Eskom	Standard	Technology

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Content

Figures

1. Introduction

The standard describes Transmission Telecommunication's functional requirements for the generic telecommunications equipment installation.

2. Supporting clauses

2.1 Scope

This document covers the generic minimum requirements for sound installation of telecommunications equipment, and to standardize installation practices in Transmission Telecommunications. Equipment and OEM specific installation guide will still apply over and above these requirements.

2.1.1 Purpose

The purpose of this document is to provide the operational staff and contractors with a procedure that covers the generic telecommunication installations. This document is applicable to new installations, expansions, and redeployments (including refurbishment).

This standard should always be used in conjunction with the specific manufacture's installation guide for the specific equipment to be installed. In areas where this document contradicts the manufacturer's installation guide and the performance of equipment might be affected, the installer shall raise the issue with the relevant subject matter expert.

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

[1] SANS 10199 (SABS 0199) the Design and Installation of Earth Electrodes

[2] 32-9: Definition of Eskom documents.

[3] 32-644: Eskom documentation management standard.

[4] 474-65: Operating Manual of the Steering Committee of Technology (SCOT)

[5] 240-56872313: Radio Station Earthing and Bonding

[6] ST_240-75975613 Installation of a Telecoms equipment cabinet

[7] 240-112264430 Installation of Split Unit Microwave Radio Systems Using Coaxial Cable

[8] 240-69501548 Telecommunications Installation, Commissioning and Testing of Feeders and Antennas

This document supersedes the transport network equipment installation and commissioning standard Doc No.: 240-56576361

2.2.2 Informative

None

2.3 Definitions

2.3.1 General

Definition	Description
Antenna	The device used to effectively radiate radio output power as electromagnetic waves
Feeder	The transmission line used to get radio power to the antenna
Earth	The conductive mass of the earth, whose electrical path to carry the lightning current from the point of strike to the ground
Earth Termination	A conductive part, or group of conductive parts, of an earthing system in contact with and providing an electrical connection with the earth.
Electromagnetic Compatibility	The ability of electrical equipment to operate as intended without adversely interfering (electromagnetic interference) with other equipment.
Electromagnetic Interference	Unwanted interference in an electrical path caused by an outside source such as lightning and industrial machinery
Cross Polar Interference Cancelation	A signal processing mechanism used to effectively cancel out the cross-polarization interference, when both vertical and horizontal polarizations are in the same frequency channel
Voltage Standing Wave Ratio: (VSWR)	A measure of transmission efficiency of radio-frequency power from a power source, through a transmission line, into a load

2.3.2 Disclosure classification

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

2.4 Abbreviations

Abbreviation	Description
ADM	Add Drop Multiplexer
DC	Direct Current
DDF	Digital Distribution Frame
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
IDF	Intermediate Distribution Frame
IDU	Indoor Unit
NMC	Network Management Centre
ODU	Outdoor Unit
OEM	Original Equipment Manufacturer
OTN	Optical Transport Network
PDU	Power Distribution Unit
RX	Receive

SD	Space Diversity
Tx	Transmit
UV	Ultraviolet
VSWR	Voltage Standing Wave Radio
WSB	Working Standby
XPIC	Cross Polar Interference Cancelation

2.5 Roles and responsibilities

Transmission Telecommunications will be responsible to ensure that this document is utilized and implemented.

2.6 Process for monitoring

The Acceptance Test Procedure and the Quality Assurance process will be utilised to track compliance with requirement of this document.

