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EQUIPMENT INSTALLATION  
AND COMMISSIONING  
STANDARD**

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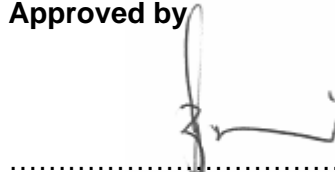
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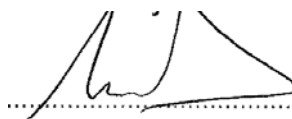
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## Foreword

Not applicable

## Revision history

This is a new document.

Date	Rev.	Compiled By	Paragraph	Remarks
April 2013	0	K Setlhapelo	-	First issue

## Acceptance

This document has been seen and accepted by:	
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This standard shall apply throughout Eskom Holdings Limited, its divisions, subsidiaries and entities wherein Eskom has a controlling interest.

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## **Introduction**

This standard describes Eskom Telecommunications' functional requirements for the installation of transport equipment including, radio systems, Add-Drop Multiplexers, and any other similar equipment in Eskom Telecommunications Equipment rooms and substations.

## **Keywords**

Add Drop Multiplexor, ADM, Radio, Antenna, Installation, Feeder, Waveguide, Outdoor Unit, ODU, Space Diversity

## **1 Scope**

This document covers the internal and external aspects of transport network equipment installation. This includes radio antenna, radio outdoor unit, feeder cable, radio indoor unit, Add Drop Multiplexers (ADM), earthing and infrastructure requirements.

The purpose of this document is to provide the operational staff and contractors with a procedure that covers the general aspects transport network equipment installation. These standards are applicable to green field installations, expansions and redeployments.

This standard shall always be used in conjunction with the specific manufacturer'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. This document will take precedence over all the other installation preferences in the manufacturer's installation guide. The document only sets the minimum requirements and does not limit the installer from exceeding these minimum requirements

## **2 Normative References**

### **South African national document(s):**

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

### **Eskom national document(s):**

32-9: Definition of Eskom documents.

32-644: Eskom documentation management standard.

474-65: Operating Manual of the Steering Committee of Wires Technologies (SCOWT)

240-56872313: Radio Station Earthing and Bonding

### **International document(s):**

None

### **Eskom Divisional documents(s):**

TST41-695 Installation of a Telecoms equipment cabinet

## **3 Definitions and abbreviations**

### **3.1 Definitions**

None

### **3.2 Abbreviations**

<b>ADM:</b>	Add Drop Multiplexer
<b>EMC</b>	Electromagnetic Compatibility
<b>EMI</b>	Electromagnetic Interference
<b>DC:</b>	Direct Current
<b>DDF:</b>	Digital Distribution Frame
<b>HSB:</b>	Hot Standby
<b>IDF:</b>	Intermediate Distribution Frame
<b>NMC:</b>	Network Management Centre
<b>ODU:</b>	Outdoor Unit
<b>PDH:</b>	Plesiochronous Digital Hierarchy
<b>RX</b>	Receive
<b>TX</b>	Transmit
<b>SD:</b>	Space Diversity
<b>UV:</b>	Ultra violet
<b>VSWR:</b>	Voltage Standing Wave Ratio
<b>WSB:</b>	Working Standby
<b>XPIC:</b>	Cross Polar Interference Cancelation

## **4 Requirements**

### **4.1 Site Visits**

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

- availability and allocation of floor space,
- authorisation of use of space in the existing rack,
- ensuring that the existing cabinet is securely mounted on the floor,
- cable space on existing cable routes,
- physical routes for new cable trays (if required),
- floor type (raised or concrete floor),
- radio tower earth conditions, identification of radio Outdoor Units' (ODU) nearest earth points and identification of stolen earth bars,
- possible line of sight obstructions,
- present DC power capacity meets the equipment requirements,
- present air-conditioning capacity meets the equipment requirements (note the additional requirements for full indoor radio installation),
- feeder space on waveguide entry point including earthing and sealing of waveguide entry plate,
- cable lengths (to comply with manufacturer's specification for recommended/ acceptable maximum cable lengths)
- space for cable terminating point (cable /fibre patch panel),
- cable entry space hole and earth point on the top or bottom gland plate of the cabinet.

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 the expansions of the already installed system.

Installations shall be done as per scope of work. Blue books (as built documentation) shall be complete with all the required information before commencement of installation.

## **4.2 Antenna Installations**

This section incorporates and/or supersedes *ETST 0218 Standard of Antenna Installations at Eskom Radio Sites and ETPR 0702 PDH Digital Installation & Commission Procedure*.

