Eskom	Standard	Technology

Title: **ANTENNAS, CABLES AND CONNECTORS FOR CELLULAR MODEMS**

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SCOT Study Committee Number/Name: **Telecommunication SC**

Content

Tables

1. Introduction

This technical specification forms part of Eskom's Enquiry process for the provision of antennas, cables and connector for cellular Modems.

2. Supporting clauses

2.1 Scope

The purpose of this document is to stipulate Eskom's Enquiry specification requirements for antennas, cables and connectors for cellular Modems.

This specification overrides any other recommendation or specification. In cases of conflicting requirements, schedule A to the Supplier or contract documents only, overrides this specification.

The supplier must complete schedule A "Statement of Technical Conformance" for this specification.

2.1.1 Purpose

The purpose of this document is to give equipment requirements for cellular modems for internal use in Eskom. This is to ensure that the purchased equipment is according to Eskom's particular requirements and conforms to the desired standards. The specification forms part of the enquiry documentation for the establishment of an Enabling Contract with Eskom Holdings (SO.3 Ltd.

2.1.2 Applicability

This specification shall apply throughout Eskom Holdings (SO.3 Ltd, 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

[1] ISO 9001 Quality Management Systems.

[2] 240-135089195 - Generic Technical Requirements for Eskom Telecoms Contracts

[3] ITU-T Recommendation G.703 Physical/electrical characteristics of hierarchical digital interfaces.

[4] ITU-T Recommendation G.823 The Control of Jitter and Wander within Digital Networks that are based on the 2048kBit/s hierarchy.

[5] ITU-T Recommendation X.21 Interface between DTE and DCE Equipment for Synchronous Operation on Public Data Networks

[6] ITU-T Recommendation V.11 Electrical Characteristics for Balanced Double-Current Interchange Circuits for general use with Integrated Circuit. Equipment in the field of Data Communications.

[7] ITU-T Recommendation V.24 List of Definitions for Interchange Circuits Between Data Terminal equipment (DT.5 and Data Circuit Terminating Equipment (DC.5

[8] ETSI EN 301 489. EMC Parts 1 and 4

2.2.2 Informative

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
ASL	Altitude above sea level
BER	Bit Error Rate
BME	Bandwidth management equipment
Bps	Bits per second
DCE	Data Communications Equipment
DTE	Data Termination Equipment
E1	2.048 Mbps
EMC	Electromagnetic Compatibility
ETSI	European Telecommunications Standards Institute
ICASA	Independent Communications Authority of South Africa
IP	Internet Protocol
ITU	International Telecommunications Union
Kbps	Kilobits per second
Mbps	Megabits per second
PE	Polyethylene
Ppm	Parts per million
QAM	Quadrature Amplitude Modulation
QPSK	Quadrature Phase Shift Keying
RF	Radio Frequency
RX	Receive
SNMP	Simple Network Management Protocol
TX	Transmit
VCXO	Voltage Controlled Crystal Oscillator
VSWR	Voltage Standing Wave Ratio

2.5 Roles and responsibilities

Not applicable.

2.6 Process for monitoring

Not applicable.

2.7 Related/supporting documents

Not applicable.