2.7 Related/supporting documents.

Not Applicable

3. Requirements

3.1 Site Visits

Site visits must be completed, before any project or installation is carried out. Exemptions are granted on minor installations that have no impact on existing infrastructure. Information to be verified during the site visit includes but not limited to the following:

a) General condition of the site and equipment room(s)

b) Availability and allocation of floor space,

c) Availability and authorisation for use of space on existing rack,

d) New cabinet space (footprint and height)

e) Ensuring that the existing cabinet is securely mounted on the floor, and all infrastructure to be used for installation is in sound condition.

f) Cable space on existing cable routes and racks

g) Physical routes for new cable trays (if required),

h) Floor type (raised or concrete floor),

i) Observe tower condition,

j) Radio tower earth conditions, and identification of stolen earth bars

k) Confirmation of space on the tower, and identification of radio Outdoor Units' (ODU) nearest earth points

l) Possible line of sight obstructions,

m) MCB space on the PDU

n) Present DC power capacity meets the equipment requirements (or upgrade done if needed),

o) Present air-conditioning capacity meets the equipment requirements

p) Feeder space on waveguide entry point including earthing and sealing of waveguide entry plate,

q) Feeder lengths (to comply with OEM's specification for maximum feeder lengths)

r) Space for cable terminating point (e.g., krone blocks /fibre patch panel),

s) Cable entry space hole and earth point on the top or bottom gland plate of the cabinet.

A snag list of all issues observed on site shall be compiled, which will contribute to the installation planning process. Departments responsible for the defective equipment and infrastructure that may have a bearing on safety and quality of the work to be done, should be requested to assist in normalizing site conditions.

Site inspections must always consider current and future expansions. If there is a requirement to make use of existing, installed cabinets, the owner of that cabinet shall always be contacted before any installation is carried out. Installing equipment in any available, but unauthorised space may have impact on expansion of the already installed systems and other local regional plans.

Installations shall be done as per scope of work in the planning book.

3.2 Indoor Equipment

a) Inside the building, installation shall comply with the rest of Eskom's indoor installations standards for all telecoms equipment in both Telecoms Equipment Room at radio sites and substations.

b) Feeders shall be clamped and supported at every a 0.5 to 1 meter. See Figure 1.

Figure 1: Feeder clamped.

c) For full telecoms equipment installation, each unit must be clearly labelled with the same label as indicated in the OEM documents, link to OEM documents is provided in section 4 below.

d) If there is no space for a label on the unit, the label must be put on the side of the cabinet/frame holding the telecoms equipment. See Figure 2.

Figure 2: Equipment labelling

e) All cables connecting the telecoms equipment to DDF must be neatly secured.

f) IDF and DDF must be individually earthed and labelled.

g) E1 cables must be fully wired onto the IDF

h) Joints are not permitted in internal cables.

i) Power distribution cables shall be sized to ensure the voltage drop does not exceed 1% with the racks fully equipped. No joints will be permitted in DC supply cables.

j) The DC circuit breakers must also be labelled with the distant station or sub-rack/unit name, and each sub-rack/unit shall have its own circuit breaker(s). See Figure 3.

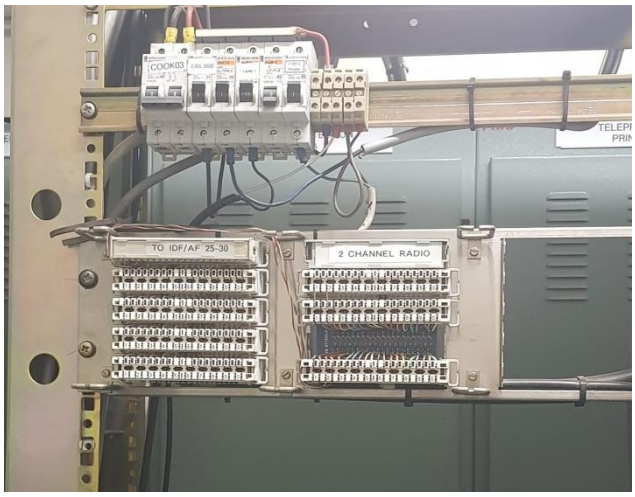

Figure 3: Circuit breakers labelled

k) Each telecom equipment's alarm cables must be supported and cabled to the allocated IDF position, and each cable must be clearly labelled as per planning book. Refer to OEM document for instruction on how the wiring should be done.

l) Flimsy brush panels with no proper support are not allowed.

m) Some telecoms equipment will need to be installed in EMC/EMI shielded cabinets while others do not; refer to OEM document for each equipment for this.