- 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.

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- c) 1.8m and larger antennas 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.

#### **4.2.1 Outdoor Units (ODU)**

This section incorporates and/or supersedes ETPR 0702 PDH Digital Installation & Commission Procedure.

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

#### **4.3 Feeder**

This section incorporates and/or supersedes *ETST 0218 Standard of Antenna Installations at Eskom Radio Sites, ETPR 0702 PDH Digital Installation & Commission Procedure ETST 1010 RF Feeder Installation Standard*

- 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. Standoff supports shall be used on any bend, where the distance between clamps exceeds 2m.
- c) Feeder trays/ ladders shall have a crossing at every 1m as a minimum.

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- d) Feeders shall be clamped at every crossing
- e) Installers and/or contractors shall report on any cable tray/ladder that does not meet these requirements (4.3c and 4.3d)
- f) Feeder clamps shall be ordered by Eskom from the radio system manufacturer. Figure 1 shows an example of a feeder clamp. The metallic portion of the clamps including washes shall be galvanised.



**Figure 1: An example of a feeder clamp**

- 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 must be readable from ground level. 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 A operating as Hot Standby: SiteB-HSB-STM1-8GHz. If operating as a working standby replace HSB with WSB.



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- 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). In the event that an installer and/or contractor reports a ladder/ cable tray not meeting this requirement a "Sanky" tray (125mm wide) must be installed. 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 teleprotection services are required, shall be full indoor installations and shall always implement a waveguide.

#### **4.4 Earthing**

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

- a) The feeder shall be earthed at the two extremes (top and bottom) of the VERTICAL section of the feeder run: At the top, the earth kit shall be connected on the vertical section of the feeder just before the horizontal bend to the antenna; At the bottom, 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.
- b) 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.
- c) 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 16mm<sup>2</sup> insulated cable. 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.

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- d) 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.
- e) 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.
- f) Where the distance of the vertical feeder exceeds 45m, additional earth kits must be installed at every 25m.
- g) For Ericsson/Marconi Long Haul radios, there shall be earthing kits at every 25m of the vertical feeder portion.
- h) 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.
- i) The contractor shall report on the radio towers where this earthing requirement is not met.
- j) Manufacturer's guide must be consulted when installing the earth kits and care must be taken to avoid damaging the cable shield.
- k) 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*. These 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.
- l) 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.
- m) As per 240-56872313 *Radio Station Earthing and Bonding Standard*, a minimum of two legs of the tower shall be grounded on the earth ring as shown in Figure 2.



**Figure 2: Tower leg grounded on the tower ring**

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- n) The latest revision of *TST41-695 Installation* of a Telecoms equipment cabinet shall be used for cabinet earthing in the substations.
- o) Earth from the cable tray must terminate on the bolt on top of the cabinet.
- p) Armoured cables must be glanded on both sides onto the cabinet entry gland plate with armoured glands. Figure 3 shows cable entry through the cabinet for the substation installation



**Figure 3: Cabinet gland plate (bottom/top of the cabinet)**

- q) For installations in the Eskom Telecoms Radio sites, termination of the cable on the inside cabinet earth bar shall be allowed using a 16mm<sup>2</sup> earth cable.

## **4.5 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 4 shows an example of a boot assembly to be used.



**Figure 4: Boot assembly**

- 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

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- d) All drillings and any other structural alteration shall only be done by Eskom. Wave guide entry must be earthed to the tower earth ring. See Figure 5 for sealed waveguide entry with gland plate 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.

#### **4.6 Inside the Building**

- a) Inside the building, installation shall comply with the rest of Eskom's indoor installations standards for all telecoms equipment in both Eskom Telecoms Equipment Room and substations.
- b) Feeders shall be clamped and supported at every 0.5 m. Figure 5 shows example of a feeder clamp inside an Eskom Telecommunications Equipment room.



**Figure 5: Feeder Clamp**

- c) The vertical feeder section into the top of the radio cabinet or rack must also be clamped. Where circulators are used, these must be securely fastened with stand-offs
- d) 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.
- e) If there is no space for a label on the unit, the label must be put on the side of the cabinet, as shown in Figure 6.



