Eskom	Standard	Technology

Title: **TST41-695 Standard for the Installation of a Telecomms Equipment Cabinet Standard**

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1. INTRODUCTION

This document covers Eskom Transmission's requirements for the installation of any telecommunications cabinet in a telecommunications or control room in a high voltage environment.

2. SUPPORTING CLAUSES

2.1 SCOPE

This document sets out a standard for any telecommunications cabinet, being installed in a telecommunication or control room, associated with a High voltage environment and providing details on the earthing of the cabinet and the glanding of armoured and non-armoured cables.

2.1.1 Purpose

The purpose of the document is to provide a standard which will ensure that all telecommunications cabinets, associated with the harsh high voltage environment, is installed in such a way that it will safeguard the electronic equipment installed in the cabinet.

2.1.2 Applicability

This document shall apply throughout Eskom Holdings Limited 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

None

2.2.2 Informative

None

2.3 DEFINITIONS

Definition	Description
	None

2.3.1 Disclosure Classification

Controlled Disclosure: Controlled Disclosure to External Parties (either enforced by law, or discretionary).

2.4 ABBREVIATIONS

Abbreviation	Description
AC	Alternating Current
BME	Bandwidth Management Equipment
DC	Direct Current
EA	Engineering Assistant
HDPE	High Density Polyethylene
IDF	Intermediate Distribution frame
LME	Line Matching Equipment.
PLC	Power Line Carrier

2.5 ROLES AND RESPONSIBILITIES

It will be the responsibility of the Power Telecommunications staff to ensure that this document accompanies any installation requirements of a telecommunications cabinet in a telecommunications or control room at a Transmission substation.

It will also be the responsibility of the contractor or any Eskom staff, employed to install a telecommunications cabinet mentioned in this document, to ensure that the cabinets are installed in accordance with this standard.

2.6 PROCESS FOR MONITORING

None

2.7 RELATED/SUPPORTING DOCUMENTS

None

3. TST41-695 STANDARD FOR THE INSTALLATION OF A TELECOMMS EQUIPMENT CABINET

3.1.1 Scope of work

A Scope of work will be issued with details of the installation requirements of the cabinet and the following documents and drawings will accompany the Scope of Work:

3.1.1.1 A Room Layout drawing for that station

A Room Layout drawing for that station, which shows the position of the cabinet.

3.1.1.2 The cabling block diagram of the cabinet

The cabling block diagram of the cabinet, showing the cables associated with the cabinet and their termination.

3.1.1.3 The IDF Index drawing

The IDF Index drawing, showing the cable terminations on the IDF.

3.1.1.4 The DC circuit breaker positions on the 50 v DC board.

3.1.2 The following information will be made available in the Scope of Work:

3.1.2.1 The Project Number.

3.1.2.2 The contact details of the Designer.

3.1.2.3 The contact details of the Project Leader.

3.1.2.4 The contact details of the EA of the station

3.2 PRE-INSTALLATION CHECK

The following checks must be made prior to installing the cabinet in the station:

3.2.1 The top and bottom gland

The top and bottom gland plates must be connected to the cabinet earth bar using braided copper, as indicated in the attached sketch. Appendix A & B.

3.2.2 The 19” equipment mounting

The 19” equipment mounting brackets must be installed and both be connected to the top and bottom gland plates using braided copper.

3.2.3 The front and back doors

The front and back doors must be connected to the top and bottom gland plates using braided copper.

3.2.4 No scratches or damage

No scratches or damage must be found on the cabinet. Scratches and severe damage must be reported to the designer

3.2.5 A DC circuit breaker rail

A DC circuit breaker rail for mounting circuit breakers, if called for in the Scope of Work, must be installed in the cabinet.

3.2.6 A label holder

A label holder fixed to the front and/or the back of the cabinet on the top, preferably above the door.

3.2.7 The installer

Should any of the above not comply, the installer must call the designer immediately so that the above can be corrected before installation commences.

3.3 INSTALLATION PROCEDURE

3.3.1 Installation.

3.3.1.1 All cabinets will be installed on computer floors

All cabinets will be installed on computer floors in new control rooms and therefore all cables will enter the cabinet from the bottom. The installer must, however, ensure that the floor is strong enough for the cabinet before fixing the cabinet to the floor.

3.3.1.2 In the case of a cabinet being installed in an existing telecommunications room

In the case of a cabinet being installed in an existing telecommunications room, where there is no computer floor, the cabinet must be bolted to the floor using suitable “Rawl bolts”.