n) For custom cabinets received from supplier. These cabinets must be accompanied by their certificates of compliance with the substation environment voltage.

o) For equipment with empty slots, these slots must be covered with dummy units to comply with either EMC or manufacturer's cooling specifications.

p) Where suppliers have specific requests e.g. a requirements for shielded cables; this shall be identified during the site visit.

q) For raised floors, where there is forced cooling through the cabinet, the contractor/supplier shall indicate (during the site visit) whether the airspeed and temperature meets the equipment environmental requirements.

r) If the air speed and temperature does not meet the equipment requirements, appropriate fans shall be used.

s) Where possible, ensure that cables are routed through cable guides and finger trunking within a cabinet.

t) Space on the cable panels must always accommodate future growth. See cable tray manufacturer's specification on the recommended number of cables per cable tray and the allowed maximum cable banding radius.

u) Allocation of modules on the slots shall be as recommended by the supplier guideline. This includes control modules, power modules, service modules and plug in units.

v) To ensure future ESD compliance, each rack must be installed with a wrist strap.

w) All cable trays shall be earthed.

x) Fibre patch cords running through a conduit shall not be installed between cabinets. Fibre patch panel shall be used, instead. The latest revision of 240-46264031 Fibre Optic Design Standard: Substations shall be used as a fibre installation guide.

y) Patch cords slack shall be rolled neatly in the patch panels.

z) For full radio indoor installations each radio unit must be clearly labelled with the same label as the feeder indicating the:

- site name of the opposite end of the link,
- operating frequency,
- operating mode, and
- Link capacity.

aa) All IDU's and sub-racks shall be firmly earthed to the cabinet earth bar. This cabinet earth bar shall be firmly earthed to the station earth within the building using a minimum of 16mm2 insulated cables.

bb) For green field installations, 75 Ohm DDFs shall no longer be used,120 ohm shall be used. This shall even be more enforced in the substation installations, due to EMC requirements.

cc) Special requirements on module positions for 1+1 radio installation must be handled according to manufacturer's recommendation.

dd) The polarisation pairs for 1+1 and XPIC must be noted, where applicable.

ee) During installation, care against electrostatic discharge must be taken to avoid damaging modules.

3.2.1 Cabinet

a) Feeders used to connect the ODU to the radio equipment in a cabinet or rack must be clamped. If circulators are used, they must be securely fastened with stand-offs.

b) All telecoms equipment installed in the cabinet must be firmly earthed using the cabinet earth bar. This cabinet earth bar shall be firmly earthed to the station earth within the building using a minimum of 16mm^2 insulated cables. Cabinet earth bar is shown in Figure 4.

Figure 4: Cabinet earthing bar

c) Where telecoms equipment is installed in bearer comms cabinets, the euro rails in the cabinet must be positioned 80-100 mm from the front door when the door is closed to avoid front entry cables being damaged when the door is closed.

d) Indoor units in Bearer Comms Cabinets must be labelled with the distant station name on each unit and with the Tx and Rx frequencies, working mode and the link capacity.

e) For concrete floors, where there is no forced cooling through the cabinet, fans shall always be installed. Air guide plates must be installed according to manufacturers' specification. The fan units must be earthed as per supplier recommendation and 240-56872313 Radio Station Earthing and Bonding Standard.

f) Compliance with document 240-153473135 Installation of Telecommunications Equipment Cabinet standard must be ensured.

Note: This section to be used with document: ST_240-60725641 specification for 19-inch equipment cabinets which incorporates cabinet earthing requirements.

