode</b>			
Manufacturer Details - address/location		<i>comply</i>	
Specification/Device name		<i>comply</i>	
3.3 a)	Patch box shall be a closed mild steel case with a slide out cover	<i>comply</i>	
3.3 a)	Similar to specifications of the Eskom approved drawing 0.54/09002	<i>comply</i>	
3.3 a)	Adhere to 240-75655504 Eskom's Corrosion Protection Standard.	<i>comply</i>	
3.3 b)	Maximum size of 200 mm x 120mm x 45mm. Provide drawing.	<i>Provide outline sketch</i>	
3.3 c)	Mounting on a wall or on the side panel of a cabinet with din rail facility.	<i>comply</i>	
3.3 d)	Accessories for securing and organising the fibre and splice cassette	<i>comply</i>	
3.3 e)	Splice cassette with an approximate size of 120mm x 100mm x 10mm	<i>comply</i>	
3.3 f)	Supplied with 6 x SC/APC single mode pigtails	<i>6x SC/APC single mode pigtails</i>	

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Clause No	Description of Clause	Schedule A  (Eskom's Requirement)	Schedule B (Tenderer's  Compliance and Supporting Evidence)
3.3 g)	A mounting plate with 6 single SC/APC mid couplers. Tenderer to supply specifications.	<i>Single mode SC/APC mid couplers. Tenderer to supply specifications</i>	
3.3 h)	Suitable gland to secure the unarmoured cable	<i>comply</i>	
3.3 i)	Provide a strain relief clamp to secure the Glass Reinforced Plastic strength member	<i>comply</i>	
3.3 j)	Casing finish shall be smooth for adhesive labelling	<i>comply</i>	

**Annex D – Schedule A/B – Multimode Patch Box**

Clause No	Description of Clause	Schedule A (Eskom's Requirement)	Schedule B (Tenderer's  Compliance and Supporting Evidence)
<b>Patch Box - Multimode</b>			<b>XXXXXXXX</b>
Manufacturer Details - address/location			
Specification/Device name			
3.3 a)	Patch box shall be a closed mild steel case with a slide out cover	<i>comply</i>	
3.3 a)	Similar to specifications of the Eskom approved drawing 0.54/09002	<i>comply</i>	
3.3 a)	Adhere to 240-75655504 Eskom's Corrosion Protection Standard.	<i>comply</i>	
3.3 b)	Maximum size of 200 mm x 120mm x 45mm. Provide drawing.	<i>Provide outline sketch</i>	
3.3 c)	Mounting on a wall or on the side panel of a cabinet with din rail facility.	<i>comply</i>	
3.3 d)	Accessories for securing and organising the fibre and splice cassette	<i>comply</i>	
3.3 e)	Splice cassette with an approximate size of 120mm x 100mm x 10mm	<i>comply</i>	
3.3 f)	Supplied with 12 x 50/125µm multimode LC pigtails	<i>12x 50/125µm multimode LC pigtails</i>	
3.3 g)	A mounting plate with 6 duplex LC mid couplers. Tenderer to supply specifications.	<i>Multimode LC duplex midcouplers required. Tenderer to supply specifications</i>	

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Clause No	Description of Clause	Schedule A  (Eskom's Requirement)	Schedule B (Tenderer's  Compliance and Supporting Evidence)
3.3 h)	Suitable gland to secure the unarmoured cable	<i>comply</i>	
3.3 i)	Provide a strain relief clamp to secure the Glass Reinforced Plastic strength member	<i>comply</i>	
3.3 j)	Casing finish shall be smooth for adhesive labelling	<i>comply</i>	
3.3 k)	Supply M6x15 earthing stud	<i>comply</i>	

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**Annex E – Schedule A/B – Additional Requirements**

Clause No	Description of Clause	Schedule A (Eskom's Requirement)	Schedule B (Tenderer's Compliance and Supporting Evidence)
<b>Additional Requirements -Complete for all Options</b>			
3.4 a)	Provide a sample of the patch panel/box	<i>comply</i>	
<b>Documentation - Complete for all Options</b>			
3.5 a) 1)	All outline drawings for ODF/Patch panel & Patch box	<i>provide details/drawings</i>	
3.5 a) 2)	Details of splice organisers	<i>provide details/drawings</i>	
3.5 a) 3)	Installation instructions	<i>provide installation document</i>	
3.5 a) 4)	All specifications of mid couplers	<i>provide specifications</i>	
3.5 b)	Note documentation conformance	<i>comply</i>	
3.5 c)	Hardcopies of documentation to be supplied	<i>comply</i>	

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