3. Requirements

3.1 Antenna

3.1.1 Material

3.1.1.1 Only corrosion-resistant materials will be considered (Stainless steel or hot-dipped galvanised

3.1.1.2 Mounting hardware to be stainless steel

3.1.2 Mounting

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

3.1.3 VSWR

3.1.3.1 All products to exhibit better than 1.5:1 VSWR at antenna connector over the stated band.

3.1.4 Impedance

3.1.4.1 All products to match to 50 Ohm feeder characteristic impedance.

3.1.5 Detailed requirements of antennas

3.1.5.1 Medium gain wide band directional antenna

3.1.5.1.1 Frequency range: 700-2600 MHz. Tenderer state if antennas operate in frequency-specific bands

3.1.5.1.2 Average gain: 7dBi

3.1.5.1.3 VSWR: ≤ 1.5:1

3.1.5.1.4 Maximum power rating: >10W

3.1.5.1.5 H-Plane 3dB beam width: 70°

3.1.5.1.6 E-Plane 3dB beam width: 64°

3.1.5.1.7 Front to back ratio: > 18dB

3.1.5.1.8 Input impedance: 50 ohms

3.1.5.1.9 Maximum Wind load: ≥ 160 km/h, Tenderer to state

3.1.5.1.10 Operating temperature range: -20° C to +60° C

3.1.5.1.11 IP rating: IP65

3.1.5.1.12 Connector/Termination: N-type (female)

3.1.5.1.13 Lighting Protection: Tenderer to state

3.1.5.1.14 Material: Non-corrosive. Tenderer to state

3.1.5.1.15 Packaged weight: Tenderer to state

3.1.5.1.16 Mounting: Tenderer to state

3.1.5.2 High gain antenna – long periodic dipole array

3.1.5.2.1 Frequency range: 700-1000 MHz and 1600-2600MHz

3.1.5.2.2 Average gain: 10 dBi

3.1.5.2.3 VSWR: ≤ 1.5:1

3.1.5.2.4 Maximum power rating: >10W

3.1.5.2.5 H-Plane 3dB beam width: 70°

3.1.5.2.6 E-Plane 3dB beam width: 64°

3.1.5.2.7 Front to back ratio: > 18dB

3.1.5.2.8 Input impedance: 50 ohms

3.1.5.2.9 Maximum Wind load: ≥ 160 km/h, Tenderer to state

3.1.5.2.10 Operating temperature range: -20° C to +60° C

3.1.5.2.11 IP rating: IP65

3.1.5.2.12 Connector/Termination: N-type (female)

3.1.5.2.13 Lighting Protection: Tenderer to state

3.1.5.2.14 Material: Non-corrosive. Tenderer to state

3.1.5.2.15 Packaged weight: Tenderer to state.

3.1.5.2.16 Mounting: Tenderer to state

3.1.5.3 Omni directional antenna

3.1.5.3.1 Frequency range: 800-950, 1700-2200, 2400-2600 MHz

3.1.5.3.2 Average gain: 5 dBi

3.1.5.3.3 VSWR: ≤ 1.5:1

3.1.5.3.4 Maximum power rating: >10W

3.1.5.3.5 H-Plane 3dB beam width: 360°

3.1.5.3.6 E-Plane 3dB beam width: 30°

3.1.5.3.7 Input impedance: 50 ohms

3.1.5.3.8 Maximum Wind load: ≥ 160 km/h, Tenderer to state

3.1.5.3.9 Operating temperature range: -20° C to +60° C

3.1.5.3.10 IP rating: IP65

3.1.5.3.11 Connector/Termination: N-type (female)

3.1.5.3.12 Lighting Protection: Tenderer to state

3.1.5.3.13 Material: Non-corrosive. Tenderer to state

3.1.5.3.14 Packaged weight: Tenderer to state

3.1.5.3.15 Mounting: Tenderer to state

3.1.5.4 Quad band Omni directional antenna

3.1.5.4.1 Frequency range: 800, 900, 1800 and 2100 MHz

3.1.5.4.2 Average gain: 0 dBi

3.1.5.4.3 VSWR: ≤ 2:1

3.1.5.4.4 Maximum power rating: >10W

3.1.5.4.5 H-Plane 3dB beam width: 360°

3.1.5.4.6 E-Plane 3dB beam width: 30°

3.1.5.4.7 Input impedance: 50 ohms

3.1.5.4.8 Maximum Wind load: ≥ 160 km/h, Tenderer to state

3.1.5.4.9 Operating temperature range: -20° C to +60° C

3.1.5.4.10 IP rating: IP65

3.1.5.4.11 Connector/Termination: N-type (female)

3.1.5.4.12 Lighting Protection: Tenderer to state

3.1.5.4.13 Material: Non-corrosive. Tenderer to state

3.1.5.4.14 Packaged weight: Tenderer to state

3.1.5.4.15 Mounting: Tenderer to state

3.1.5.5 Covert/Disguised antenna (for metal kiosk)

3.1.5.5.1 Frequency range: 800, 900, 1800 and 2100 MHz. Tenderer to state whether broadband or individual frequency bands