3.2.2 Cables and cabinet population

a) All infrastructure upgrades, including air conditioning, DC power and cable trays must only be performed by Eskom (or a contractor identified to perform infrastructure upgrades appointed by Eskom).

b) For raised floors, all cables, including feeder cables must always run under the floor and the cabinet must be populated from the top to the bottom.

c) In sites where there is forced airflow under the floor, the tile under the rack must be removed to allow air flow through the cabinet and the space for cables.

d) For green field cable trays installations, all T joints, L joints, horizontal bends, internal and external riser must have smooth bends with a standard acceptable radius. Joints without smooth bends are only acceptable on existing sites.

e) Green field installation shall have separate cable trays for feeder cables, power cables, optic fibre and the rest of the traffic/signal cables. Cable trays for fibre must always be aerial cable tray irrespective of the nature of the floor.

f) For existing installations where cables are already mixed, an effort must be made to maintain a distance between signal and power cables with preferably a separation of 200mm where possible. Crossing with AC cables may only be allowed at 90°.

g) All cables shall be neatly tied with cable ties.

h) Cable tray sizes must always be planned for current and future requirements.

i) Cable trays running through the wall must be continuous throughout the wall.

j) Make sure that the rack where the equipment is installed has a label.

k) For concrete floors all cable tray requirements and cabinet equipment population are the same as in the raised floor with the difference being all cables including fibre cables must always be on aerial cable tray.

3.3 Outdoor Equipment

Outdoor telecoms equipment installation includes transport network equipment. Installation requirements are outlined below.

3.3.1 Antenna installations

a) The antenna support structure and panning arm brace shall be properly secured using galvanised bolts. The antenna-mounting bracket shall sit firmly against the tower and the bolts shall be long enough to protrude from the nut. A washer and spring washer shall be used on each bolt. No antenna shall be secured directly to the tower with stainless steel straps.

b) On Tubular towers, i.e. Webb, do not clamp the panning arms to braces of 34mm OD – extend the panning arm to a tower corner. Only “Cross-over” clamps as manufactured by Eskom / Webb Industries / Andrew Satcom (or similar) to be used to clamp panning arms to tower – available on request if not supplied with the antenna-mounting bracket.

c) Antennas 1.8m and larger shall be fitted with at least one stabilising pipe (over and above the panning arm) & 3.7m antennas must be fitted with a 3rd stabilising pipe.

d) Only approved brackets obtained from Eskom, or the antenna supplier shall be permitted to install and stabilise antennas. Avoid clamping panning arms on tower braces that cannot support the antenna adequately. Panning arms must be fixed to tower legs, where practically possible. Panning arms must be cut off neatly, if too long. Panning arms shall not protrude more than approximately 500mm from the tower.

e) Any additional clamps and brackets needed to properly stabilise antennas are available on request from Eskom. “Custom” made brackets can also be supplied. Antennas should not “twist” the tower leg where it is installed in high wind conditions, as this will cause metal fatigue.

f) When panning antennas ensure that all of the main antenna fastening clamps / U-bolts are sufficiently loosened to prevent stripping the threads of the micro adjustment mechanism. All bolts are to be re-tightened once panning has been completed.

g) The threads of all stainless-steel bolts shall be lubricated with copper lubricating compound (sometimes referred to as “Copper-slip” grease) before any form of tightening or adjustment of the bolts or micro adjustment mechanism takes place.

h) No drilling or welding on the radio tower is allowed.

i) Bolts supporting the tower structure shall not be removed during installation, as this may compromise the strength of the structure.

j) Environmentally friendly cold galvanising zinc spray shall be used to cover any spots exposed to corrosion.

3.3.2 Outdoor Units

a) For outdoor radio installation, outdoor units (ODUs) must be mounted onto the antenna mounting bracket or tower leg (unless it is of the integrated antenna mounting type) using the manufacturer supplied mounting brackets.

b) For full indoor radio installations, the ODU must be installed indoor and be connected to the antenna using a waveguide. ODUs must be neatly mounted inside a rack or cabinet.

c) Waveguides shall be ordered by the Project Engineer, who shall also be required to take waveguide losses into account when designing the link.

