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## Content

# 1. Introduction

This technical specification forms part of Eskom's Enquiry process for the provision of VHF/UHF and GSM base station antennas, as well as their associated accessories, to be used for Access radio applications.

# 2. Supporting clauses

## 2.1 Scope

### 2.1.1 Purpose

The purpose of this standard is to stipulate the technical requirements of Eskom for VHF/UHF antennas and their associated accessories. The standard will form part of the enquiry documentation for the establishment of an Eskom enabling contract.

### 2.1.2 Applicability

This standard shall apply throughout Eskom Holding Limited, its divisions, subsidiaries and entities wherein Eskom has a controlling interest.

## 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

[1] ISO 9001, Quality Management Systems.

[2] IEC 60529, Degrees of protection provided by enclosures (IP code)

[3] IEC 61000-6-5, Generic standards - Emission for power station and substation environments

[4] SANS 301489-12, Electromagnetic compatibility and Radio Spectrum Matters (ERM); Electromagnetic compatibility (EMC) standard for radio equipment and services Part 12: Specific conditions for Very Small Aperture Terminal, Satellite Interactive Earth Stations operated in the frequency ranges between 4 GHz and 30 GHz in the Fixed Satellite Service (FSS).

[5] SANS 301489-20, Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services Part 20: Specific conditions for Mobile Earth Stations (MES) used in the Mobile Satellite Services (MSS)

[6] 32-9, Definition of Eskom documents

[7] 32-644, Eskom documentation management standard

[8] 474-65, Operating manual of the Steering Committee of Technologies (SCOT)

## 2.3 Definitions

### 2.3.1 General

None

### 2.3.2 Disclosure classification

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

## 2.4 Abbreviations

| Abbreviation | Description |
|---|---|
| **dB** | Decibel |
| **dBd** | Decibel compared with a half-wave dipole antenna |
| **dBi** | Decibels relative to isotropic antanna |
| **GSM** | Global System for Mobile communication |
| **IP** | Ingress Protection |
| **km/h** | Kilometres per hour |
| **MHz** | Mega Hertz |
| **lbw** | Length, breath, width |
| **mm** | Millimetre |
| **SMA** | Sub-Miniature version A |
| **UHF** | Ultra-High Frequency |
| **VHF** | Very High Frequency |
| **VSWR** | Voltage Standing Wave Ratio |

## 2.5 Roles and responsibilities

The responsibility to implement this document will lie with the relevant planning and technology departments.

## 2.6 Process for monitoring

Not applicable.

## 2.7 Related/supporting documents

Not applicable.

# 3. Requirements

## 3.1 Material

**3.1.1** All materials shall be corrosion-resistant materials.

**3.1.2** Mounting hardware shall be stainless steel.

## 3.2 Configuration

### 3.2.1 Omni directional

**3.2.1.1** Both 3dBd and 6dBd versions of antenna shall be offered in the VHF and UHF bands.

**3.2.1.2** Co-linear and stacked dipole options required.

**3.2.1.3** VHF/UHF 4 stack array shall be of a corporate feed designed for digital radio equipment which has an extremely short 'lead in time', less than 5ms.

**3.2.1.4** Unity gain dipole or whip shall be offered in the UHF band for telemetry applications.

### 3.2.2 Gain antennas

**3.2.2.1** UHF directional antennas shall be the corner reflector type, grid type or yagi for telemetry applications.

**3.2.2.2** All the VHF/UHF base station and mobile antennas tendered must be compatible to (i.e. able to operate on) digital radio networks (DMR).

### 3.2.3 Connectors

**3.2.3.1** N-type coaxial connectors shall be the standard.

### 3.2.4 Mounting

**3.2.4.1** Antenna shall be able to be fixed to a pole of 30-50mm diameter, either with integral bracket or additional hardware. Directional antennas shall be mounted in either the vertical or horizontal plane.