3.3.1.3 The cabinet must be installed in the position indicated on the official Eskom drawing

The cabinet must be installed in the position indicated on the official Eskom drawing, which will be included with the Scope of Work. In the case of a discrepancy with the position of the cabinet, the designer must be contacted and the matter resolved.

3.3.1.4 A cabinet will be installed over a trench and bolted in an existing Transmission substation

A cabinet will be installed over a trench and bolted in an existing Transmission substation. In most cases there will be overhead racking above the cabinet as well. This is to facilitate top and bottom entry of all cables. Where there is no position over a trench, contact the designer for a new position.

3.3.1.5 Overhead racking should be installed in existing telecommunications rooms

Overhead racking should be installed in existing telecommunications rooms. If there is no overhead racking where the cabinet is to be installed, the following procedure must apply.

a. The new section of overhead rack must match the existing overhead racking in the room. The overhead racking must be galvanised.

b. The new section must be galvanically connected to the existing rack, using a wide, low impedance joint.

c. A flat copper earth bar, 3mm x 25mm, must be connected to the existing earth bar and must extend the full length of the new section.

3.3.2 Cabinet Earthing.

The cabinet earth must be connected to the top and/or bottom gland plate. The bottom gland plate is connected to station earth found in the trench below the cabinet. The top gland plate must be connected to the station earth found in the overhead rack. Where feasible both top and bottom gland plates must be connected to station earth. (See Appendix D, Appendix A & B provides additional detail), The following methods can be used for connecting the telecommunications cabinet to the station earth mat:

3.3.2.1 A flat copper bar, 25mm x 3 mm, or 75mm2 cross section.

3.3.2.2 10mm Ø solid round copper conductor. The copper lugs must be brazed to the copper conductor. The crimping method is not acceptable.

3.3.3 Installation of Cables.

3.3.3.1 All armoured cables

All armoured cables can enter the cabinet from the top and the bottom. However all unarmoured cables shall enter the cabinet from the top only. Unarmoured cables that enter the cabinet from the bottom must be installed in HDPE tubing or flexible tubing, i.e. “Sprague” tubing.

3.3.3.2 All power cables

All power cables, i.e. 50 v DC or 220 v AC cables, shall be installed in trenches. Where there are no trenches, these cables may enter the cabinet from the top.

3.3.4 Glanding of cables

3.3.4.1 All armoured

All armoured cables must be glanded to the gland plate using an armour gland. There must be a 360^{o} galvanic connection from the screen to the gland plate.

3.3.4.2 All un-armoured cables

All un-armoured cables must be fitted with a compression gland. Shrouds must be fitted over the armoured glands.Where armoured cables are installed within 30 km from the coast, the shrouds must be filled with grease to protect the armouring from marine corrosion.

3.3.4.3 An existing telecommunications cabinet and protection

An existing telecommunications cabinet and protection panel is considered to be live. The installer installing new cables to these cabinets or panels must do so under the supervision of the relevant discipline. If no supervision is available, the cable must be left glanded below the cabinet and the cable end sealed with a heat shrink cap to prevent the ingress of moisture into the cores of the cable.

3.3.5 Terminating of the various cables.

An installer, who is deemed by the designer not to have any telecommunications experience and also not accredited by Eskom, may not terminate any cables associated with the telecommunications cabinet.

The cores of all the cables involved with the installation of a telecommunications cabinet must be lugged with a lug suitable for the connector block being used

The lugs must be used where terminations are not done on Kröne tag blocks.

3.3.5.1 The installer is required to terminate the following cable types:

- 10 pair armoured and unarmoured cables at both the telecommunications

cabinet and the IDF end.
- 25 pair armoured and unarmoured cables at both the telecommunications cabinet and the IDF end.
- 50v DC and 220v AC power cables at the cabinet and the relevant power supply end.

3.3.5.2 The installer is not required to terminate the following cables:

- 6 Pair X.21 data cable.
-12 Z teleprotection and protection interface cable at the protection panel end.
- 75 Ω coaxial cable at the cabinet and the LME end.

Connectors to the above mentioned cables will be fitted by the commissioning staff and terminated.

3.3.5.3 The drain wires for cables

The drain wires for cables fitted with them must be earthed at the IDF or at the distant end of the cable.