3.1.5.5.2 Average gain: 2 dBi

3.1.5.5.3 VSWR: ≤ 2:1

3.1.5.5.4 Maximum power rating: >10W

3.1.5.5.5 Input impedance: 50 ohms

3.1.5.5.6 Operating temperature range: -20° C to +60° C

3.1.5.5.7 IP rating: IP65

3.1.5.5.8 Connector/Termination: SMA (male) with 1m, 1.5m and 3m fly-lead (utilising 6mm co-axial as supplied in 3.2.1)

3.1.5.5.9 Lighting Protection: Tenderer to state

3.1.5.5.10 Casing material: Non-corrosive. Tenderer to state

3.1.5.5.11 Physical dimensions: not greater than 170 x 70 x 60 mm

3.1.5.5.12 Packaged weight: Tenderer to state

3.1.5.5.13 Mounting: screwed with 20mm (M20 x 35mm) Screw and nut

3.1.5.6 Covert/Disguised antenna (for metallic surface)

3.1.5.6.1 Frequency range: 800, 900, 1800 and 2100 MHz. Tenderer to state whether broadband or individual frequency bands

3.1.5.6.2 Average gain: 2 dBi

3.1.5.6.3 VSWR: ≤2:1

3.1.5.6.4 Maximum power rating: >10W

3.1.5.6.5 Input impedance: 50 ohms

3.1.5.6.6 Operating temperature range: -20° C to +60° C

3.1.5.6.7 IP rating: IP65

3.1.5.6.8 Connector/Termination: SMA (male) with 1m, 1.5m and 2m fly-lead (utilising 6mm co-axial as supplied in 3.2.1)

3.1.5.6.9 Lighting Protection: Tenderer to state

3.1.5.6.10 Casing material: Non-corrosive. Tenderer to state

3.1.5.6.11 Physical dimensions: not greater than 170 x 70 x 60 mm

3.1.5.6.12 Packaged weight: Tenderer to state

3.1.5.6.13 Mounting: Either screwed or riveted onto a metal box

3.1.5.7 Covert/ Disguised antenna (for wooden pole / non-metallic surface)

3.1.5.7.1 Frequency range: 800, 900, 1800 and 2100 MHz. Tenderer to state whether broadband or individual frequency bands

3.1.5.7.2 Average gain: 2 dBi

3.1.5.7.3 VSWR: ≤ 2:1

3.1.5.7.4 Maximum power rating: >10W

3.1.5.7.5 Input impedance: 50 ohms

3.1.5.7.6 Operating temperature range: -20° C to +60° C

3.1.5.7.7 IP rating: IP65

3.1.5.7.8 Connector/Termination: SMA (male) with 1m, 1.5m and 2m fly-lead (utilising 6mm co-axial as

supplied in 3.2.1)