## 3.3 Frequency of operation

**3.3.1** VHF shall be in the range 138 - 173 MHz

**3.3.2** UHF shall be in the range 406 - 418 MHz

**3.3.3** UHF high shall be in the range 450 - 470 MHz

**3.3.4** Grid shall be in the range 1350 - 1550 MHz

**3.3.5** GSM shall be in the frequency band 900, 1800 and 2100 MHz

## 3.4 Antenna gain

### 3.4.1 Omni directional antennas

**3.4.1.1** Offer shall include both 3dBd and 6dBd versions.

### 3.4.2 Directional antennas

**3.4.2.1** Offer shall include both 6dBd and 9dBd versions.

## 3.5 VSWR

**3.5.1** All products shall exhibit better than 1.5:1 VSWR at antenna connector over the stated band.

## 3.6 Impedance

**3.6.1** All products shall match to 50 Ohm feeder characteristic impedance.

## 3.7 Power handling

**3.7.1** All products shall be rated at 30W continuous transmit power minimum.

## 3.8 Wind loading

**3.8.1** All products shall withstand 180km/h wind velocity.

## 3.9 Antenna types

### 3.9.1 Four Stack Dipole (UHF)

**3.9.1.1** Frequency range shall be between 406 - 418MHz.

**3.9.1.2** Average gain shall be bigger than or equal to 6dBd omni with a 9dBd offset.

**3.9.1.3** Tenderer shall state corporate Feed.

**3.9.1.4** VSWR shall be better than 1.5:1.

**3.9.1.5** Polarization shall be vertical.

**3.9.1.6** Offset H plane 3dB beam width shall be 145°.

**3.9.1.7** Omni E plane 3 dB beam width shall be 18°.

**3.9.1.8** Offset E plane 3dB beam width shall be 16°.

**3.9.1.9** Rated power shall be 30 watts or more.

**3.9.1.10** Impedance shall be 50 ohms.

**3.9.1.11** Tenderer shall state termination.

**3.9.1.12** All metal parts shall be grounded for lightning protection.

**3.9.1.13** Maximum wind velocity shall be greater than or equal to 180km/h.

**3.9.1.14** Tenderer shall state windload.

**3.9.1.15** Tenderer shall state the equivalent flat plate area dimensions.

**3.9.1.16** The material shall be aluminium.

**3.9.1.17** Tenderer shall state antenna array length.

**3.9.1.18** Tenderer shall state the packaged weight.

**3.9.1.19** Tenderer shall state the mounting mechanism.

### 3.9.2 Four Stack Dipole (VHF)

**3.9.2.1** Frequency range shall be between 146-173MHz.

**3.9.2.2** Average gain shall be bigger than or equal to 6dBd.

**3.9.2.3** VSWR shall be better than 1.5:1.

**3.9.2.4** Polarization shall be vertical.

**3.9.2.5** E plane 3dB beam width shall be 16°.

**3.9.2.6** Rated power shall be 100 watts or more.

**3.9.2.7** Impedance shall be 50 ohms.

**3.9.2.8** Tenderer shall state termination.

**3.9.2.9** All metal parts shall be grounded for lightning protection.

**3.9.2.10** Maximum wind velocity shall be greater than or equal to 180km/h.

**3.9.2.11** Tenderer shall state windload.

**3.9.2.12** Tenderer shall state the equivalent flat plate area dimensions.

**3.9.2.13** The material shall be aluminium.

**3.9.2.14** Tenderer shall state antenna array length.

**3.9.2.15** Tenderer shall state the packaged weight.

**3.9.2.16** Tenderer shall state the mounting mechanism.

**3.9.2.17** Tenderer shall state corporate feed.

### 3.9.3 Four Stack Dipole (VHF) lower band

**3.9.3.1** Frequency range shall be between 138-158MHz.

**3.9.3.2** Average gain shall be bigger than or equal to 6dBd.

**3.9.3.3** VSWR shall be better than 1.5:1.

**3.9.3.4** Polarization shall be vertical.

**3.9.3.5** E plane 3dB beam width shall be 16°.

**3.9.3.6** Rated power shall be 100 watts or more.

**3.9.3.7** Impedance shall be 50 ohms.

**3.9.3.8** Tenderer shall state termination.

**3.9.3.9** All metal parts shall be grounded for lightning protection.

**3.9.3.10** Maximum wind velocity shall be greater than or equal to 180km/h.

**3.9.3.11** Tenderer shall state windload.

**3.9.3.12** Tenderer shall state the equivalent flat plate area dimensions.

**3.9.3.13** The material shall be aluminium.

**3.9.3.14** Tenderer shall state antenna array length.

**3.9.3.15** Tenderer shall state the packaged weight.

**3.9.3.16** Tenderer shall state the mounting mechanism.

**3.9.3.17** Tenderer shall state corporate feed.

### 3.9.4 Co-Linear Antenna (UHF)

**3.9.4.1** Frequency range shall be between 406 - 418MHz.

**3.9.4.2** Average gain shall be bigger than or equal to 5dBd omnidirectional.

**3.9.4.3** VSWR shall be better than 1.5:1.

**3.9.4.4** Polarization shall be vertical.

**3.9.4.5** H plane 3dB beam width shall be 360° UHF.

**3.9.4.6** E plane 3dB beam width shall be 16° UHF.

**3.9.4.7** Rated power shall be 30 watts or more.

**3.9.4.8** Impedance shall be 50 ohms.

**3.9.4.9** Tenderer shall state termination.

**3.9.4.10** All metal parts shall be grounded for lightning protection.

**3.9.4.11** Maximum wind velocity shall be greater than or equal to 180km/h.

**3.9.4.12** Tenderer shall state windload.

**3.9.4.13** Tenderer shall state the equivalent flat plate area dimensions.

**3.9.4.14** Material shall be fibreglass shroud with aluminium base.

**3.9.4.15** Tenderer shall state antenna array length.

**3.9.4.16** Tenderer shall state the packaged weight.

**3.9.4.17** Tenderer shall state the mounting mechanism.

### 3.9.5 Co-Linear Antenna (VHF)

**3.9.5.1** Frequency range shall be between 146-173MHz.

**3.9.5.2** Average gain shall be bigger than or equal to 3dBd omnidirectional.

**3.9.5.3** VSWR shall be better than 1.5:1.

**3.9.5.4** Polarization shall be vertical.

**3.9.5.5** H plane 3dB beam width shall be 360°.

**3.9.5.6** E plane 3dB beam width shall be 36°.

**3.9.5.7** Rated power shall be 30 watts or more.

**3.9.5.8** Impedance shall be 50 ohms.

**3.9.5.9** Tenderer shall state termination.

**3.9.5.10** All metal parts shall be grounded for lightning protection.

**3.9.5.11** Maximum wind velocity shall be greater than or equal to 180km/h.

**3.9.5.12** Tenderer shall state windload.

**3.9.5.13** Tenderer shall state the equivalent flat plate area dimensions.

**3.9.5.14** Material shall be fibreglass shroud with aluminium base.

**3.9.5.15** Tenderer shall state antenna array length.

**3.9.5.16** Tenderer shall state the packaged weight.

**3.9.5.17** Tenderer shall state the mounting mechanism.

### 3.9.6 Corner Reflector

**3.9.6.1** Frequency range shall be between 400-470MHz.

**3.9.6.2** Average gain shall be bigger than or equal to 9dBd.

**3.9.6.3** VSWR shall be better than 1.5:1.

**3.9.6.4** Polarization shall be vertical and horizontal.

**3.9.6.5** H plane 3dB beam width shall be 54°.

**3.9.6.6** E plane 3dB beam width shall be 72°.

**3.9.6.7** Front-to-Back ratio shall be better than 25dB.

**3.9.6.8** Rated power shall be 30 watts or more.

**3.9.6.9** Impedance shall be 50 ohms.

**3.9.6.10** Tenderer shall state termination.

**3.9.6.11** All metal parts shall be grounded for lightning protection.

**3.9.6.12** Maximum wind velocity shall be greater than or equal to 180km/h.

**3.9.6.13** Tenderer shall state windload.

**3.9.6.14** Tenderer shall state the equivalent flat plate area dimensions.

**3.9.6.15** The material shall be aluminium.

**3.9.6.16** Tenderer shall state antenna array length.

**3.9.6.17** Tenderer shall state the packaged weight.

**3.9.6.18** Tenderer shall state the mounting mechanism.

### 3.9.7 Two Stack Array (UHF)

**3.9.7.1** Frequency range shall be between 400-470MHz.

**3.9.7.2** Average gain shall be bigger than or equal to 3dBd.

**3.9.7.3** VSWR shall be better than 1.5:1.

**3.9.7.4** Polarization shall be vertical.

**3.9.7.5** H plane 3dB beam width shall be 230°.

**3.9.7.6** E plane 3dB beam width shall be 32°.

**3.9.7.7** Rated power shall be 30 watts or more.

**3.9.7.8** Impedance shall be 50 ohms.

**3.9.7.9** Tenderer shall state termination.

**3.9.7.10** All metal parts shall be grounded for lightning protection.

**3.9.7.11** Maximum wind velocity shall be greater than or equal to 180km/h.

**3.9.7.12** Tenderer shall state windload.

**3.9.7.13** Tenderer shall state the equivalent flat plate area dimensions.

**3.9.7.14** The material shall be aluminium.

**3.9.7.15** Tenderer shall state antenna array length.

**3.9.7.16** Tenderer shall state the packaged weight.

**3.9.7.17** Tenderer shall state the mounting mechanism.

### 3.9.8 Two Stack Array (VHF)

**3.9.8.1** Frequency range shall be between 146-173MHz.

**3.9.8.2** Average gain shall be bigger than or equal to 3dBd.

**3.9.8.3** VSWR shall be better than 1.5:1.

**3.9.8.4** Polarization shall be vertical.

**3.9.8.5** H plane 3dB beam width shall be 190°.

**3.9.8.6** E plane 3dB beam width shall be 30°.

**3.9.8.7** Rated power shall be 50 watts or more.

**3.9.8.8** Impedance shall be 50 ohms.

**3.9.8.9** Tenderer shall state termination.

**3.9.8.10** All metal parts shall be grounded for lightning protection.

**3.9.8.11** Maximum wind velocity shall be greater than or equal to 180km/h.

**3.9.8.12** Tenderer shall state windload.

**3.9.8.13** Tenderer shall state the equivalent flat plate area dimensions.

**3.9.8.14** The material shall be aluminium.

**3.9.8.15** Tenderer shall state antenna array length.

**3.9.8.16** Tenderer shall state the packaged weight.

**3.9.8.17** Tenderer shall state the mounting mechanism.

### 3.9.9 Two Stack Array (VHF) lower band

**3.9.9.1** Frequency range shall be between 138-156MHz.

**3.9.9.2** Average gain shall be bigger than or equal to 3dBd.

**3.9.9.3** VSWR shall be better than 1.5:1.

**3.9.9.4** Polarization shall be vertical.

**3.9.9.5** H plane 3dB beam width shall be 190°.

**3.9.9.6** E plane 3dB beam width shall be 30°.

**3.9.9.7** Rated power shall be 50 watts or more.

**3.9.9.8** Impedance shall be 50 ohms.

**3.9.9.9** Tenderer shall state termination.

**3.9.9.10** All metal parts shall be grounded for lightning protection.

**3.9.9.11** Maximum wind velocity shall be greater than or equal to 180km/h.

**3.9.9.12** Tenderer shall state windload.

**3.9.9.13** Tenderer shall state the equivalent flat plate area dimensions.

**3.9.9.14** The material shall be aluminium.

**3.9.9.15** Tenderer shall state antenna array length.

**3.9.9.16** Tenderer shall state the packaged weight.

**3.9.9.17** Tenderer shall state the mounting mechanism.

### 3.9.10 Dipole (VHF)

**3.9.10.1** Frequency range shall be between 146-173MHz.

**3.9.10.2** Average gain shall be bigger than or equal to 0dBd.

**3.9.10.3** VSWR shall be better than 1.5:1.

**3.9.10.4** Polarization shall be vertical.

**3.9.10.5** E plane 3dB beam width shall be 78°.

**3.9.10.6** Rated power shall be 30 watts or more.

**3.9.10.7** Impedance shall be 50 ohms.

**3.9.10.8** Tenderer shall state termination.

**3.9.10.9** All metal parts shall be grounded for lightning protection.

**3.9.10.10** Maximum wind velocity shall be greater than or equal to 180km/h.

**3.9.10.11** Tenderer shall state windload.

**3.9.10.12** Tenderer shall state the equivalent flat plate area dimensions.

**3.9.10.13** Material shall be hot dip galvanized steel outer if made of steel. In the case of aluminium then hot dip galvanized is not a requirement.

**3.9.10.14** Tenderer shall state antenna array length.

**3.9.10.15** Tenderer shall state the packaged weight.

**3.9.10.16** Mounting mechanism shall be integral clamps to bolt directly to wall or to clamp to a 25-76mm diameter pipe.