**Figure 6: Label on the side of the Ericsson/Marconi Long Haul**

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- f) Cables to the DDF must be neatly secured. Where lacing of the cables is not done, a cable tie shall be used in such a manner as to ensure a similar standard of neatness.
- g) Each IDF and DDF vertical must be individually earthed and labelled.
- h) For greenfield installations, 75 Ohm DDFs shall no longer be used. 120 Ohm CAT 6 shall be used. This shall even be more enforced in the substation installations, due to EMC requirements.
- i) 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 16mm<sup>2</sup> insulated cable.
- j) All racks must be fully wired out as though the rack was fully equipped to its maximum capacity.
- k) Joints shall not be permitted in internal cables.
- l) 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.
- m) Where radio indoor units are installed in Bearer Comms Cabinets, the Euro rails in the Cabinets must be positioned 85mm from the front door when the door is closed to avoid front entry cables being damaged when the door is closed.
- n) 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.
- o) The DC circuit breakers must also be labelled with the distant station name. Each sub rack/unit shall have its own circuit breaker. The cables on the DC circuit breaker (SOS) unit shall be routed as shown in Figure 7.



**Figure 7: DC circuit breaker Cable route**

- p) Each radio system's EOW and Alarm cables must be supplied and cabled to the allocated IDF position and each cable must be clearly labelled as per the project asbuilt documentation (blue book)
- q) On the IDF, the EOW cable will be wired first and the Alarm cable next. Some radio EOW's (for example Melodie) will not be cabled to the IDF. In this case, only alarm functions will be wired.
- r) Flimsy brush panels with no proper support are not allowed

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- s) In substations, all installations must only be done in the EMC/EMI shielded cabinets. Installation in the glass door cabinets and any other non EMC hardened cabinets is not allowed.
  - t) If the supplier has a custom cabinet, as is the case for the Ericson Long Haul for example, the supplier shall provide the certificate of compliance with the substation environment up to 765 kV substations.
  - u) All empty slots must be covered with dummy units to comply with EMC and manufacturer's cooling specifications.
  - v) Some suppliers (for example Ericsson) require specific requests or orders for EMC shielded cables; this shall be identified during the site visit.
  - w) 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.
  - x) If the air speed and temperature does not meet the equipment requirements appropriate fans shall be used.
  - y) Additional heat generated by ODU must be taken into consideration in full indoor radio installations.
  - z) For concrete floors, where there is no forced cooling through the cabinet, fans shall always be installed. Air guide plates must be installed according manufacturers' specification. The fan units must be earthed as per supplier recommendation and 240-56872313 Radio Station Earthing and Bonding Standard.
  - aa) Cable bands must be kept within suppliers' requirements and should be controlled with cable bands panels, where possible and ensure that cables are routed through the cable guides.
  - bb) Space on the cable panels must always be planned for future growth. See cable tray manufacturer's specification on the recommended number of cables per cable tray and the minimum cable banding radius.
  - cc) 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.
  - dd) Special demands on module positions for 1+1 radio installation must be handled according manufacturer's recommendation.
  - ee) The polarisation pairs for 1+1 XPIC must be noted, where applicable.
  - ff) During installation, care against for electrostatic discharge must be taken to avoid damaging modules.
  - gg) To ensure future compliance, each rack must be installed with a wrist strap.
  - hh) All brackets, including radio cable brackets, shall be earthed.
  - ii) Fibre patch cords running through a conduit shall not be installed between cabinets. Fibre patch panel shall be used, instead. The latest revision of TST 41-115 Substation Fibre Optic Cable shall be used as an installation guide.
  - jj) Patch cords slack shall be rolled neatly in the patch panels.

#### **4.7 Cable Trays 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) A Sanky cable tray must be used as a support the cables before they drop on the horizontal tray. The standard size for dropdown Sanky tray shall be 200 to 250mm. The Sanky tray must be connected to the cable tray above and the cabinet below, with correct byte washes to ensure continuity between the two systems.
- e) 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.
- f) 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 on aerial cable tray irrespective of the nature of the floor.
- g) 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°.
- h) All cables shall be neatly tied with cable ties.
- i) Cable tray sizes must always be planned for current and future requirements.
- j) Cable trays running through the wall must be continuous throughout the wall.
- k) Make sure that the rack where the equipment is installed has a label
- l) 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.

#### **4.8 Commissioning**

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

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

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

#### **4.9 Test Results**

- 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 on the front cover as well as the spine.
- 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 Bearer Project radio link designer and one for the Maintenance section.
- i) The Test results are to be forwarded to the Bearer Project 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 title 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 of 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.



## **Annex A – Impact Assessment** (Normative)

**Impact assessment form to be completed for all documents.**

### **A1 Guidelines**

- All comments must be completed.
- Motivate why items are N/A (not applicable)
- Indicate actions to be taken, persons or organisations responsible for actions and deadline for action.
- Change control committees to discuss the impact assessment, and if necessary give feedback to the compiler of any omissions or errors.