3.1.5.7.9 Lighting Protection: Tenderer to state

3.1.5.7.10 Casing material: Non-metallic & UV resistant. Tenderer to state

3.1.5.7.11 Physical dimensions: not greater than 220 x 70 x 30 mm

3.1.5.7.12 Packaged weight: Tenderer to state

3.1.5.7.13 Mounting: Either screwed or nailed onto a wooden pole

3.2 Cables and Connectors

3.2.1 Cable: 6mm coaxial cable

3.2.1.1 Attenuation per 100 metres better than:

3.2.1.1.1 37dB @ 900 MHz

3.2.1.1.2 48dB @ 1500 MHz

3.2.1.1.3 53dB @ 1800 MHz

3.2.1.1.4 56dB @ 2000 MHz

3.2.1.1.5 63dB @ 2500 MHz

3.2.1.2 Radius bend: Less than 18mm

3.2.1.3 Outer conductor: aluminium tape or copper (clad/tube)

3.2.1.4 Inner conductor: copper clad aluminium or copper

3.2.1.5 Dielectric: Foam Polyethylene (PE)

3.2.1.6 Impedance: 50 ohm

3.2.2 Cable: 1/2 inch coaxial cable

3.2.2.1 Attenuation per 100 metres better than:

3.2.2.1.1 8dB @ 800 MHz

3.2.2.1.2 8dB @ 900 MHz

3.2.2.1.3 8.5dB @ 1000 MHz

3.2.2.1.4 10.5dB @ 1600 MHz

3.2.2.1.5 11dB @ 1800 MHz

3.2.2.1.6 12.5dB @ 2100 MHz

3.2.2.1.7 13dB @ 2200 MHz

3.2.2.1.8 14dB @ 2400 MHz

3.2.2.1.9 15dB @ 2600 MHz

3.2.2.2 Outer conductor: aluminium tape or copper (clad/tube)

3.2.2.3 Inner conductor: copper clad aluminium

3.2.2.4 Dielectric: Foam Polyethylene (PE)

3.2.2.5 Impedance: 50 ohm

3.2.3 Fly-lead: 6mm coaxial cable

3.2.3.1 SMA (male) to N-type (male) – 0.5m, 1m and 1.5m lengths

3.2.4 Fly-lead: 1/2 inch coaxial cable

3.2.4.1 N-Type (male) to N-type (male) – 4m length

3.2.5 Connector: N-female Straight 6mm

3.2.5.1 Compatible with 6mm cables tendered in 3.2.1

3.2.5.2 Impedance: 50 ohm

3.2.5.3 Ingress Protection: IP68 (with inner conductor)

3.2.5.4 Connector to be crimp type or re-usable type. If crimp type then the tenderer must state which crimping tool (specialised or generic) to be used.

3.2.5.5 Tenderer to supply full datasheet with test results of certified laboratory

3.2.6 Connector: N-male Straight 6mm

3.2.6.1 Compatible with 6mm cables tendered in 3.2.1

3.2.6.2 Impedance: 50 ohm

3.2.6.3 Ingress Protection: IP68 (with inner conductor)

3.2.6.4 Connector to be crimp type or re-usable type. If crimp type then the tenderer must state which crimping tool (specialised or generic)to be used.

3.2.6.5 Tenderer to supply full datasheet with test results of certified laboratory

3.2.7 Connector: N-female Straight ½ inch

3.2.7.1 Compatible with ½ inch cables tendered

3.2.7.2 Impedance: 50 ohm

3.2.7.3 Ingress Protection: IP68 (with inner conductor)

3.2.7.4 Connector to be crimp type or re-usable type. If crimp type then the tenderer must state which crimping tool (specialised or generic) to be used.

3.2.7.5 Tenderer to supply full datasheet with test results of certified laboratory

3.2.8 Connector: N-male Straight ½ inch

3.2.8.1 Compatible with ½ inch cables tendered in 3.2.1.6

3.2.8.2 Impedance: 50 ohm

3.2.8.3 Ingress Protection: IP68 (with inner conductor)

3.2.8.4 Connector to be crimp type or re-usable type. If crimp type then the tenderer must state which crimping tool (specialised or generic) to be used.

3.2.8.5 Tenderer to supply full datasheet with test results of certified laboratory.

3.2.9 Connector: SMA female Straight 6mm

3.2.9.1 Compatible with 6mm cables tendered in 3.2.1

3.2.9.2 Impedance: 50 ohm

3.2.9.3 Ingress Protection: IP68 (with inner conductor)

3.2.9.4 Connector to be crimp type or re-usable type. If crimp type then the tenderer must state which crimping tool (specialised or generic) to be used.

3.2.9.5 Tenderer to supply full datasheet with test results of certified laboratory.

3.2.10 Connector: SMA male Straight 6mm

3.2.10.1 Compatible with 6mm cables tendered in 3.2.1

3.2.10.2 Impedance: 50 ohm

3.2.10.3 Ingress Protection: IP68 (with inner conductor)

3.2.10.4 Connector to be crimp type or re-usable type. If crimp type then the tenderer must state which crimping tool (specialised or generic) to be used.