### 3.9.11 Dipole (UHF)

**3.9.11.1** Frequency range shall be between 406-418MHz.

**3.9.11.2** Average gain shall be bigger than or equal to 0dBd.

**3.9.11.3** VSWR shall be better than 1.5:1.

**3.9.11.4** Polarization shall be vertical.

**3.9.11.5** H plane 3dB beam width shall be 180°.

**3.9.11.6** E plane 3dB beam width shall be 66°.

**3.9.11.7** Rated power shall be 30 watts or more.

**3.9.11.8** Impedance shall be 50 ohms.

**3.9.11.9** Tenderer shall state termination.

**3.9.11.10** All metal parts shall be grounded for lightning protection.

**3.9.11.11** Maximum Wind velocity shall be greater than or equal to 180km/h.

**3.9.11.12** Tenderer shall state windload.

**3.9.11.13** Tenderer shall state the equivalent flat plate area dimensions.

**3.9.11.14** Tenderer shall state material.

**3.9.11.15** Tenderer shall state antenna array length.

**3.9.11.16** Tenderer shall state the packaged weight.

**3.9.11.17** Mounting mechanism shall be integral V-bolt to bolt to 25-50mm diameter pipe.

### 3.9.12 YAGI (UHF)

**3.9.12.1** Frequency range shall be between 400-470MHz.

**3.9.12.2** Average gain shall be bigger than or equal to7dBd.

**3.9.12.3** VSWR shall be better than 1.5:1.

**3.9.12.4** Polarization shall be vertical or horizontal.

**3.9.12.5** Front-to-Back ratio shall be better than 15dB.

**3.9.12.6** H plane 3dB beam width shall be 120°.

**3.9.12.7** E plane 3dB beam width shall be 70°.

**3.9.12.8** Rated power shall be 30 watts or more.

**3.9.12.9** Impedance shall be 50 ohms.

**3.9.12.10** Tenderer shall state termination.

**3.9.12.11** All metal parts shall be grounded for lightning protection.

**3.9.12.12** Maximum wind velocity shall be greater than or equal to 180km/h.

**3.9.12.13** Tenderer shall state windload.

**3.9.12.14** Tenderer shall state the equivalent flat plate area dimensions.

**3.9.12.15** Tenderer shall state material.

**3.9.12.16** Tenderer shall state antenna array length.

**3.9.12.17** Tenderer shall state the packaged weight.

**3.9.12.18** Mounting mechanism shall be Integral V-bolt to bolt to 25-50mm diameter pipe.

### 3.9.13 YAGI (UHF)

**3.9.13.1** Frequency range shall be between 400-470MHz.

**3.9.13.2** Average gain shall be bigger than or equal to12dBd.

**3.9.13.3** VSWR shall be better than 1.5:1.

**3.9.13.4** Polarization shall be vertical or horizontal.

**3.9.13.5** Front-to-Back ratio shall be better than 15dB.

**3.9.13.6** H plane 3dB beam width shall be 40°.

**3.9.13.7** E plane 3dB beam width shall be 34°.

**3.9.13.8** Rated power shall be 30 watts or more.

**3.9.13.9** Impedance shall be 50 ohms.

**3.9.13.10** Tenderer shall state termination.

**3.9.13.11** All metal parts shall be grounded for lightning protection.

**3.9.13.12** Maximum wind velocity shall be greater than or equal to 180km/h.

**3.9.13.13** Tenderer shall state windload.

**3.9.13.14** Tenderer shall state the equivalent flat plate area dimensions.

**3.9.13.15** Tenderer shall state the material.

**3.9.13.16** Tenderer shall state antenna array length.

**3.9.13.17** Tenderer shall state the packaged weight.

**3.9.13.18** Mounting mechanism shall be integral V-bolt to bolt to 25-50mm diameter pipe.

### 3.9.14 YAGI (VHF)

**3.9.14.1** Frequency range shall be between 146-173MHz.

**3.9.14.2** Average gain shall be bigger than or equal to 8dBd.

**3.9.14.3** VSWR shall be better than 1.5:1.

**3.9.14.4** Polarization shall be vertical or horizontal.

**3.9.14.5** Front-to-Back ratio shall be better than 10dB.

**3.9.14.6** H plane 3dB beam width shall be 70°.

**3.9.14.7** E plane 3dB beam width shall be 52°.

**3.9.14.8** Rated power shall be 30 watts or more.

**3.9.14.9** Impedance shall be 50 ohms.

**3.9.14.10** Tenderer shall state termination.

**3.9.14.11** All metal parts shall be grounded for lightning protection.

**3.9.14.12** Maximum wind velocity shall be greater than or equal to 180km/h.

**3.9.14.13** Tenderer shall state windload.

**3.9.14.14** Tenderer shall state the equivalent flat plate area dimensions.

**3.9.14.15** Tenderer shall state the material.

**3.9.14.16** Tenderer shall state antenna array length.

**3.9.14.17** Tenderer shall state the packaged weight.

**3.9.14.18** Mounting mechanism shall be integral V-bolt to bolt to 25-50mm diameter pipe.

### 3.9.15 YAGI

**3.9.15.1** Frequency range shall be between 1350-1550MHz.

**3.9.15.2** Average gain shall be bigger than or equal to 15 dBi.

**3.9.15.3** VSWR shall be better than 1.5:1.

**3.9.15.4** Polarization shall be vertical or horizontal.

**3.9.15.5** Front-to-Back ratio shall be better than 25dB.

**3.9.15.6** H plane 3dB beam width shall be 30°.

**3.9.15.7** E plane 3dB beam width shall be 30°.

**3.9.15.8** Rated power shall be 30 watts or more.

**3.9.15.9** Impedance shall be 50 ohms.

**3.9.15.10** Tenderer shall state termination.

**3.9.15.11** All metal parts shall be grounded for lightning protection.

**3.9.15.12** Maximum wind velocity shall be greater than or equal to 180km/h.

**3.9.15.13** Tenderer shall state windload.

**3.9.15.14** Tenderer shall state the equivalent flat plate area dimensions.

**3.9.15.15** Tenderer shall state the material.

**3.9.15.16** Tenderer shall state antenna array length.

**3.9.15.17** Tenderer shall state the packaged weight.

**3.9.15.18** Mounting mechanism shall be integral V-bolt to bolt to 90-110 mm diameter pipe.

**3.9.16 Mobile**

**3.9.16.1** Frequency range shall be between 146-173MHz.

**3.9.16.2** Average gain shall be bigger than or equal to 2 dB.

**3.9.16.3** VSWR shall be better than 1.5:1.

**3.9.16.4** Polarization shall be vertical.

**3.9.16.5** Rated power shall be 30 watts or more.

**3.9.16.6** Impedance shall be 50 ohms.

**3.9.16.7** Feed shall be a 3 meter RG58.

**3.9.16.8** All metal parts shall be grounded for lightning protection.

**3.9.16.9** Maximum wind velocity shall be greater than or equal to 180km/h.

**3.9.16.10** Tenderer shall state windload.

**3.9.16.11** Tenderer shall state the material.

**3.9.16.12** Tenderer shall state antenna array length.

**3.9.16.13** Tenderer shall state the packaged weight.

**3.9.16.14** Mounting mechanism shall be a hole size of 16–22 mm.

**3.9.17 Mobile**

**3.9.17.1** Frequency range shall be between 50-470MHz.

**3.9.17.2** Average gain shall be unity.

**3.9.17.3** VSWR shall be better than 1.5:1.

**3.9.17.4** Polarization shall be vertical.

**3.9.17.5** Rated power shall be 30 watts or more.

**3.9.17.6** Impedance shall be 50 ohms.

**3.9.17.7** Feed shall be a 3 meter RG58.

**3.9.17.8** All metal parts shall be grounded for lightning protection.

**3.9.17.9** Maximum wind velocity shall be greater than or equal to 180km/h.

**3.9.17.10** Tenderer shall state windload.

**3.9.17.11** Tenderer shall state the material.

**3.9.17.12** Tenderer shall state antenna array length.

**3.9.17.13** Tenderer shall state the packaged weight.

**3.9.17.14** Mounting mechanism shall be a hole size of 16–22 mm.

**3.9.18 Grid**

**3.9.18.1** Frequency range shall be between 1350-1550MHz.

**3.9.18.2** Average gain shall be bigger than or equal to 22dBd.

**3.9.18.3** VSWR shall be better than 1.5:1.

**3.9.18.4** Polarization shall be vertical and/or horizontal.

**3.9.18.5** Front-to-Back ratio shall be better than 30dB.

**3.9.18.6** H plane 3dB beam width shall be 10°.

**3.9.18.7** E plane 3dB beam width shall be 11°.

**3.9.18.8** Rated power shall be 30 watts or more.

**3.9.18.9** Impedance shall be 50 ohms.

**3.9.18.10** Tenderer shall state termination.

**3.9.18.11** All metal parts shall be grounded for lightning protection.

**3.9.18.12** Maximum wind velocity shall be greater than or equal to 180km/h.

**3.9.18.13** Tenderer shall state windload.

**3.9.18.14** Tenderer shall state the equivalent flat plate area dimensions.

**3.9.18.15** Tenderer shall state the material.

**3.9.18.16** Tenderer shall state antenna array length.

**3.9.18.17** Tenderer shall state the packaged weight.

**3.9.18.18** Tenderer shall state the mounting mechanism.

**3.9.18.19** Tenderer shall state the dimensions (lbw in mm).

**3.9.19 Disguised Non-Metallic Antenna**

**3.9.19.1** Frequency range shall be in the bands 900/1800/2100MHz.

**3.9.19.2** Average gain shall be unity.

**3.9.19.3** VSWR shall be better than 1.5:1.

**3.9.19.4** Polarization shall be vertical and/or horizontal.

**3.9.19.5** Tenderer shall state the H plane 3dB beam width.

**3.9.19.6** Tenderer shall state the E plane 3dB beam width.

**3.9.19.7** Rated power shall be 10 watts or more.

**3.9.19.8** Impedance shall be 50 ohms.

**3.9.19.9** Termination shall be a SMA male connector with 2m LMR195 co-ax.

**3.9.19.10** All metal parts shall be grounded for lightning protection.

**3.9.19.11** Maximum wind velocity shall be greater than or equal to 180km/h.

**3.9.19.12** Equivalent flat plate area shall be 210mmX65mm.

**3.9.19.13** Material shall be a Black UV stabilized ABS.

**3.9.19.14** Tenderer shall state antenna array length.

**3.9.19.15** Tenderer shall state the packaged weight.

**3.9.19.16** Mounting mechanism shall be able to screw to non-metallic surfaces.

**3.9.19.17** Tenderer shall state the dimensions (lbw <=210mmx65xmm30 mm).

### 3.9.20 GSM LOG P

**3.9.20.1** Frequency range shall be in the bands 900/1800/2100MHz.

**3.9.20.2** Average gain shall be bigger than or equal to 7 dBi.

**3.9.20.3** VSWR shall be better than 1.5:1.

**3.9.20.4** Polarization shall be vertical and/or horizontal.

**3.9.20.5** Tenderer shall state the H plane 3dB beam width.

**3.9.20.6** Tenderer shall state the E plane 3dB beam width.

**3.9.20.7** Rated power shall be 30 watts or more.

**3.9.20.8** Impedance shall be 50 ohms.

**3.9.20.9** Tenderer shall state termination.

**3.9.20.10** All metal parts shall be grounded for lightning protection.

**3.9.20.11** Maximum wind velocity shall be greater than or equal to 180km/h.

**3.9.20.12** Tenderer shall state windload.

**3.9.20.13** Tenderer shall state the equivalent flat plate area dimensions.

**3.9.20.14** Tenderer shall state the material.

**3.9.20.15** Tenderer shall state antenna array length.

**3.9.20.16** Tenderer shall state the packaged weight.

**3.9.20.17** Tenderer shall state the mounting mechanism.

**3.9.20.18** Tenderer shall state the dimensions (lbw in mm).

### 3.9.21 Disguised Metallic Antenna

**3.9.21.1** Frequency range shall be in the bands 900/1800/2100MHz.

**3.9.21.2** Average gain shall be bigger than or equal to 2dBd.

**3.9.21.3** VSWR shall be better than 1.5:1.

**3.9.21.4** Polarization shall be vertical and/or horizontal.

**3.9.21.5** Tenderer shall state the H plane 3dB beam width.

**3.9.21.6** Tenderer shall state the E plane 3dB beam width.

**3.9.21.7** Rated power shall be 10 watts or more.

**3.9.21.8** Impedance shall be 50 ohms.

**3.9.21.9** Termination shall be a SMA Male connector with 2m LMR195 co-ax.

**3.9.21.10** All metal parts shall be grounded for lightning protection.

**3.9.21.11** Maximum wind velocity shall be greater than or equal to 180km/h.

**3.9.21.12** Equivalent flat plate area shall be180mmX65mm.

**3.9.21.13** Material: Black UV stabilized ABS.

**3.9.21.14** Tenderer shall state antenna array length.

**3.9.21.15** Tenderer shall state the packaged weight.

**3.9.21.16** Mounting mechanism shall screw to metallic surface.

## 3.10 Mounting accessories

The following specifications shall be offered for clamps, bolts, brackets and bars:

### 3.10.1 Clamps

**3.10.1.1 Crossover 25 mm to 60 mm**

**3.10.1.1.1** 6 mm thickness mild steel hot dipped galvanized.

**3.10.1.1.2** Vertical and horizontal clamping 25 mm to 60 mm pipe.

**3.10.1.2 Crossover 25 mm to 165 mm**

**3.10.1.2.1** 6 mm thickness mild steel hot dipped galvanized.

**3.10.1.2.2** Vertical clamping 25 mm to 165 mm pipe.

**3.10.1.2.3** Horizontal clamping 25 mm to 64 mm pipe.

**3.10.1.3 Crossover 25 mm to 300 mm**

**3.10.1.3.1** 6 mm thickness mild steel hot dipped galvanized.

**3.10.1.3.2** Vertical clamping 25 mm to 300 mm pipe.

**3.10.1.3.3** Horizontal clamping 25 mm to 64 mm pipe.

**3.10.1.4 Parallel 34 mm to 77 mm (small)**

**3.10.1.4.1** Mild steel hot dipped galvanized.

**3.10.1.4.2** Complete with all nuts and washers.

**3.10.1.5 Parallel 34 mm to 90 mm (standard)**

**3.10.1.5.1** Mild steel hot dipped galvanized.

**3.10.1.5.2** Complete with all nuts and washers.

### 3.10.2 Bolts

**3.10.2.1 Angle iron bolt 100 mm × 100 mm**

**3.10.2.1.1** M10 hot dipped galvanized.

**3.10.2.1.2** Complete with nuts and washers.

**3.10.2.2 Angle iron bolt 127 mm to 127 mm**

**3.10.2.2.1** M10 hot dipped galvanized.

**3.10.2.2.2** Complete with nuts and washers.

**3.10.2.3 U-bolt 60 mm**

**3.10.2.3.1** Diameter: 57 mm to 60 mm pipe.

**3.10.2.3.2** M10 hot dipped galvanized.

**3.10.2.3.3** Complete with nuts and washers.

**3.10.2.4 U-bolt 100 mm**

**3.10.2.4.1** Diameter: 95 mm to 102 mm pipe.

**3.10.2.4.2** M10 hot dipped galvanized.

**3.10.2.4.3** Complete with nuts and washers.

**3.10.2.5 U-bolt 115 mm**

**3.10.2.5.1** Diameter: 112 mm to 116 mm pipe .

**3.10.2.5.2** M10 hot dipped galvanized.

**3.10.2.5.3** Complete with nuts and washers.

**3.10.2.6 U-bolt 215 mm**

**3.10.2.6.1** Diameter: 177 mm to 219 mm pipe.

**3.10.2.6.2** M10 hot dipped galvanized.

**3.10.2.6.3** Complete with nuts and washers.

**3.10.2.7 V-bolt 25 mm to 60 mm**

**3.10.2.7.1** Diameter: 25 mm to 60 mm pipe.

**3.10.2.7.2** M10 hot dipped galvanized.

**3.10.2.7.3** Complete with nuts and washers.

**3.10.2.8 V-bolt 76 mm to 115 mm**

**3.10.2.8.1** Diameter: 76 mm to 115 mm pipe.

**3.10.2.8.2** M10 hot dipped galvanized.

**3.10.2.8.3** Complete with nuts and washers.

### 3.10.3 Brackets

**3.10.3.1 Elbow 600 mm mast offset**

**3.10.3.1.1** Pipe diameter: 50 mm. .

**3.10.3.2 Elbow 1 m mast offset**

**3.10.3.2.1** Pipe diameter: 50 mm.

**3.10.3.3 Light duty wall mount 150 mm offset**

**3.10.3.3.1** Single clamping position for pole.

**3.10.3.3.2** Metal to be hot dipped galvanized.

**3.10.3.4 Heavy duty wall mount 150 mm offset**

**3.10.3.4.1** Dual clamping positions for pole, 400 mm apart.

**3.10.3.4.2** Metal to be hot dipped galvanized.

**3.10.3.5 Heavy duty wall mount 400 mm offset**

**3.10.3.5.1** Dual clamping positions for pole, 400 mm apart.

**3.10.3.5.2** Metal to be hot dipped galvanized.

**3.10.3.6 Heavy duty wall mount 750-1000 mm offset**

**3.10.3.6.1** 50/60mm pipe mount with dual clamping positions.

**3.10.3.6.2** Metal to be hot dipped galvanized.

### 3.10.4 Poles

**3.10.4.1 Aluminium antenna pole 6 metre**

**3.10.4.1.1** Length: 6m.

**3.10.4.1.2** Diameter: 60 mm. Wall Thickness: 5 mm.

**3.10.4.2 Aluminium antenna pole 5 metre**

**3.10.4.2.1** Length: 5m.

**3.10.4.2.2** Diameter: 50 mm. Wall Thickness: 5 mm.

**3.10.4.3 Aluminium antenna pole 3 metre**

**3.10.4.3.1** Length: 3m.

**3.10.4.3.2** Diameter: 50 mm. Wall Thickness: 5 mm.

### 3.10.5 Bar

**3.10.5.1 Copper flat bar 25 mm × 3 mm**

**3.10.5.1.1** Width: 25 mm. Thickness: 3 mm. Length: per metre.

## 4. Authorization

This document has been seen and accepted by:

| Name and surname | Designation |
|---|---|
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## 5. Revisions

| Date | Rev | Compiler | Remarks |
|---|---|---|---|
| July 2025 | 5 | J Schutte | Updated / corrected clauses: 3.2.1.3, 3.2.2.2, 3.9.10.13, 3.9.19.7, 3.9.21.7 |
| May 2024 | 4 | J Schutte | Review, added antenna poles and brackets. |
| June 2019 | 3 | SO Ngwenya | Added Requirements for GSM Antennas. |
| Aug 2018 | 2 | SO Ngwenya | Review Document, added Mounting accessories |
| June 2013 | 1 | J. Schutte | Modifications and template change to SCOT. |
| Jul 2003 | 0 | C. Scarr | Initial document |

## 6. Development team

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

- Oscar Ngwenya
- Chis Scarr
- Jacques Schutte

## 7. Acknowledgements

Not applicable

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# Annex A – Schedule A: Schedule of Technical Compliance

This must be completed by providing technical details of tendered equipment and Tenderer's statement of compliance or non-compliance. The Tenderers statement of compliance (Schedule B) must be supported by additional information of a concise reference to the relevant submitted documents (e.g., file number, section number, page number, paragraph number). A failure to support the clause with the relevant reference will result in non-compliance.

**Table A.1: Technical Specification Requirements**

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3 | Requirements | | | |
| 3.1 | Material | | | |
| 3.1.1 | All materials shall be corrosion-resistant materials. | State Compliance & Provide Evidence | | |
| 3.1.2 | Mounting hardware shall be stainless steel. | State Compliance & Provide Evidence | | |
| 3.2 | Configuration | | | |
| 3.2.1 | Omni directional | | | |
| 3.2.1.1 | Both 3dBd and 6dBd versions of antenna shall be offered in the VHF and UHF bands. | State Compliance & Provide Evidence | | |
| 3.2.1.2 | Co-linear and stacked dipole options required. | State Compliance & Provide Evidence | | |
| 3.2.1.3 | VHF/UHF 4 stack array shall be of a corporate feed designed for digital radio equipment which has an extremely short 'lead in time', less than 5ms. | State Compliance & Provide Evidence | | |
| 3.2.1.4 | Unity gain dipole or whip shall be offered in the UHF band for telemetry applications. | State Compliance & Provide Evidence | | |
| 3.2.2 | Gain antennas | | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.2.2.1 | UHF directional antennas shall be the corner reflector type, grid type or yagi for telemetry applications. | State Compliance & Provide Evidence | | |
| 3.2.2.2 | All the VHF/UHF base station and mobile antennas tendered must be compatible to (i.e. able to operate on) digital radio networks (DMR). | State Compliance & Provide Evidence | | |
| 3.2.3 | Connectors | | | |
| 3.2.3.1 | N-type coaxial connectors shall be the standard. | State Compliance & Provide Evidence | | |
| 3.2.4 | Mounting | | | |
| 3.2.4.1 | Antenna shall be able to be fixed to a pole of 30-50mm diameter, either with integral bracket or additional hardware. Directional antennas shall be mounted in either the vertical or horizontal plane. | State Compliance & Provide Evidence | | |
| 3.3 | Frequency of operation | | | |
| 3.3.1 | VHF shall be in the range 138 - 173 MHz | State Compliance & Provide Evidence | | |
| 3.3.2 | UHF shall be in the range 406 - 418 MHz | State Compliance & Provide Evidence | | |
| 3.3.3 | UHF high shall be in the range 450 - 470 MHz | State Compliance & Provide Evidence | | |
| 3.3.4 | Grid shall be in the range 1350 - 1550 MHz | State Compliance & Provide Evidence | | |
| 3.3.5 | GSM shall be in the frequency band 900, 1800 and 2100 MHz | State Compliance & Provide Evidence | | |
| 3.4 | Antenna gain | | | |
| 3.4.1 | Omni directional antennas | | | |
| 3.4.1.1 | Offer shall include both 3dBd and 6dBd versions. | State Compliance & Provide Evidence | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.4.2 | Directional antennas | | | |
| 3.4.2.1 | Offer shall include both 6dBd and 9dBd versions. | State Compliance & Provide Evidence | | |
| 3.5 | VSWR | | | |
| 3.5.1 | All products shall exhibit better than 1.5:1 VSWR at antenna connector over the stated band. | State Compliance & Provide Evidence | | |
| 3.6 | Impedance | | | |
| 3.6.1 | All products shall match to 50 Ohm feeder characteristic impedance. | State Compliance & Provide Evidence | | |
| 3.7 | Power handling | | | |
| 3.7.1 | All products shall be rated at 30W continuous transmit power minimum. | State Compliance & Provide Evidence | | |
| 3.8 | Wind loading | | | |
| 3.8.1 | All products shall withstand 180km/h wind velocity. | State Compliance & Provide Evidence | | |
| 3.9 | Antenna types | | | |
| 3.9.1 | Four Stack Dipole (UHF) | | | |
| 3.9.1.1 | Frequency range shall be between 406 - 418MHz. | State Compliance & Provide Evidence | | |
| 3.9.1.2 | Average gain shall be bigger than or equal to 6dBd omni with a 9dBd offset. | State Compliance & Provide Evidence | | |
| 3.9.1.3 | Tenderer shall state corporate Feed. | State Compliance & Provide Evidence | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.9.1.4 | VSWR shall be better than 1.5:1. | State Compliance & Provide Evidence | | |
| 3.9.1.5 | Polarization shall be vertical. | State Compliance & Provide Evidence | | |
| 3.9.1.6 | Offset H plane 3dB beam width shall be 145°. | State Compliance & Provide Evidence | | |
| 3.9.1.7 | Omni E plane 3 dB beam width shall be 18°. | State Compliance & Provide Evidence | | |
| 3.9.1.8 | Offset E plane 3dB beam width shall be 16°. | State Compliance & Provide Evidence | | |
| 3.9.1.9 | Rated power shall be 30 watts or more. | State Compliance & Provide Evidence | | |
| 3.9.1.10 | Impedance shall be 50 ohms. | State Compliance & Provide Evidence | | |
| 3.9.1.11 | Tenderer shall state termination. | State Compliance & Provide Evidence | | |
| 3.9.1.12 | All metal parts shall be grounded for lightning protection. | State Compliance & Provide Evidence | | |
| 3.9.1.13 | Maximum wind velocity shall be greater than or equal to 180km/h. | State Compliance & Provide Evidence | | |
| 3.9.1.14 | Tenderer shall state windload. | State Compliance & Provide Evidence | | |
| 3.9.1.15 | Tenderer shall state the equivalent flat plate area dimensions. | State Compliance & Provide Evidence | | |
| 3.9.1.16 | The material shall be aluminium. | State Compliance & Provide Evidence | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.9.1.17 | Tenderer shall state antenna array length. | State Compliance & Provide Evidence | | |
| 3.9.1.18 | Tenderer shall state the packaged weight. | State Compliance & Provide Evidence | | |
| 3.9.1.19 | Tenderer shall state the mounting mechanism. | State Compliance & Provide Evidence | | |
| 3.9.2 | Four Stack Dipole (VHF) | | | |
| 3.9.2.1 | Frequency range shall be between 146-173MHz. | State Compliance & Provide Evidence | | |
| 3.9.2.2 | Average gain shall be bigger than or equal to 6dBd. | State Compliance & Provide Evidence | | |
| 3.9.2.3 | VSWR shall be better than 1.5:1. | State Compliance & Provide Evidence | | |
| 3.9.2.4 | Polarization shall be vertical. | State Compliance & Provide Evidence | | |
| 3.9.2.5 | E plane 3dB beam width shall be 16°. | State Compliance & Provide Evidence | | |
| 3.9.2.6 | Rated power shall be 100 watts or more. | State Compliance & Provide Evidence | | |
| 3.9.2.7 | Impedance shall be 50 ohms. | State Compliance & Provide Evidence | | |
| 3.9.2.8 | Tenderer shall state termination. | State Compliance & Provide Evidence | | |
| 3.9.2.9 | All metal parts shall be grounded for lightning protection. | State Compliance & Provide Evidence | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.9.2.10 | Maximum wind velocity shall be greater than or equal to 180km/h. | State Compliance & Provide Evidence | | |
| 3.9.2.11 | Tenderer shall state windload. | State Compliance & Provide Evidence | | |
| 3.9.2.12 | Tenderer shall state the equivalent flat plate area dimensions. | State Compliance & Provide Evidence | | |
| 3.9.2.13 | The material shall be aluminium. | State Compliance & Provide Evidence | | |
| 3.9.2.14 | Tenderer shall state antenna array length. | State Compliance & Provide Evidence | | |
| 3.9.2.15 | Tenderer shall state the packaged weight. | State Compliance & Provide Evidence | | |
| 3.9.2.16 | Tenderer shall state the mounting mechanism. | State Compliance & Provide Evidence | | |
| 3.9.2.17 | Tenderer shall state corporate feed. | State Compliance & Provide Evidence | | |
| 3.9.3 | Four Stack Dipole (VHF) lower band | | | |
| 3.9.3.1 | Frequency range shall be between 138-158MHz. | State Compliance & Provide Evidence | | |
| 3.9.3.2 | Average gain shall be bigger than or equal to 6dBd. | State Compliance & Provide Evidence | | |
| 3.9.3.3 | VSWR shall be better than 1.5:1. | State Compliance & Provide Evidence | | |
| 3.9.3.4 | Polarization shall be vertical. | State Compliance & Provide Evidence | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.9.3.5 | E plane 3dB beam width shall be 16°. | State Compliance & Provide Evidence | | |
| 3.9.3.6 | Rated power shall be 100 watts or more. | State Compliance & Provide Evidence | | |
| 3.9.3.7 | Impedance shall be 50 ohms. | State Compliance & Provide Evidence | | |
| 3.9.3.8 | Tenderer shall state termination. | State Compliance & Provide Evidence | | |
| 3.9.3.9 | All metal parts shall be grounded for lightning protection. | State Compliance & Provide Evidence | | |
| 3.9.3.10 | Maximum wind velocity shall be greater than or equal to 180km/h. | State Compliance & Provide Evidence | | |
| 3.9.3.11 | Tenderer shall state windload. | State Compliance & Provide Evidence | | |
| 3.9.3.12 | Tenderer shall state the equivalent flat plate area dimensions. | State Compliance & Provide Evidence | | |
| 3.9.3.13 | The material shall be aluminium. | State Compliance & Provide Evidence | | |