3.3.3 Feeder

a) The feeder must be clamped within 1m from the back of the antenna or ODU as the case may be.

b) The minimum bending radius of the feeder must be maintained on all bends. Stand-off supports shall be used on any bend, where the distance between clamps exceeds 2m.

c) Feeders shall be clamped at every crossing.

d) Feeder trays/ ladders shall have a crossing at every 1m as a minimum.

e) Installers and/or contractors shall report on any cable tray/ladder that does not meet these requirements (3.4.3c and 3.4.3d).

f) Feeder clamps shall be ordered by Eskom from the radio system manufacturer. The metallic portion of the clamps including washes shall be galvanised. See Figure 5 for feeder clamps.

Figure 5: Feeder clamps

g) The feeder to antenna / ODU connection shall be covered with self-vulcanising tape. Connectors shall be covered a minimum of 50mm before and 50mm after the connector, where possible. This tape shall be covered with UV resistant Scotch / 3M black tape from the back of the antenna to a few centimetres past the end of the self-vulcanising tape. Each end of this tape shall be firmly secured with a stainless-steel cable strap to stop the tape from unwinding. As an alternative to the strap, a UV resistant air shrink sleeve may be used.

h) The feeder must be labelled within 1m from the back of the antenna / ODU. A second label must be provided on the horizontal section of the feeder at the waveguide entry, outside the building. The label must clearly indicate the following:

- site name of the opposite end of the link,
- the operating frequency,
- operating mode (Hot Standby/ Working Standby), and

- Link capacity.

Any space diversity feeders shall be labelled “SD” in addition to the site name.

i) The label and label clamp shall be UV resistant and rust proof. Stainless steel punched or aluminium labels shall be used, as they are less likely to fade away with time, as compared to copper and plastic labels.

j) The following is the example of a label for an 8 GHz STM1 link operating between Site A and site B.

- Label on site A operating as the main link: SiteB-STM1-8GHz.
- Label on site operating as Hot Standby: SiteB-HSB-STM1-8GHz. If operating as a working standby replace HSB with WSB.

k) For safety reasons, no feeder cable shall obstruct the platform walkway. The preferred routing of these cables is under the platform, or at least 2m above the platform.

l) Crossing of feeders shall be avoided.

m) No plastic cable ties will be allowed on any tower: for lighting and earthing cables, stainless steel straps/cable ties shall be used; for feeder cables, a suitable insulated hanger as specified by the cable manufacturer, which can firmly secure the cable as well as hold the weight of the cable.

n) The recommended maximum spacing between insulated hangers for FSJ Superflex cables is 1m (0.91m for 6mm and 1.22m for 10mm) in 200 km/hr winds (without ice). The distance between insulated hangers for RG6/U cable must not exceed 1m. The RG6/U cable must be pulled straight inside the hangers and each hanger clip shall be tightened to hold and keep the cable straight. No “loops” between hangers will be permitted. It is also recommended that a small cable tie be installed around RG6/U cables between hangers to minimise vibration and chafing.

o) The feeder cables on the waveguide cable tray may not run diagonally across the cable tray, but shall run vertically from the bottom of the tower to the exit point.

p) No cable may be attached to any other feeder cable for support.

q) Joints in the feeder cable shall not be permitted.

r) The feeder cable must be installed so as to comply with the manufacturer’s recommendations, especially regarding the bending radius.

s) All installations in Eskom Transmission substation, where tele-protection services are required, shall be full indoor installations and shall always implement a waveguide.

3.3.4 Earthing

This section shall be read in conjunction with 240-56872313 Radio Station Earthing and Bonding Standard.

a) All sub-racks installed in a cabinet must be earthed, and the earth firmly connected to the cabinet copper earth bar. The earth bar must be connected to station earth.

b) Earthing on the coaxial cable shall be done at the gland plate of the cabinet, at the outside of the waveguide entry point of the building, at the point of attachment to the tower and at the top of the tower at the outdoor unit, using the earth kits.

c) At the top of the tower, the earth kit shall be connected on the vertical section of the feeder just before the horizontal bend to the antenna. At the bottom of the tower, the earth kit shall be connected on the VERTICAL section of the feeder, just before the horizontal bend to the waveguide entry. The earth kits shall be earthed to the earth network with a short as possible lead. This could be the tower, or a specific earth point on the tower and earthing system.