3.3.6 Sealing of Cable ends.

3.3.6.1 In cases where the installer is required to gland a cable and fasten it to the gland plate of the telecomms cabinet

In cases where the installer is required to gland a cable and fasten it to the gland plate of the telecomms cabinet, the unarmoured portion of the cable must be fitted with a heat shrink sealing cap to prevent the ingress of moisture into the cores of the cable.

3.3.6.2 In cases where the installer is required to gland a cable and not fasten it to the gland plate of the telecomms cabinet

In cases where the installer is required to gland a cable and not fasten it to the gland plate of the telecomms cabinet, the unarmoured portion of the cable must be fitted with a heat shrink sealing cap to prevent the ingress of moisture into the cores of the cable. Enough slack must be left below the cabinet for the person terminating the cable to fasten it to the gland plate and terminate the cores of the cable. See Paragraph 3.3.4.5.

3.3.7 Chequer Plates.

All chequer plates, where applicable, shall be made to fit after the cabinet has been installed, and adequate support provided where needed.

3.3.8 Cabinet Labels.

The cabinet must be labelled on the front and/or back, as indicated in the Scope of Work. Note: Concerns queries and comments on this document should be referred to the compiler.
When downloaded from Transmission database, this document is uncontrolled, responsibility lies with the user to ensure that it is the authorised version

3.3.9 Cable Numbers.

3.3.9.1 All cables must be numbered at both ends.

3.3.9.2 Cables installed in the control or carrier room can be labelled with non metal labels.

Cables installed in the yard which are exposed to ultra violet rays must be numbered with a metal plate and the cable number stamped on it. The plate must be fastened to the cable using metal ties. Plastic cable ties are unacceptable.

3.4 CLOSURE

3.4.1 The person installing the equipment

The person installing the equipment must ensure that the cabinet is clean inside and is free of all wire cuttings and cable sheaths.

3.4.2 All drawings

All drawings must be revised to show the “as built” condition of the equipment in the Carrier room.

3.4.3 The revised drawings

The revised drawings must be returned to the designer and the project leader.

3.4.4 The designer

The designer must ensure that all drawings are properly revised and the revision issued to the appropriate recipients

4. AUTHORISATION

This document has been seen and accepted by:

Name & Surname	Designation
	Document Approved by TDAC ROD 27 February 2013

5. REVISIONS

Date	Rev.	Compiler	Remarks
November 2012	0		Draft document for review created from TST41-695
November 2012	1	T Gosai	Final Document for Publication