| 3.9.3.14 | Tenderer shall state antenna array length. | State Compliance & Provide Evidence | | |
| 3.9.3.15 | Tenderer shall state the packaged weight. | State Compliance & Provide Evidence | | |
| 3.9.3.16 | Tenderer shall state the mounting mechanism. | State Compliance & Provide Evidence | | |
| 3.9.3.17 | Tenderer shall state corporate feed. | State Compliance & Provide Evidence | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.9.4 | Co-Linear Antenna (UHF) | | | |
| 3.9.4.1 | Frequency range shall be between 406 - 418MHz. | State Compliance & Provide Evidence | | |
| 3.9.4.2 | Average gain shall be bigger than or equal to 5dBd omnidirectional. | State Compliance & Provide Evidence | | |
| 3.9.4.3 | VSWR shall be better than 1.5:1. | State Compliance & Provide Evidence | | |
| 3.9.4.4 | Polarization shall be vertical. | State Compliance & Provide Evidence | | |
| 3.9.4.5 | H plane 3dB beam width shall be 360° UHF. | State Compliance & Provide Evidence | | |
| 3.9.4.6 | E plane 3dB beam width shall be 16° UHF. | State Compliance & Provide Evidence | | |
| 3.9.4.7 | Rated power shall be 30 watts or more. | State Compliance & Provide Evidence | | |
| 3.9.4.8 | Impedance shall be 50 ohms. | State Compliance & Provide Evidence | | |
| 3.9.4.9 | Tenderer shall state termination. | State Compliance & Provide Evidence | | |
| 3.9.4.10 | All metal parts shall be grounded for lightning protection. | State Compliance & Provide Evidence | | |
| 3.9.4.11 | Maximum wind velocity shall be greater than or equal to 180km/h. | State Compliance & Provide Evidence | | |
| 3.9.4.12 | Tenderer shall state windload. | State Compliance & Provide Evidence | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.9.4.13 | Tenderer shall state the equivalent flat plate area dimensions. | State Compliance & Provide Evidence | | |
| 3.9.4.14 | Material shall be fibreglass shroud with aluminium base. | State Compliance & Provide Evidence | | |
| 3.9.4.15 | Tenderer shall state antenna array length. | State Compliance & Provide Evidence | | |
| 3.9.4.16 | Tenderer shall state the packaged weight. | State Compliance & Provide Evidence | | |
| 3.9.4.17 | Tenderer shall state the mounting mechanism. | State Compliance & Provide Evidence | | |
| 3.9.5 | Co-Linear Antenna (VHF) | | | |
| 3.9.5.1 | Frequency range shall be between 146-173MHz. | State Compliance & Provide Evidence | | |
| 3.9.5.2 | Average gain shall be bigger than or equal to 3dBd omnidirectional. | State Compliance & Provide Evidence | | |
| 3.9.5.3 | VSWR shall be better than 1.5:1. | State Compliance & Provide Evidence | | |
| 3.9.5.4 | Polarization shall be vertical. | State Compliance & Provide Evidence | | |
| 3.9.5.5 | H plane 3dB beam width shall be 360°. | State Compliance & Provide Evidence | | |
| 3.9.5.6 | E plane 3dB beam width shall be 36°. | State Compliance & Provide Evidence | | |
| 3.9.5.7 | Rated power shall be 30 watts or more. | State Compliance & Provide Evidence | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.9.5.8 | Impedance shall be 50 ohms. | State Compliance & Provide Evidence | | |
| 3.9.5.9 | Tenderer shall state termination. | State Compliance & Provide Evidence | | |
| 3.9.5.10 | All metal parts shall be grounded for lightning protection. | State Compliance & Provide Evidence | | |
| 3.9.5.11 | Maximum wind velocity shall be greater than or equal to 180km/h. | State Compliance & Provide Evidence | | |
| 3.9.5.12 | Tenderer shall state windload. | State Compliance & Provide Evidence | | |
| 3.9.5.13 | Tenderer shall state the equivalent flat plate area dimensions. | State Compliance & Provide Evidence | | |
| 3.9.5.14 | Material shall be fibreglass shroud with aluminium base. | State Compliance & Provide Evidence | | |
| 3.9.5.15 | Tenderer shall state antenna array length. | State Compliance & Provide Evidence | | |
| 3.9.5.16 | Tenderer shall state the packaged weight. | State Compliance & Provide Evidence | | |
| 3.9.5.17 | Tenderer shall state the mounting mechanism. | State Compliance & Provide Evidence | | |
| 3.9.6 | Corner Reflector | | | |
| 3.9.6.1 | Frequency range shall be between 400-470MHz. | State Compliance & Provide Evidence | | |
| 3.9.6.2 | Average gain shall be bigger than or equal to 9dBd. | State Compliance & Provide Evidence | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.9.6.3 | VSWR shall be better than 1.5:1. | State Compliance & Provide Evidence | | |
| 3.9.6.4 | Polarization shall be vertical and horizontal. | State Compliance & Provide Evidence | | |
| 3.9.6.5 | H plane 3dB beam width shall be 54°. | State Compliance & Provide Evidence | | |
| 3.9.6.6 | E plane 3dB beam width shall be 72°. | State Compliance & Provide Evidence | | |
| 3.9.6.7 | Front-to-Back ratio shall be better than 25dB. | State Compliance & Provide Evidence | | |
| 3.9.6.8 | Rated power shall be 30 watts or more. | State Compliance & Provide Evidence | | |
| 3.9.6.9 | Impedance shall be 50 ohms. | State Compliance & Provide Evidence | | |
| 3.9.6.10 | Tenderer shall state termination. | State Compliance & Provide Evidence | | |
| 3.9.6.11 | All metal parts shall be grounded for lightning protection. | State Compliance & Provide Evidence | | |
| 3.9.6.12 | Maximum wind velocity shall be greater than or equal to 180km/h. | State Compliance & Provide Evidence | | |
| 3.9.6.13 | Tenderer shall state windload. | State Compliance & Provide Evidence | | |
| 3.9.6.14 | Tenderer shall state the equivalent flat plate area dimensions. | State Compliance & Provide Evidence | | |
| 3.9.6.15 | The material shall be aluminium. | State Compliance & Provide Evidence | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.9.6.16 | Tenderer shall state antenna array length. | State Compliance & Provide Evidence | | |
| 3.9.6.17 | Tenderer shall state the packaged weight. | State Compliance & Provide Evidence | | |
| 3.9.6.18 | Tenderer shall state the mounting mechanism. | State Compliance & Provide Evidence | | |
| 3.9.7 | Two Stack Array (UHF) | | | |
| 3.9.7.1 | Frequency range shall be between 400-470MHz. | State Compliance & Provide Evidence | | |
| 3.9.7.2 | Average gain shall be bigger than or equal to 3dBd. | State Compliance & Provide Evidence | | |
| 3.9.7.3 | VSWR shall be better than 1.5:1. | State Compliance & Provide Evidence | | |
| 3.9.7.4 | Polarization shall be vertical. | State Compliance & Provide Evidence | | |
| 3.9.7.5 | H plane 3dB beam width shall be 230°. | State Compliance & Provide Evidence | | |
| 3.9.7.6 | E plane 3dB beam width shall be 32°. | State Compliance & Provide Evidence | | |
| 3.9.7.7 | Rated power shall be 30 watts or more. | State Compliance & Provide Evidence | | |
| 3.9.7.8 | Impedance shall be 50 ohms. | State Compliance & Provide Evidence | | |
| 3.9.7.9 | Tenderer shall state termination. | State Compliance & Provide Evidence | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.9.7.10 | All metal parts shall be grounded for lightning protection. | State Compliance & Provide Evidence | | |
| 3.9.7.11 | Maximum wind velocity shall be greater than or equal to 180km/h. | State Compliance & Provide Evidence | | |
| 3.9.7.12 | Tenderer shall state windload. | State Compliance & Provide Evidence | | |
| 3.9.7.13 | Tenderer shall state the equivalent flat plate area dimensions. | State Compliance & Provide Evidence | | |
| 3.9.7.14 | The material shall be aluminium. | State Compliance & Provide Evidence | | |
| 3.9.7.15 | Tenderer shall state antenna array length. | State Compliance & Provide Evidence | | |
| 3.9.7.16 | Tenderer shall state the packaged weight. | State Compliance & Provide Evidence | | |
| 3.9.7.17 | Tenderer shall state the mounting mechanism. | State Compliance & Provide Evidence | | |
| 3.9.8 | Two Stack Array (VHF) | | | |
| 3.9.8.1 | Frequency range shall be between 146-173MHz. | State Compliance & Provide Evidence | | |
| 3.9.8.2 | Average gain shall be bigger than or equal to 3dBd. | State Compliance & Provide Evidence | | |
| 3.9.8.3 | VSWR shall be better than 1.5:1. | State Compliance & Provide Evidence | | |
| 3.9.8.4 | Polarization shall be vertical. | State Compliance & Provide Evidence | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.9.8.5 | H plane 3dB beam width shall be 190°. | State Compliance & Provide Evidence | | |
| 3.9.8.6 | E plane 3dB beam width shall be 30°. | State Compliance & Provide Evidence | | |
| 3.9.8.7 | Rated power shall be 50 watts or more. | State Compliance & Provide Evidence | | |
| 3.9.8.8 | Impedance shall be 50 ohms. | State Compliance & Provide Evidence | | |
| 3.9.8.9 | Tenderer shall state termination. | State Compliance & Provide Evidence | | |
| 3.9.8.10 | All metal parts shall be grounded for lightning protection. | State Compliance & Provide Evidence | | |
| 3.9.8.11 | Maximum wind velocity shall be greater than or equal to 180km/h. | State Compliance & Provide Evidence | | |
| 3.9.8.12 | Tenderer shall state windload. | State Compliance & Provide Evidence | | |
| 3.9.8.13 | Tenderer shall state the equivalent flat plate area dimensions. | State Compliance & Provide Evidence | | |
| 3.9.8.14 | The material shall be aluminium. | State Compliance & Provide Evidence | | |
| 3.9.8.15 | Tenderer shall state antenna array length. | State Compliance & Provide Evidence | | |
| 3.9.8.16 | Tenderer shall state the packaged weight. | State Compliance & Provide Evidence | | |
| 3.9.8.17 | Tenderer shall state the mounting mechanism. | State Compliance & Provide Evidence | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.9.9 | Two Stack Array (VHF) lower band | | | |
| 3.9.9.1 | Frequency range shall be between 138-156MHz. | State Compliance & Provide Evidence | | |
| 3.9.9.2 | Average gain shall be bigger than or equal to 3dBd. | State Compliance & Provide Evidence | | |
| 3.9.9.3 | VSWR shall be better than 1.5:1. | State Compliance & Provide Evidence | | |
| 3.9.9.4 | Polarization shall be vertical. | State Compliance & Provide Evidence | | |