3.2.10.5 Tenderer to supply full datasheet with test results of certified laboratory.

3.2.11 Bulkhead Adapter

3.2.11.1 N-type (female) / N-type (female)

3.2.12 Surge arrestor bulkhead N-female/N-female

3.2.12.1 Frequency range: 700 MHz – 2700 MHz

3.2.12.2 Insertion loss: < 0.1 dB

3.2.12.3 Tenderer to supply full datasheet with test results of certified laboratory.

4. Authorization

This document has been seen and accepted by:

Name and surname	Designation
Alison Maseko	Senior Manager - Eskom Telecommunications
Judith Malinga	Senior Manager – PTM&C Engineering
Lenah Mothata	Senior Manager – Grids
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5. Revisions

Date	Rev	Compiler	Remarks
Jan 2024	3	T.Thakhudi	Review
Oct 2019	2	O. Ngwenya	Review
April 2015	1	J. Schutte	First issue

6. Development team

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

- K Plasket Group Technology
- J Schutte Group Technology
- R Brooks Distribution Western Cape OU

7. Acknowledgments

Not applicable.

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. If the Tenderers statement of compliance needs to be supported by additional information a concise reference to the relevant section of the tender documents is required.

Table A.1: Schedule of technical compliance

Spec. clause number	Description	Schedule A: Eskom's minimum technical requirements	Schedule B: Supplier's statements of compliance	Supplier's Reference/Comment (Supporting Evidence.5
3	Requirements			
3.1	Antenna			
3.1.1	Material			
3.1.1.1	Only corrosion-resistant materials will be considered (Stainless steel or hot-dipped galvanised	State Compliance & Provide Evidence		
3.1.1.2	Mounting hardware to be stainless steel	State Compliance & Provide Evidence		
3.1.2	Mounting			
3.1.2.1	Antenna must be able to be fixed to a pole of 30-50mm diameter, either with integral bracket or additional hardware. Directional antennas must be mounted in either the vertical or horizontal plane.	State Compliance & Provide Evidence		
3.1.3	VSWR			
3.1.3.1	All products to exhibit better than 1.5:1 VSWR at antenna connector over the stated band.	State Compliance & Provide Evidence		
3.1.4	Impedance			
3.1.4.1	All products to match to 50 Ohm feeder characteristic impedance.	State Compliance & Provide Evidence		
3.1.5	Detailed requirements of 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.5
3.1.5.1	Medium gain wide band directional antenna			
3.1.5.1.1	Frequency range: 700-2600 MHz. Tenderer state if antennas operate in frequency-specific bands	State Compliance & Provide Evidence		
3.1.5.1.2	Average gain: 7dBi	State Compliance & Provide Evidence		
3.1.5.1.3	VSWR: ≤ 1.5:1	State Compliance & Provide Evidence		
3.1.5.1.4	Maximum power rating: >10W	State Compliance & Provide Evidence		
3.1.5.1.5	H-Plane 3dB beam width: 70°	State Compliance & Provide Evidence		
3.1.5.1.6	E-Plane 3dB beam width: 64°	State Compliance & Provide Evidence		
3.1.5.1.7	Front to back ratio: > 18dB	State Compliance & Provide Evidence		
3.1.5.1.8	Input impedance: 50 ohms	State Compliance & Provide Evidence		
3.1.5.1.9	Maximum Wind load: ≥ 160 km/h, Tenderer to state	State Compliance & Provide Evidence		
3.1.5.1.10	Operating temperature range: -20° C to +60° C	State Compliance & Provide Evidence		
3.1.5.1.11	IP rating: IP65	State Compliance & Provide Evidence		
3.1.5.1.12	Connector/Termination: N-type (female)	State Compliance & Provide Evidence		
3.1.5.1.13	Lighting Protection: Tenderer to state	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.5
3.1.5.1.14	Material: Non-corrosive. Tenderer to state	State Compliance & Provide Evidence		
3.1.5.1.15	Packaged weight: Tenderer to state	State Compliance & Provide Evidence		
3.1.5.1.16	Mounting: Tenderer to state	State Compliance & Provide Evidence		