d) The earth kit connection must be covered with self-vulcanising tape. This tape shall, then, be completely covered with UV resistant Scotch black tape to a few centimetres past each end of the self-vulcanising tape. Each end of this tape shall be firmly secured with a stainless-steel strap to stop the tape from unwinding. As an alternative to the strap, a UV resistant air shrink sleeve may be used.

e) In the case of radio systems with outdoor units, the above rule also applies, i.e. install an earth kit per feeder. Outdoor units must be earthed using a minimum of 16mm2 insulated cables. Suitably sized lugs must be crimped on the cable ends and connected to the provided ODU earth stud and the nearest tower earthing point. Stainless steel bolts, nuts, washers, and spring washers must be used to prevent corrosion at these connection points. If the earthing point is at a distance greater than the allowed manufacturer's earthing cable length, the manufacturer shall supply a longer and thicker, resistance equivalent cable to reach the earthing point and so as not to void the ODU warranty.

f) The earth cable from the feeder earthing kit shall be taken to the nearest proper earth point in such a way that bends in the cable are minimised. The shortest practical route must be used without crossing any platform walkways.

g) Where the distance of the vertical feeder exceeds 45m, additional earth kits must be installed at every 30m (upper limit).

h) For Ericsson/Marconi and Ceragon radios radio, there shall be earthing kits at every 25m of the vertical feeder portion.

i) Where the distance from the tower to the building exceeds 5m, an additional earthing kit/lightning surge arrestor must be installed on the feeder at the entry to the building. In the case of new towers, an earth bar will be provided at the waveguide entry point for this earth. On existing sites, where no proper earthing point exists, one must be provided. This earth must firmly bond the waveguide entry & earth bar to the site earth mat. Flat copper bar shall be used. The tower shall be earthed in accordance with the latest revision of the "Radio Station Earthing and Bonding Standard" – 240-56872313.

j) The contractor/installer shall report on the radio towers where this earthing requirement is not meet.

k) Manufacturers' guide must be consulted when installing the earth kits and care must be taken to avoid damaging the cable shield.

l) As stated in 240-56872313 Radio Station Earthing and Bonding Standard, Eskom to ensure the integrity of the entire earthing system is in compliance with SANS 10199 (SABS 0199), The Design and Installation of Earth Electrodes. Tests must be performed to ensure that there is electrical continuity between the ODU earth and the IDU earth. The tests must ensure that all ODU, feeder, waveguide entry, IDU, and cabinet earth connections are firmly and securely connected to the station earth. Ensure that there are records of the station earth mat tests available. Periodic station earth testing is recommended to ensure that the earthing system remains intact.

m) Inspection of the site earthing system shall include ensuring that the legs of the radio tower are earthed to the tower earth ring, air termination spike is installed as recommended on 240-56872313 Radio Station Earthing and Bonding and none of the copper earth points are stolen.

n) As per 240-56872313 Radio Station Earthing and Bonding Standard, a minimum of two legs of the tower shall be grounded on the earth.

o) The latest revision of ST 240-60725641 Spec for 19-inch equipment cabinets Installation shall be used for cabinet earthing in the substations.

p) Earth from the cable tray must terminate on the bolt on top of the cabinet.

q) Armoured cables must be connected on both sides onto the cabinet entry gland plate with armoured glands.

Figure 6: Cabinet gland plate

r) For installations in Eskom Telecoms Radio sites, termination of the cable on the inside cabinet earth bar shall be allowed using a 16mm2 earth cable.

s) For earthing and bonding standards during the installation of split-unit radio systems used at Eskom Telecommunication's radio sites, please refer to 240-112264430 Installation of Split unit Microwave Radio Systems using Coaxial Cable.

3.3.5 Waveguide Entry

a) The waveguide entry must be securely bolted to the wall. Each feeder entry hole/ pipe must be sealed with a waveguide boot on the outside of the waveguide entry around the pipe and feeder.