| 3.9.9.5 | H plane 3dB beam width shall be 190°. | State Compliance & Provide Evidence | | |
| 3.9.9.6 | E plane 3dB beam width shall be 30°. | State Compliance & Provide Evidence | | |
| 3.9.9.7 | Rated power shall be 50 watts or more. | State Compliance & Provide Evidence | | |
| 3.9.9.8 | Impedance shall be 50 ohms. | State Compliance & Provide Evidence | | |
| 3.9.9.9 | Tenderer shall state termination. | State Compliance & Provide Evidence | | |
| 3.9.9.10 | All metal parts shall be grounded for lightning protection. | State Compliance & Provide Evidence | | |
| 3.9.9.11 | Maximum wind velocity shall be greater than or equal to 180km/h. | State Compliance & Provide Evidence | | |
| 3.9.9.12 | Tenderer shall state windload. | State Compliance & Provide Evidence | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.9.9.13 | Tenderer shall state the equivalent flat plate area dimensions. | State Compliance & Provide Evidence | | |
| 3.9.9.14 | The material shall be aluminium. | State Compliance & Provide Evidence | | |
| 3.9.9.15 | Tenderer shall state antenna array length. | State Compliance & Provide Evidence | | |
| 3.9.9.16 | Tenderer shall state the packaged weight. | State Compliance & Provide Evidence | | |
| 3.9.9.17 | Tenderer shall state the mounting mechanism. | State Compliance & Provide Evidence | | |
| 3.9.10 | Dipole (VHF) | | | |
| 3.9.10.1 | Frequency range shall be between 146-173MHz. | State Compliance & Provide Evidence | | |
| 3.9.10.2 | Average gain shall be bigger than or equal to 0dBd. | State Compliance & Provide Evidence | | |
| 3.9.10.3 | VSWR shall be better than 1.5:1. | State Compliance & Provide Evidence | | |
| 3.9.10.4 | Polarization shall be vertical. | State Compliance & Provide Evidence | | |
| 3.9.10.5 | E plane 3dB beam width shall be 78°. | State Compliance & Provide Evidence | | |
| 3.9.10.6 | Rated power shall be 30 watts or more. | State Compliance & Provide Evidence | | |
| 3.9.10.7 | Impedance shall be 50 ohms. | State Compliance & Provide Evidence | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.9.10.8 | Tenderer shall state termination. | State Compliance & Provide Evidence | | |
| 3.9.10.9 | All metal parts shall be grounded for lightning protection. | State Compliance & Provide Evidence | | |
| 3.9.10.10 | Maximum wind velocity shall be greater than or equal to 180km/h. | State Compliance & Provide Evidence | | |
| 3.9.10.11 | Tenderer shall state windload. | State Compliance & Provide Evidence | | |
| 3.9.10.12 | Tenderer shall state the equivalent flat plate area dimensions. | State Compliance & Provide Evidence | | |
| 3.9.10.13 | Material shall be hot dip galvanized steel outer if made of steel. In the case of aluminium then hot dip galvanized is not a requirement. | State Compliance & Provide Evidence | | |
| 3.9.10.14 | Tenderer shall state antenna array length. | State Compliance & Provide Evidence | | |
| 3.9.10.15 | Tenderer shall state the packaged weight. | State Compliance & Provide Evidence | | |
| 3.9.10.16 | Mounting mechanism shall be integral clamps to bolt directly to wall or to clamp to a 25-76mm diameter pipe. | State Compliance & Provide Evidence | | |
| 3.9.10 | Dipole (UHF) | | | |
| 3.9.11.1 | Frequency range shall be between 406-418MHz. | State Compliance & Provide Evidence | | |
| 3.9.11.2 | Average gain shall be bigger than or equal to 0dBd. | State Compliance & Provide Evidence | | |
| 3.9.11.3 | VSWR shall be better than 1.5:1. | State Compliance & Provide Evidence | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.9.11.4 | Polarization shall be vertical. | State Compliance & Provide Evidence | | |
| 3.9.11.5 | H plane 3dB beam width shall be 180°. | State Compliance & Provide Evidence | | |
| 3.9.11.6 | E plane 3dB beam width shall be 66°. | State Compliance & Provide Evidence | | |
| 3.9.11.7 | Rated power shall be 30 watts or more. | State Compliance & Provide Evidence | | |
| 3.9.11.8 | Impedance shall be 50 ohms. | State Compliance & Provide Evidence | | |
| 3.9.11.9 | Tenderer shall state termination. | State Compliance & Provide Evidence | | |
| 3.9.11.10 | All metal parts shall be grounded for lightning protection. | State Compliance & Provide Evidence | | |
| 3.9.11.11 | Maximum Wind velocity shall be greater than or equal to 180km/h. | State Compliance & Provide Evidence | | |
| 3.9.11.12 | Tenderer shall state windload. | State Compliance & Provide Evidence | | |
| 3.9.11.13 | Tenderer shall state the equivalent flat plate area dimensions. | State Compliance & Provide Evidence | | |
| 3.9.11.14 | Tenderer shall state material. | State Compliance & Provide Evidence | | |
| 3.9.11.15 | Tenderer shall state antenna array length. | State Compliance & Provide Evidence | | |
| 3.9.11.16 | Tenderer shall state the packaged weight. | State Compliance & Provide Evidence | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.9.11.17 | Mounting mechanism shall be integral V-bolt to bolt to 25-50mm diameter pipe. | State Compliance & Provide Evidence | | |
| 3.9.12 | YAGI (UHF) | | | |
| 3.9.12.1 | Frequency range shall be between 400-470MHz. | State Compliance & Provide Evidence | | |
| 3.9.12.2 | Average gain shall be bigger than or equal to7dBd. | State Compliance & Provide Evidence | | |
| 3.9.12.3 | VSWR shall be better than 1.5:1. | State Compliance & Provide Evidence | | |
| 3.9.12.4 | Polarization shall be vertical or horizontal. | State Compliance & Provide Evidence | | |
| 3.9.12.5 | Front-to-Back ratio shall be better than 15dB. | State Compliance & Provide Evidence | | |
| 3.9.12.6 | H plane 3dB beam width shall be 120°. | State Compliance & Provide Evidence | | |
| 3.9.12.7 | E plane 3dB beam width shall be 70°. | State Compliance & Provide Evidence | | |
| 3.9.12.8 | Rated power shall be 30 watts or more. | State Compliance & Provide Evidence | | |
| 3.9.12.9 | Impedance shall be 50 ohms. | State Compliance & Provide Evidence | | |
| 3.9.12.10 | Tenderer shall state termination. | State Compliance & Provide Evidence | | |
| 3.9.12.11 | All metal parts shall be grounded for lightning protection. | State Compliance & Provide Evidence | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.9.12.12 | Maximum wind velocity shall be greater than or equal to 180km/h. | State Compliance & Provide Evidence | | |
| 3.9.12.13 | Tenderer shall state windload. | State Compliance & Provide Evidence | | |
| 3.9.12.14 | Tenderer shall state the equivalent flat plate area dimensions. | State Compliance & Provide Evidence | | |
| 3.9.12.15 | Tenderer shall state material. | State Compliance & Provide Evidence | | |
| 3.9.12.16 | Tenderer shall state antenna array length. | State Compliance & Provide Evidence | | |
| 3.9.12.17 | Tenderer shall state the packaged weight. | State Compliance & Provide Evidence | | |
| 3.9.12.18 | Mounting mechanism shall be Integral V-bolt to bolt to 25-50mm diameter pipe. | State Compliance & Provide Evidence | | |
| 3.9.13 | YAGI (UHF) | | | |
| 3.9.13.1 | Frequency range shall be between 400-470MHz. | State Compliance & Provide Evidence | | |
| 3.9.13.2 | Average gain shall be bigger than or equal to12dBd. | State Compliance & Provide Evidence | | |
| 3.9.13.3 | VSWR shall be better than 1.5:1. | State Compliance & Provide Evidence | | |
| 3.9.13.4 | Polarization shall be vertical or horizontal. | State Compliance & Provide Evidence | | |
| 3.9.13.5 | Front-to-Back ratio shall be better than 15dB. | State Compliance & Provide Evidence | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.9.13.6 | H plane 3dB beam width shall be 40°. | State Compliance & Provide Evidence | | |
| 3.9.13.7 | E plane 3dB beam width shall be 34°. | State Compliance & Provide Evidence | | |
| 3.9.13.8 | Rated power shall be 30 watts or more. | State Compliance & Provide Evidence | | |
| 3.9.13.9 | Impedance shall be 50 ohms. | State Compliance & Provide Evidence | | |
| 3.9.13.10 | Tenderer shall state termination. | State Compliance & Provide Evidence | | |
| 3.9.13.11 | All metal parts shall be grounded for lightning protection. | State Compliance & Provide Evidence | | |
| 3.9.13.12 | Maximum wind velocity shall be greater than or equal to 180km/h. | State Compliance & Provide Evidence | | |
| 3.9.13.13 | Tenderer shall state windload. | State Compliance & Provide Evidence | | |
| 3.9.13.14 | Tenderer shall state the equivalent flat plate area dimensions. | State Compliance & Provide Evidence | | |
| 3.9.13.15 | Tenderer shall state the material. | State Compliance & Provide Evidence | | |
| 3.9.13.16 | Tenderer shall state antenna array length. | State Compliance & Provide Evidence | | |
| 3.9.13.17 | Tenderer shall state the packaged weight. | State Compliance & Provide Evidence | | |
| 3.9.13.18 | Mounting mechanism shall be integral V-bolt to bolt to 25-50mm diameter pipe. | State Compliance & Provide Evidence | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.9.14 | YAGI (VHF) | | | |
| 3.9.14.1 | Frequency range shall be between 146-173MHz. | State Compliance & Provide Evidence | | |
| 3.9.14.2 | Average gain shall be bigger than or equal to 8dBd. | State Compliance & Provide Evidence | | |
| 3.9.14.3 | VSWR shall be better than 1.5:1. | State Compliance & Provide Evidence | | |
| 3.9.14.4 | Polarization shall be vertical or horizontal. | State Compliance & Provide Evidence | | |
| 3.9.14.5 | Front-to-Back ratio shall be better than 10dB. | State Compliance & Provide Evidence | | |
| 3.9.14.6 | H plane 3dB beam width shall be 70°. | State Compliance & Provide Evidence | | |
| 3.9.14.7 | E plane 3dB beam width shall be 52°. | State Compliance & Provide Evidence | | |
| 3.9.14.8 | Rated power shall be 30 watts or more. | State Compliance & Provide Evidence | | |
| 3.9.14.9 | Impedance shall be 50 ohms. | State Compliance & Provide Evidence | | |
| 3.9.14.10 | Tenderer shall state termination. | State Compliance & Provide Evidence | | |