### **A2 Critical points**

**A2.1 Importance of this document. E.g. is implementation required due to safety deficiencies, statutory requirements, technology changes, document revisions, improved service quality, improved service performance, optimised costs.**

Comment: Improved service quality and standardisation.

**A2.2 If the document to be released impacts on statutory or legal compliance - this need to be very clearly stated and so highlighted.**

Comment: N/A

**A2.3 Impact on stock holding and depletion of existing stock prior to switch over.**

Comment: N/A

**A2.4 When will new stock be available?**

Comment: N/A

**A2.5 Has the interchangeability of the product or item been verified - i.e. when it fails is a straight swap possible with a competitor's product?**

Comment: N/A

**A2.6 Identify and provide details of other critical (items required for the successful implementation of this document) points to be considered in the implementation of this document.**

Comment: N/A

**A2.7 Provide details of any comments made by the Regions regarding the implementation of this document.**

Comment: N/A

**Annex A**  
(continued)

**A3 Implementation timeframe**

**A3.1 Time period for implementation of requirements.**

Comment: As soon as document is approved and signed off

**A3.2 Deadline for changeover to new item and personnel to be informed of DX wide change-over.**

Comment: N/A

**A4 Buyers Guide and Power Office**

**A4.1 Does the Buyers Guide or Buyers List need updating?**

Comment: N/A

**A4.2 What Buyer's Guides or items have been created?**

Comment: N/A

**A4.3 List all assembly drawing changes that have been revised in conjunction with this document.**

Comment: N/A

**A4.4 If the implementation of this document requires assessment by CAP, provide details under 5**

**A4.5 Which Power Office packages have been created, modified or removed?**

Comment: N/A

**A5 CAP / LAP Pre-Qualification Process related impacts**

**A5.1 Is an ad-hoc re-evaluation of all currently accepted suppliers required as a result of implementation of this document?**

Comment: N/A

**A5.2 If NO, provide motivation for issuing this specification before Acceptance Cycle Expiry date.**

Comment: N/A

**A5.3 Are ALL suppliers (currently accepted per LAP), aware of the nature of changes contained in this document?**

Comment: N/A

**Annex A**  
(continued)

**A5.4 Is implementation of the provisions of this document required during the current supplier qualification period?**

Comment: N/A

**A5.5 If Yes to 5.4, what date has been set for all currently accepted suppliers to comply fully?**

Comment: N/A

**A5.6 If Yes to 5.4, have all currently accepted suppliers been sent a prior formal notification informing them of Eskom's expectations, including the implementation date deadline?**

Comment: N/A

**A5.7 Can the changes made, potentially impact upon the purchase price of the material/equipment?**

Comment: N/A

**A5.8 Material group(s) affected by specification: (Refer to Pre-Qualification invitation schedule for list of material groups)**

Comment: N/A

**A6 Training or communication**

**A6.1 Is training required?**

Comment: (If NO then 6.2 – 6.6 will be N/A)

**A6.2 State the level of training required to implement this document. (E.g. awareness training, practical / on job, module, etc.)**

Comment: Yes. Awareness

**A6.3 State designations of personnel that will require training.**

Comment: Technicians.

**A6.4 Is the training material available? Identify person responsible for the development of training material.**

Comment: Equipment Suppliers

**A6.5 If applicable, provide details of training that will take place. (E.G. sponsor, costs, trainer, schedule of training, course material availability, training in erection / use of new equipment, maintenance training, etc).**

Comment: Radio and ADM Training by Equipment Supplier, as and when required at Eskom Academy of Learning

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**Annex A**  
(continued)

**A6.6 Was Technical Training Section consulted w.r.t module development process?**

Comment: No

**A6.7 State communications channels to be used to inform target audience.**

Comment: Eskom Telecommunications Group Communications

**A7 Special tools, equipment, software**

**A7.1 What special tools, equipment, software, etc will need to be purchased by the Region to effectively implement?**

Comment: N/A

**A7.2 Are there stock numbers available for the new equipment?**

Comment: N/A

**A7.3 What will be the costs of these special tools, equipment, software?**

Comment: N/A.

**A8 Finances**

**A8.1 What total costs would the Regions be required to incur in implementing this document? Identify all cost activities associated with implementation, e.g. labour, training, tooling, stock, obsolescence**

Comment: The regions budget for the tools required by technicians. Where contractors required to perform installation and commissioning, funds will be drawn from the contract.

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Impact assessment completed by:

Name: Kgomoetso Setlhapelo\_\_\_\_\_

Designation: \_\_ Senior Engineer\_\_\_\_\_