Figure 7: Waveguide entry

b) Any other sealer that will make it difficult to run an additional cable shall not be used.

c) Existing installations without sealer shall also be corrected.

d) All drillings and any other structural alteration shall only be done by Eskom. Waveguide entry must be earthed to the tower earth ring. The support (racking) needs to be terminated at both ends onto the gland plate at point of entry and onto the earthing network on the tower.

3.4 Commissioning

Note: This section applies to transport network equipment.

Equipment specific manufacturer guide must be consulted for commissioning. The following constitutes the commissioning minimum requirements.

a) Antennas must be panned for maximum receivable of signal strength. This “maximum” signal level should meet the “design” receive signal strength as indicated in the project planning book. If any discrepancies are found, this must be brought to the attention of the Project Engineer concerned for a solution to be found.

b) The configuration and commissioning must be carried out using the specific radio and ADM manufacturer’s configuration & commissioning procedure. If there is equipment specific Eskom Procedure available for this purpose, the Eskom version will take precedence.

c) For radios, ADMs and OTN boxes that require an IP address, each radio terminal must have a unique IP address; this can be obtained from NMC.

d) A Bit Error Rate test of at least 24 hours must be performed on the radio link before traffic can be placed on the link. In certain cases, NMC may request that these tests be carried out for a period of 7 days.

e) A system sign off will only happen after the acceptance by the NMC. NMC sign off will constitute the final sign off and will be done after the onsite sign off.

3.5 Test Results

Note: This section applies to transport network equipment.

a) Tests must be carried out using the approved Eskom Procedure and ATP test result forms. The name of the tester and the date of the tests must be clearly indicated.

b) The correct units of measurement for example dB, V etc. must be clearly indicated.

c) All test results must be neat and clearly legible. Extra copies must be typed.

d) Test results must be bound in a file and clearly labelled

e) Where more than one system is commissioned at a site, each system test results must be placed in a separate file.

f) Use an Ohmmeter to make sure there is no short circuit in the radio cable before connecting it into operation. A Voltage Standing Wave Ratio (VSWR) meter can be used for a more complete test of the radio cable.

g) Feeder test results (if applicable) must be in a clearly labelled section. Three sets of test results – the actual value at the TX and RX frequency as well as the worst-case result – must be presented. The actual Return Loss (or VSWR value) must be clearly indicated on the test sheet for each test.

h) Two sets of files are required: One for radio link designer and one for the Maintenance section.

i) The Test results are to be forwarded to the radio link designer within one week of final commissioning.

j) Where a Contractor has performed the final commissioning, a pre-designated Eskom representative must witness the final commissioning. Full names and titles must be printed with signature on the official Eskom “Hand Over/Take Over” sheet.

k) The Radio alarms must be connected and tested to the management/supervisory system (DCN, EAS) before traffic is allowed on the radio link.

l) Any deviations on the obtained test results from the planned/expected levels must be clearly stated. No deviation which degrades the performance of the system will be accepted and Eskom reserves the right to reject any installation where the obtained results deviate from the design.

m) On acceptance, all equipment shall be entered on the asset register. No equipment shall be moved without updating the asset register, including moving for redeployments and loaning.

4. Related/supporting documents.

The following link to specific OEM documents for the following telecoms equipment's

Transport network:

Transport Operations - OneDrive (sharepoint.com)

Wireless Access network:

Wireless Data Operations - OneDrive (sharepoint.com)

Voice and data:

Voice & Data Operations - OneDrive (sharepoint.com)

Physical Security:

Physical Security Operations - OneDrive (sharepoint.com)

PLC and Tele-protection:

Teleprotection Operations - OneDrive (sharepoint.com)

5. Authorization

This document has been seen and accepted by:

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6. Revisions

Date	Rev	Compiler	Remarks
March 2024	2	M. Mpanza	Document Reviewed. Inclusion of Ceragon earthing requirements (3.3.4 h) Reference made to document 240-112264430 (3.3.4 s) Inclusion of OTN box requirement in (3.4 c) Updated OEM document links in section 4
April 2018	1	OG Matlou	First Issue

7. Development team

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

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8. Acknowledgements

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