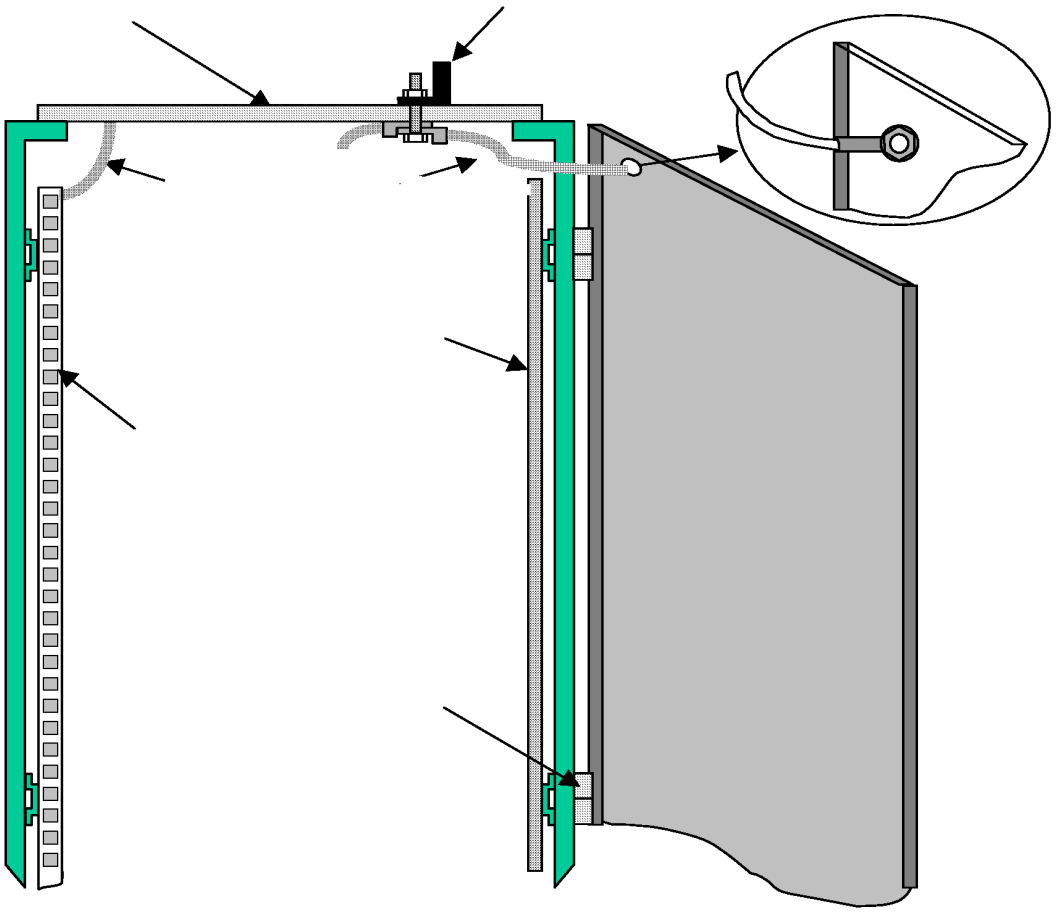
6. DEVELOPMENT TEAM

None

7. ACKNOWLEDGEMENTS

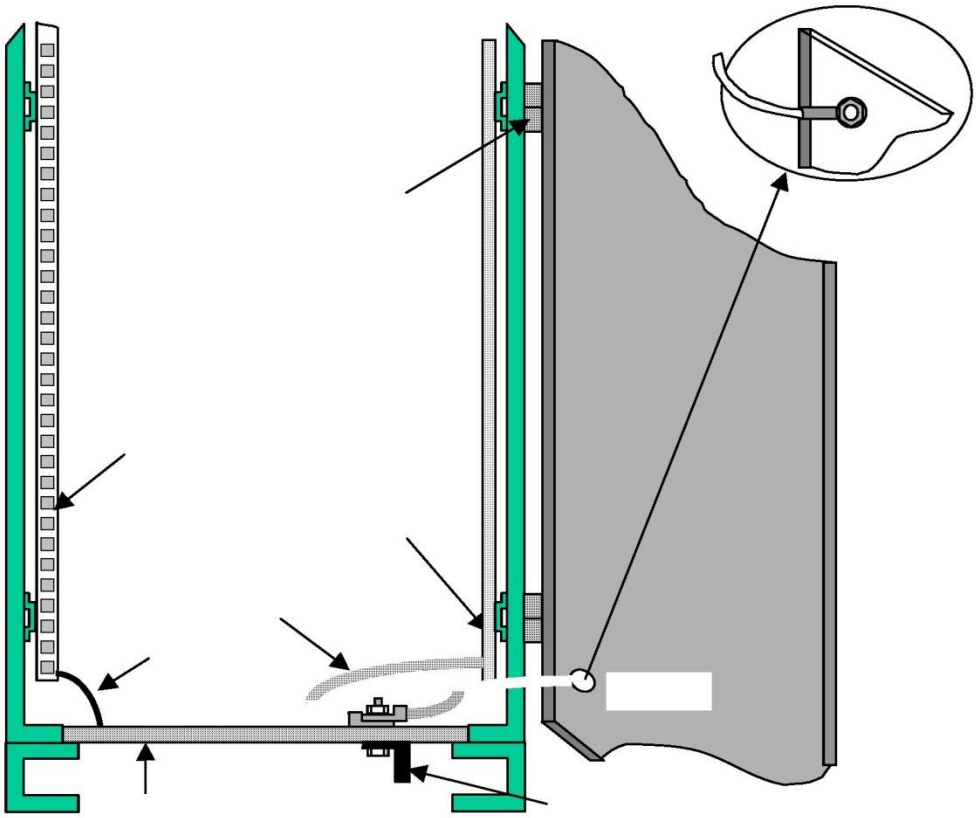
None

APPENDIX A:



Eskom Transmission

APPENDIX B:



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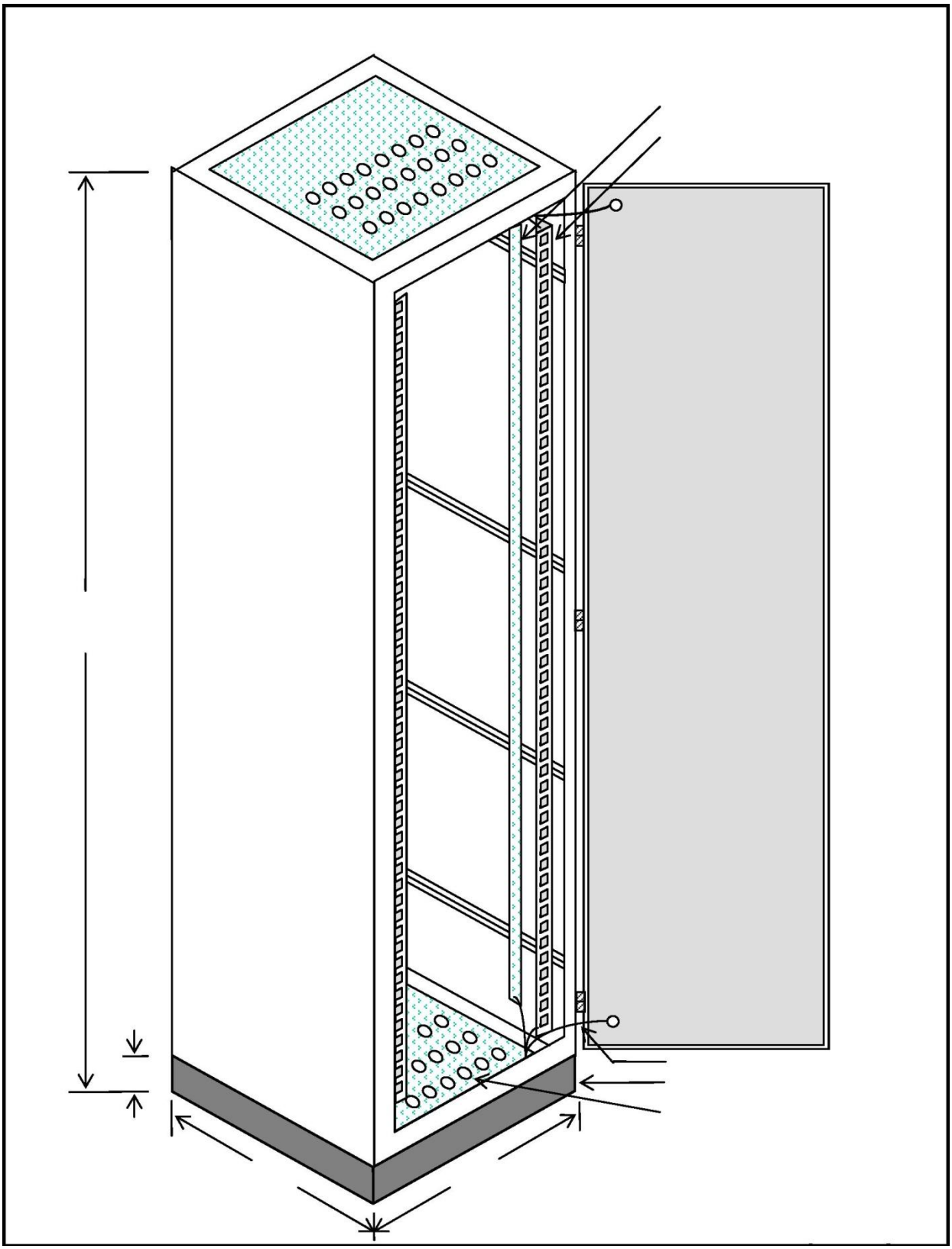