| 3.9.14.11 | All metal parts shall be grounded for lightning protection. | State Compliance & Provide Evidence | | |
| 3.9.14.12 | Maximum wind velocity shall be greater than or equal to 180km/h. | State Compliance & Provide Evidence | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.9.14.13 | Tenderer shall state windload. | State Compliance & Provide Evidence | | |
| 3.9.14.14 | Tenderer shall state the equivalent flat plate area dimensions. | State Compliance & Provide Evidence | | |
| 3.9.14.15 | Tenderer shall state the material. | State Compliance & Provide Evidence | | |
| 3.9.14.16 | Tenderer shall state antenna array length. | State Compliance & Provide Evidence | | |
| 3.9.14.17 | Tenderer shall state the packaged weight. | State Compliance & Provide Evidence | | |
| 3.9.14.18 | Mounting mechanism shall be integral V-bolt to bolt to 25-50mm diameter pipe. | State Compliance & Provide Evidence | | |
| 3.9.15 | YAGI | | | |
| 3.9.15.1 | Frequency range shall be between 1350-1550MHz. | State Compliance & Provide Evidence | | |
| 3.9.15.2 | Average gain shall be bigger than or equal to 15 dBi. | State Compliance & Provide Evidence | | |
| 3.9.15.3 | VSWR shall be better than 1.5:1. | State Compliance & Provide Evidence | | |
| 3.9.15.4 | Polarization shall be vertical or horizontal. | State Compliance & Provide Evidence | | |
| 3.9.15.5 | Front-to-Back ratio shall be better than 25dB. | State Compliance & Provide Evidence | | |
| 3.9.15.6 | H plane 3dB beam width shall be 30°. | State Compliance & Provide Evidence | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.9.15.7 | E plane 3dB beam width shall be 30°. | State Compliance & Provide Evidence | | |
| 3.9.15.8 | Rated power shall be 30 watts or more. | State Compliance & Provide Evidence | | |
| 3.9.15.9 | Impedance shall be 50 ohms. | State Compliance & Provide Evidence | | |
| 3.9.15.10 | Tenderer shall state termination. | State Compliance & Provide Evidence | | |
| 3.9.15.11 | All metal parts shall be grounded for lightning protection. | State Compliance & Provide Evidence | | |
| 3.9.15.12 | Maximum wind velocity shall be greater than or equal to 180km/h. | State Compliance & Provide Evidence | | |
| 3.9.15.13 | Tenderer shall state windload. | State Compliance & Provide Evidence | | |
| 3.9.15.14 | Tenderer shall state the equivalent flat plate area dimensions. | State Compliance & Provide Evidence | | |
| 3.9.15.15 | Tenderer shall state the material. | State Compliance & Provide Evidence | | |
| 3.9.15.16 | Tenderer shall state antenna array length. | State Compliance & Provide Evidence | | |
| 3.9.15.17 | Tenderer shall state the packaged weight. | State Compliance & Provide Evidence | | |
| 3.9.15.18 | Mounting mechanism shall be integral V-bolt to bolt to 90-110 mm diameter pipe. | State Compliance & Provide Evidence | | |
| 3.9.16 | Mobile | | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.9.16.1 | Frequency range shall be between 146-173MHz. | State Compliance & Provide Evidence | | |
| 3.9.16.2 | Average gain shall be bigger than or equal to 2 dB. | State Compliance & Provide Evidence | | |
| 3.9.16.3 | VSWR shall be better than 1.5:1. | State Compliance & Provide Evidence | | |
| 3.9.16.4 | Polarization shall be vertical. | State Compliance & Provide Evidence | | |
| 3.9.16.5 | Rated power shall be 30 watts or more. | State Compliance & Provide Evidence | | |
| 3.9.16.6 | Impedance shall be 50 ohms. | State Compliance & Provide Evidence | | |
| 3.9.16.7 | Feed shall be a 3 meter RG58. | State Compliance & Provide Evidence | | |
| 3.9.16.8 | All metal parts shall be grounded for lightning protection. | State Compliance & Provide Evidence | | |
| 3.9.16.9 | Maximum wind velocity shall be greater than or equal to 180km/h. | State Compliance & Provide Evidence | | |
| 3.9.16.10 | Tenderer shall state windload. | State Compliance & Provide Evidence | | |
| 3.9.16.11 | Tenderer shall state the material. | State Compliance & Provide Evidence | | |
| 3.9.16.12 | Tenderer shall state antenna array length. | State Compliance & Provide Evidence | | |
| 3.9.16.13 | Tenderer shall state the packaged weight. | State Compliance & Provide Evidence | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.9.16.14 | Mounting mechanism shall be a hole size of 16–22 mm. | State Compliance & Provide Evidence | | |
| 3.9.17 | Mobile | | | |
| 3.9.17.1 | Frequency range shall be between 50-470MHz. | State Compliance & Provide Evidence | | |
| 3.9.17.2 | Average gain shall be unity. | State Compliance & Provide Evidence | | |
| 3.9.17.3 | VSWR shall be better than 1.5:1. | State Compliance & Provide Evidence | | |
| 3.9.17.4 | Polarization shall be vertical. | State Compliance & Provide Evidence | | |
| 3.9.17.5 | Rated power shall be 30 watts or more. | State Compliance & Provide Evidence | | |
| 3.9.17.6 | Impedance shall be 50 ohms. | State Compliance & Provide Evidence | | |
| 3.9.17.7 | Feed shall be a 3 meter RG58. | State Compliance & Provide Evidence | | |
| 3.9.17.8 | All metal parts shall be grounded for lightning protection. | State Compliance & Provide Evidence | | |
| 3.9.17.9 | Maximum wind velocity shall be greater than or equal to 180km/h. | State Compliance & Provide Evidence | | |
| 3.9.17.10 | Tenderer shall state windload. | State Compliance & Provide Evidence | | |
| 3.9.17.11 | Tenderer shall state the material. | State Compliance & Provide Evidence | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.9.17.12 | Tenderer shall state antenna array length. | State Compliance & Provide Evidence | | |
| 3.9.17.13 | Tenderer shall state the packaged weight. | State Compliance & Provide Evidence | | |
| 3.9.17.14 | Mounting mechanism shall be a hole size of 16–22 mm. | State Compliance & Provide Evidence | | |
| 3.9.18 | Grid | | | |
| 3.9.18.1 | Frequency range shall be between 1350-1550MHz. | State Compliance & Provide Evidence | | |
| 3.9.18.2 | Average gain shall be bigger than or equal to 22dBd. | State Compliance & Provide Evidence | | |
| 3.9.18.3 | VSWR shall be better than 1.5:1. | State Compliance & Provide Evidence | | |
| 3.9.18.4 | Polarization shall be vertical and/or horizontal. | State Compliance & Provide Evidence | | |
| 3.9.18.5 | Front-to-Back ratio shall be better than 30dB. | State Compliance & Provide Evidence | | |
| 3.9.18.6 | H plane 3dB beam width shall be 10°. | State Compliance & Provide Evidence | | |
| 3.9.18.7 | E plane 3dB beam width shall be 11°. | State Compliance & Provide Evidence | | |
| 3.9.18.8 | Rated power shall be 30 watts or more. | State Compliance & Provide Evidence | | |
| 3.9.18.9 | Impedance shall be 50 ohms. | State Compliance & Provide Evidence | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.9.18.10 | Tenderer shall state termination. | State Compliance & Provide Evidence | | |
| 3.9.18.11 | All metal parts shall be grounded for lightning protection. | State Compliance & Provide Evidence | | |
| 3.9.18.12 | Maximum wind velocity shall be greater than or equal to 180km/h. | State Compliance & Provide Evidence | | |
| 3.9.18.13 | Tenderer shall state windload. | State Compliance & Provide Evidence | | |
| 3.9.18.14 | Tenderer shall state the equivalent flat plate area dimensions. | State Compliance & Provide Evidence | | |
| 3.9.18.15 | Tenderer shall state the material. | State Compliance & Provide Evidence | | |
| 3.9.18.16 | Tenderer shall state antenna array length. | State Compliance & Provide Evidence | | |
| 3.9.18.17 | Tenderer shall state the packaged weight. | State Compliance & Provide Evidence | | |
| 3.9.18.18 | Tenderer shall state the mounting mechanism. | State Compliance & Provide Evidence | | |
| 3.9.18.19 | Tenderer shall state the dimensions (lbw in mm). | State Compliance & Provide Evidence | | |
| 3.9.19 | Disguised Non-Metallic Antenna | | | |
| 3.9.19.1 | Frequency range shall be in the bands 900/1800/2100MHz. | State Compliance & Provide Evidence | | |
| 3.9.19.2 | Average gain shall be unity. | State Compliance & Provide Evidence | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.9.19.3 | VSWR shall be better than 1.5:1. | State Compliance & Provide Evidence | | |
| 3.9.19.4 | Polarization shall be vertical and/or horizontal. | State Compliance & Provide Evidence | | |
| 3.9.19.5 | Tenderer shall state the H plane 3dB beam width. | State Compliance & Provide Evidence | | |
| 3.9.19.6 | Tenderer shall state the E plane 3dB beam width. | State Compliance & Provide Evidence | | |
| 3.9.19.7 | Rated power shall be 10 watts or more. | State Compliance & Provide Evidence | | |
| 3.9.19.8 | Impedance shall be 50 ohms. | State Compliance & Provide Evidence | | |
| 3.9.19.9 | Termination shall be a SMA male connector with 2m LMR195 co-ax. | State Compliance & Provide Evidence | | |
| 3.9.19.10 | All metal parts shall be grounded for lightning protection. | State Compliance & Provide Evidence | | |
| 3.9.19.11 | Maximum wind velocity shall be greater than or equal to 180km/h. | State Compliance & Provide Evidence | | |
| 3.9.19.12 | Equivalent flat plate area shall be 210mmX65mm. | State Compliance & Provide Evidence | | |
| 3.9.19.13 | Material shall be a Black UV stabilized ABS. | State Compliance & Provide Evidence | | |
| 3.9.19.14 | Tenderer shall state antenna array length. | State Compliance & Provide Evidence | | |
| 3.9.19.15 | Tenderer shall state the packaged weight. | State Compliance & Provide Evidence | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.9.19.16 | Mounting mechanism shall be able to screw to non-metallic surfaces. | State Compliance & Provide Evidence | | |
| 3.9.19.17 | Tenderer shall state the dimensions (lbw <=210mmx65xmm30 mm). | State Compliance & Provide Evidence | | |
| 3.9.20 | GSM LOG P | | | |
| 3.9.20.1 | Frequency range shall be in the bands 900/1800/2100MHz. | State Compliance & Provide Evidence | | |
| 3.9.20.2 | Average gain shall be bigger than or equal to 7 dBi. | State Compliance & Provide Evidence | | |