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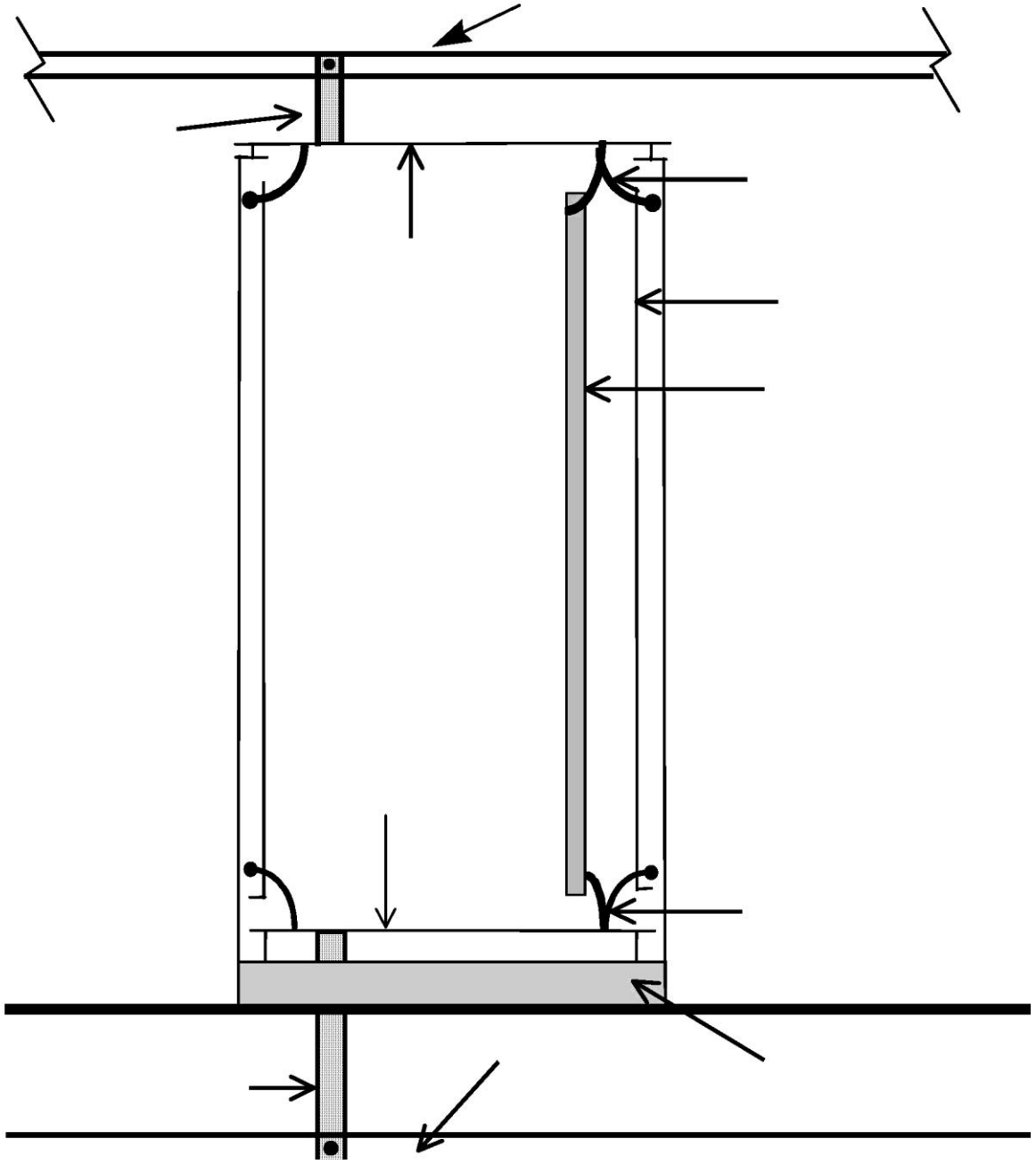