| 3.9.20.3 | VSWR shall be better than 1.5:1. | State Compliance & Provide Evidence | | |
| 3.9.20.4 | Polarization shall be vertical and/or horizontal. | State Compliance & Provide Evidence | | |
| 3.9.20.5 | Tenderer shall state the H plane 3dB beam width. | State Compliance & Provide Evidence | | |
| 3.9.20.6 | Tenderer shall state the E plane 3dB beam width. | State Compliance & Provide Evidence | | |
| 3.9.20.7 | Rated power shall be 30 watts or more. | State Compliance & Provide Evidence | | |
| 3.9.20.8 | Impedance shall be 50 ohms. | State Compliance & Provide Evidence | | |
| 3.9.20.9 | Tenderer shall state termination. | State Compliance & Provide Evidence | | |
| 3.9.20.10 | All metal parts shall be grounded for lightning protection. | State Compliance & Provide Evidence | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.9.20.11 | Maximum wind velocity shall be greater than or equal to 180km/h. | State Compliance & Provide Evidence | | |
| 3.9.20.12 | Tenderer shall state windload. | State Compliance & Provide Evidence | | |
| 3.9.20.13 | Tenderer shall state the equivalent flat plate area dimensions. | State Compliance & Provide Evidence | | |
| 3.9.20.14 | Tenderer shall state the material. | State Compliance & Provide Evidence | | |
| 3.9.20.15 | Tenderer shall state antenna array length. | State Compliance & Provide Evidence | | |
| 3.9.20.16 | Tenderer shall state the packaged weight. | State Compliance & Provide Evidence | | |
| 3.9.20.17 | Tenderer shall state the mounting mechanism. | State Compliance & Provide Evidence | | |
| 3.9.20.18 | Tenderer shall state the dimensions (lbw in mm). | State Compliance & Provide Evidence | | |
| 3.9.21 | Disguised Metallic Antenna | | | |
| 3.9.21.1 | Frequency range shall be in the bands 900/1800/2100MHz. | State Compliance & Provide Evidence | | |
| 3.9.21.2 | Average gain shall be bigger than or equal to 2dBd. | State Compliance & Provide Evidence | | |
| 3.9.21.3 | VSWR shall be better than 1.5:1. | State Compliance & Provide Evidence | | |
| 3.9.21.4 | Polarization shall be vertical and/or horizontal. | State Compliance & Provide Evidence | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.9.21.5 | Tenderer shall state the H plane 3dB beam width. | State Compliance & Provide Evidence | | |
| 3.9.21.6 | Tenderer shall state the E plane 3dB beam width. | State Compliance & Provide Evidence | | |
| 3.9.21.7 | Rated power shall be 10 watts or more. | State Compliance & Provide Evidence | | |
| 3.9.21.8 | Impedance shall be 50 ohms. | State Compliance & Provide Evidence | | |
| 3.9.21.9 | Termination shall be a SMA Male connector with 2m LMR195 co-ax. | State Compliance & Provide Evidence | | |
| 3.9.21.10 | All metal parts shall be grounded for lightning protection. | State Compliance & Provide Evidence | | |
| 3.9.21.11 | Maximum wind velocity shall be greater than or equal to 180km/h. | State Compliance & Provide Evidence | | |
| 3.9.21.12 | Equivalent flat plate area shall be180mmX65mm. | State Compliance & Provide Evidence | | |
| 3.9.21.13 | Material: Black UV stabilized ABS. | State Compliance & Provide Evidence | | |
| 3.9.21.14 | Tenderer shall state antenna array length. | State Compliance & Provide Evidence | | |
| 3.9.21.15 | Tenderer shall state the packaged weight. | State Compliance & Provide Evidence | | |
| 3.9.21.16 | Mounting mechanism shall screw to metallic surface. | State Compliance & Provide Evidence | | |
| 3.10 | Mounting accessories | | | |
| 3.10.1 | Clamps | | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.10.1.1 | Crossover 25 mm to 60 mm | | | |
| 3.10.1.1.1 | 6 mm thickness mild steel hot dipped galvanized. | State Compliance & Provide Evidence | | |
| 3.10.1.1.2 | Vertical and horizontal clamping 25 mm to 60 mm pipe. | State Compliance & Provide Evidence | | |
| 3.10.1.2 | Crossover 25 mm to 165 mm | | | |
| 3.10.1.2.1 | 6 mm thickness mild steel hot dipped galvanized. | State Compliance & Provide Evidence | | |
| 3.10.1.2.2 | Vertical clamping 25 mm to 165 mm pipe. | State Compliance & Provide Evidence | | |
| 3.10.1.2.3 | Horizontal clamping 25 mm to 64 mm pipe. | State Compliance & Provide Evidence | | |
| 3.10.1.3 | Crossover 25 mm to 300 mm | | | |
| 3.10.1.3.1 | 6 mm thickness mild steel hot dipped galvanized. | State Compliance & Provide Evidence | | |
| 3.10.1.3.2 | Vertical clamping 25 mm to 300 mm pipe. | State Compliance & Provide Evidence | | |
| 3.10.1.3.3 | Horizontal clamping 25 mm to 64 mm pipe. | State Compliance & Provide Evidence | | |
| 3.10.1.4 | Parallel 34 mm to 77 mm (small) | | | |
| 3.10.1.4.1 | Mild steel hot dipped galvanized. | State Compliance & Provide Evidence | | |
| 3.10.1.4.2 | Complete with all nuts and washers. | State Compliance & Provide Evidence | | |
| 3.10.1.5 | Parallel 34 mm to 90 mm (standard) | | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.10.1.5.1 | Mild steel hot dipped galvanized. | State Compliance & Provide Evidence | | |
| 3.10.1.5.2 | Complete with all nuts and washers. | State Compliance & Provide Evidence | | |
| 3.10.2 | Bolts | | | |
| 3.10.2.1 | Angle iron bolt 100 mm × 100 mm | | | |
| 3.10.2.1.1 | M10 hot dipped galvanized. | State Compliance & Provide Evidence | | |
| 3.10.2.1.2 | Complete with nuts and washers. | State Compliance & Provide Evidence | | |
| 3.10.2.2 | Angle iron bolt 127 mm to 127 mm | | | |
| 3.10.2.2.1 | M10 hot dipped galvanized. | State Compliance & Provide Evidence | | |
| 3.10.2.2.2 | Complete with nuts and washers. | State Compliance & Provide Evidence | | |
| 3.10.2.3 | U-bolt 60 mm | | | |
| 3.10.2.3.1 | Diameter: 57 mm to 60 mm pipe. | State Compliance & Provide Evidence | | |
| 3.10.2.3.2 | M10 hot dipped galvanized. | State Compliance & Provide Evidence | | |
| 3.10.2.3.3 | Complete with nuts and washers. | State Compliance & Provide Evidence | | |
| 3.10.2.4 | U-bolt 100 mm | | | |
| 3.10.2.4.1 | Diameter: 95 mm to 102 mm pipe. | State Compliance & Provide Evidence | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.10.2.4.2 | M10 hot dipped galvanized. | State Compliance & Provide Evidence | | |
| 3.10.2.4.3 | Complete with nuts and washers. | State Compliance & Provide Evidence | | |
| 3.10.2.5 | U-bolt 115 mm | | | |
| 3.10.2.5.1 | Diameter: 112 mm to 116 mm pipe . | State Compliance & Provide Evidence | | |
| 3.10.2.5.2 | M10 hot dipped galvanized. | State Compliance & Provide Evidence | | |
| 3.10.2.5.3 | Complete with nuts and washers. | State Compliance & Provide Evidence | | |
| 3.10.2.6 | U-bolt 215 mm | | | |
| 3.10.2.6.1 | Diameter: 177 mm to 219 mm pipe. | State Compliance & Provide Evidence | | |
| 3.10.2.6.2 | M10 hot dipped galvanized. | State Compliance & Provide Evidence | | |
| 3.10.2.6.3 | Complete with nuts and washers. | State Compliance & Provide Evidence | | |
| 3.10.2.7 | V-bolt 25 mm to 60 mm | | | |
| 3.10.2.7.1 | Diameter: 25 mm to 60 mm pipe. | State Compliance & Provide Evidence | | |
| 3.10.2.7.2 | M10 hot dipped galvanized. | State Compliance & Provide Evidence | | |
| 3.10.2.7.3 | Complete with nuts and washers. | State Compliance & Provide Evidence | | |
| 3.10.2.8 | V-bolt 76 mm to 115 mm | | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.10.2.8.1 | Diameter: 76 mm to 115 mm pipe. | State Compliance & Provide Evidence | | |
| 3.10.2.8.2 | M10 hot dipped galvanized. | State Compliance & Provide Evidence | | |
| 3.10.2.8.3 | Complete with nuts and washers. | State Compliance & Provide Evidence | | |
| 3.10.3 | Brackets | | | |
| 3.10.3.1 | Elbow 600 mm mast offset | | | |
| 3.10.3.1.1 | Pipe diameter: 50 mm. . | State Compliance & Provide Evidence | | |
| 3.10.3.2 | Elbow 1 m mast offset | | | |
| 3.10.3.2.1 | Pipe diameter: 50 mm. | State Compliance & Provide Evidence | | |
| 3.10.3.3 | Light duty wall mount 150 mm offset | | | |
| 3.10.3.3.1 | Single clamping position for pole. | State Compliance & Provide Evidence | | |
| 3.10.3.3.2 | Metal to be hot dipped galvanized. | State Compliance & Provide Evidence | | |
| 3.10.3.4 | Heavy duty wall mount 150 mm offset | | | |
| 3.10.3.4.1 | Dual clamping positions for pole, 400 mm apart. | State Compliance & Provide Evidence | | |
| 3.10.3.4.2 | Metal to be hot dipped galvanized. | State Compliance & Provide Evidence | | |
| 3.10.3.5 | Heavy duty wall mount 400 mm offset | | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.10.3.5.1 | Dual clamping positions for pole, 400 mm apart. | State Compliance & Provide Evidence | | |
| 3.10.3.5.2 | Metal to be hot dipped galvanized. | State Compliance & Provide Evidence | | |
| 3.10.3.6 | Heavy duty wall mount 750-1000 mm offset | | | |
| 3.10.3.6.1 | 50/60mm pipe mount with dual clamping positions. | State Compliance & Provide Evidence | | |
| 3.10.3.6.2 | Metal to be hot dipped galvanized. | State Compliance & Provide Evidence | | |
| 3.10.4 | Poles | | | |
| 3.10.4.1 | Aluminium antenna pole 6 metre | | | |
| 3.10.4.1.1 | Length: 6m. | State Compliance & Provide Evidence | | |
| 3.10.4.1.2 | Diameter: 60 mm. Wall Thickness: 5 mm. | State Compliance & Provide Evidence | | |
| 3.10.4.2 | Aluminium antenna pole 5 metre | | | |
| 3.10.4.2.1 | Length: 5m. | State Compliance & Provide Evidence | | |
| 3.10.4.2.2 | Diameter: 50 mm. Wall Thickness: 5 mm. | State Compliance & Provide Evidence | | |
| 3.10.4.3 | Aluminium antenna pole 3 metre | | | |
| 3.10.4.3.1 | Length: 3m. | State Compliance & Provide Evidence | | |
| 3.10.4.3.2 | Diameter: 50 mm. Wall Thickness: 5 mm. | State Compliance & Provide Evidence | | |

| Spec. clause number | Description | Schedule A: Eskom's minimum technical requirements | Schedule B: Supplier's statements of compliance | Supplier's Reference/Comment (Supporting evidence) |
|---|---|---|---|---|
| 3.10.5 | Bar | | | |
| 3.10.5.1 | Copper flat bar 25 mm × 3 mm | | | |
| 3.10.5.1.1 | Width: 25 mm. Thickness: 3 mm. Length: per metre. | State Compliance & Provide Evidence | | |