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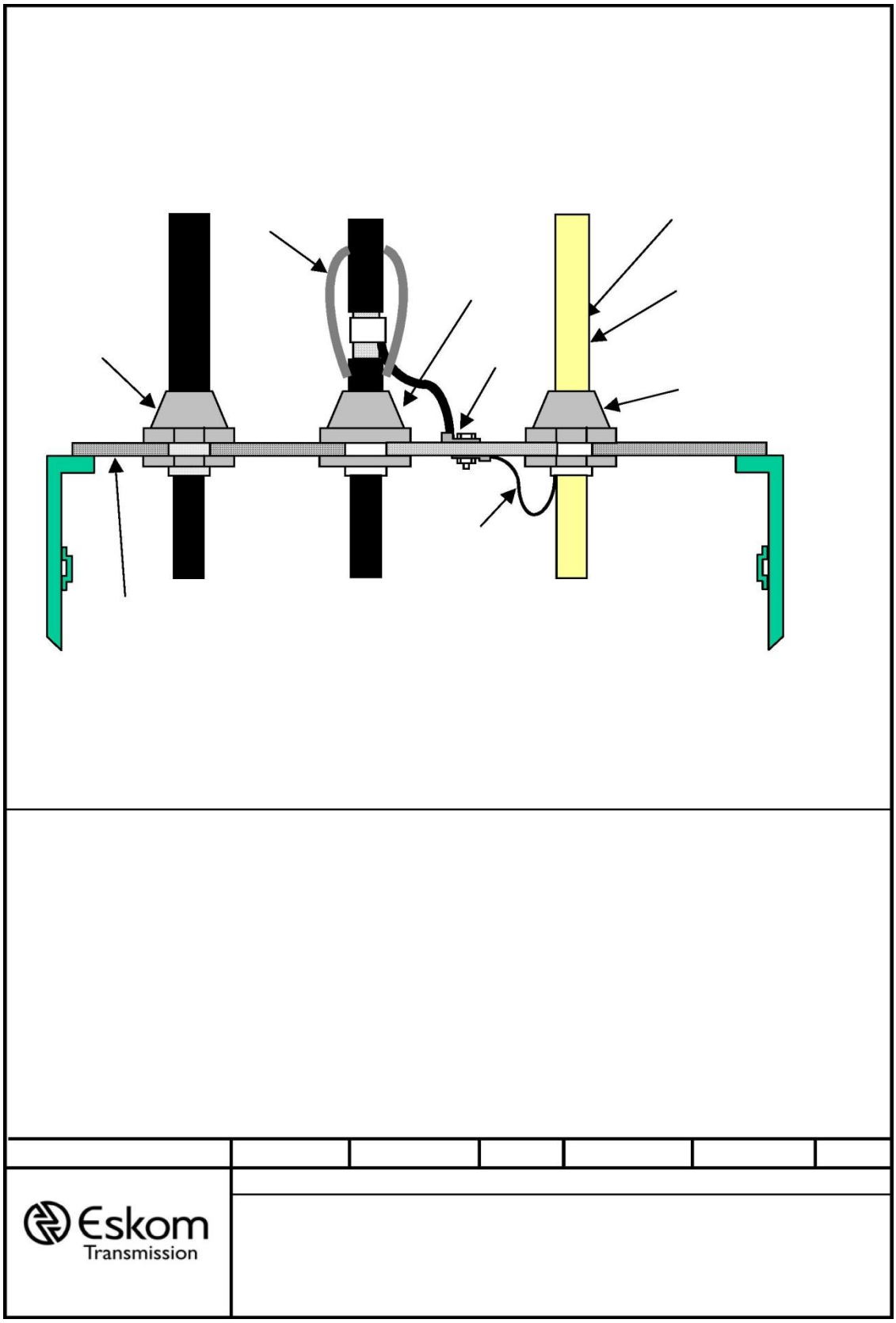

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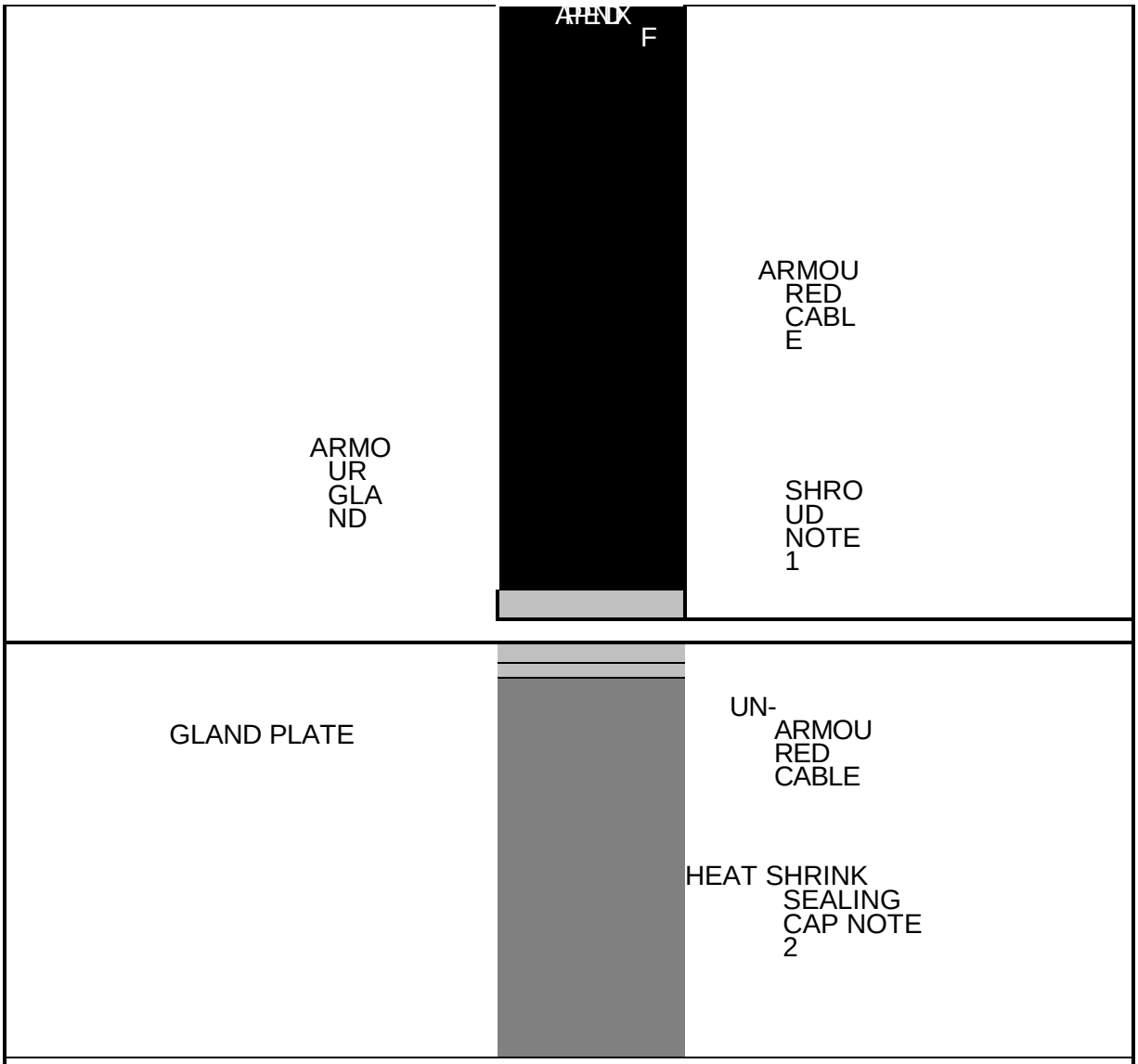

NOTES:

1. A shroud must be fitted over the armoured gland.
   In coastal areas where the installation is done within 30 km from the coast, the shroud must be filled with grease to seal the armouring of the cable from marine corrosion.
2. A heat shrink sealing cap is placed over the end of the un-armoured cable end, where the installer is not required to terminate the cores or pairs of the cable. This is to prevent the ingress of moisture to the cores of the cable.
3. In the case where the installer is required to gland the armoured cable and not fasten it to the gland plate of the cabinet, the installer must seal the cable ends with a heat shrink sealing cap to the un-armoured portion of the cable. This is to prevent the ingress of moisture into the cores of the cable.

FILE :	**DRAWN**	P T Griffith	**DATE**	08/06/2005	**REVISION**	0

	STANDARD EQUIPMENT CABINET CABLING Showing the installation of a gland on an armoured cable and the sealing of the cable ends.

APPENDIX G: TELECOMMUNICATION CABINET INSPECTION SHEET

Contractor:.....

Installer: (Print) **Signed:**..... **Date:**.....

Pre installation check

1. Top and bottom gland plates are connected to the cabinet earth bar.
2. Earth straps used are braided copper as indicated in Appendix A & B.
3. 19" mounting brackets are installed in the cabinet and connected to top and bottom gland plates
4. The front and back doors are connected to the top and bottom gland plates
5. No scratches are found on the cabinet
6. A DC circuit breaker mounting rail is installed in the cabinet
7. Label holders fixed to the cabinet

Installation check

1. Install cabinet as per the Control room layout drawing, attached to Scope of Work.
2. Install all cables as indicated in the Scope of Work, correctly.
3. Ensure that the cabinet is earthed correctly.
4. Gland all cables correctly.
5. Boot cable ends correctly.
6. Shrouds are fitted over the glands
7. Shrouds filled with grease are fitted over the glands close to the coast
8. All cables are numbered as per drawings associated with the Scope of Work.
9. All drain wires are connected to earth at the IDF and the distant ends of the cable
10. Terminate cables correctly. Lugs used where no Krone tagblocks are present.
11. Cables not terminated in a cabinet is sealed properly 12

Cabinet is correctly labelled.

13. Cabinet cleaned after installation.
14. All relevant drawings are marked up and returned to the designer