3.1.5.2	High gain antenna – long periodic dipole array			
3.1.5.2.1	Frequency range: 700-1000 MHz and 1600-2600MHz	State Compliance & Provide Evidence		
3.1.5.2.2	Average gain: 10 dBi	State Compliance & Provide Evidence		
3.1.5.2.3	VSWR: ≤ 1.5:1	State Compliance & Provide Evidence		
3.1.5.2.4	Maximum power rating: >10W	State Compliance & Provide Evidence		
3.1.5.2.5	H-Plane 3dB beam width: 70°	State Compliance & Provide Evidence		
3.1.5.2.6	E-Plane 3dB beam width: 64°	State Compliance & Provide Evidence		
3.1.5.2.7	Front to back ratio: > 18dB	State Compliance & Provide Evidence		
3.1.5.2.8	Input impedance: 50 ohms	State Compliance & Provide Evidence		
3.1.5.2.9	Maximum Wind load: ≥ 160 km/h, Tenderer to state	State Compliance & Provide Evidence		
3.1.5.2.10	Operating temperature range: -20° C to +60° C	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.5
3.1.5.2.11	IP rating: IP65	State Compliance & Provide Evidence		
3.1.5.2.12	Connector/Termination: N-type (female)	State Compliance & Provide Evidence		
3.1.5.2.13	Lighting Protection: Tenderer to state	State Compliance & Provide Evidence		
3.1.5.2.14	Material: Non-corrosive. Tenderer to state	State Compliance & Provide Evidence		
3.1.5.2.15	Packaged weight: Tenderer to state.	State Compliance & Provide Evidence		
3.1.5.2.16	Mounting: Tenderer to state	State Compliance & Provide Evidence		
3.1.5.3	Omni directional antenna			
3.1.5.3.1	Frequency range: 800-950, 1700-2200, 2400-2600 MHz	State Compliance & Provide Evidence		
3.1.5.3.2	Average gain: 5 dBi	State Compliance & Provide Evidence		
3.1.5.3.3	VSWR: ≤ 1.5:1	State Compliance & Provide Evidence		
3.1.5.3.4	Maximum power rating: >10W	State Compliance & Provide Evidence		
3.1.5.3.5	H-Plane 3dB beam width: 360°	State Compliance & Provide Evidence		
3.1.5.3.6	E-Plane 3dB beam width: 30°	State Compliance & Provide Evidence		
3.1.5.3.7	Input impedance: 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.5
3.1.5.3.8	Maximum Wind load: ≥ 160 km/h, Tenderer to state	State Compliance & Provide Evidence		
3.1.5.3.9	Operating temperature range: -20° C to +60° C	State Compliance & Provide Evidence		
3.1.5.3.11	IP rating: IP65	State Compliance & Provide Evidence		
3.1.5.3.12	Connector/Termination: N-type (female)	State Compliance & Provide Evidence		
3.1.5.3.14	Lighting Protection: Tenderer to state	State Compliance & Provide Evidence		
3.1.5.3.15	Material: Non-corrosive. Tenderer to state	State Compliance & Provide Evidence		
3.1.5.3.16	Packaged weight: Tenderer to state	State Compliance & Provide Evidence		
3.1.5.3.17	Mounting: Tenderer to state	State Compliance & Provide Evidence		
3.1.5.4	Quad band Omni directional antenna			
3.1.5.4.1	Frequency range: 800, 900, 1800 and 2100 MHz	State Compliance & Provide Evidence		
3.1.5.4.2	Average gain: 0 dBi	State Compliance & Provide Evidence		
3.1.5.4.3	VSWR: ≤ 2:1	State Compliance & Provide Evidence		
3.1.5.4.4	Maximum power rating: >10W	State Compliance & Provide Evidence		
3.1.5.4.5	H-Plane 3dB beam width: 360°	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.5
3.1.5.4.6	E-Plane 3dB beam width: 30°	State Compliance & Provide Evidence		
3.1.5.4.7	Input impedance: 50 ohms	State Compliance & Provide Evidence		
3.1.5.4.8	Maximum Wind load: ≥ 160 km/h, Tenderer to state	State Compliance & Provide Evidence		
3.1.5.4.9	Operating temperature range: -20° C to +60° C	State Compliance & Provide Evidence		
3.1.5.4.10	IP rating: IP65	State Compliance & Provide Evidence		
3.1.5.4.11	Connector/Termination: N-type (female)	State Compliance & Provide Evidence		
3.1.5.4.12	Lighting Protection: Tenderer to state	State Compliance & Provide Evidence		
3.1.5.4.13	Material: Non-corrosive. Tenderer to state	State Compliance & Provide Evidence		
3.1.5.4.14	Packaged weight: Tenderer to state	State Compliance & Provide Evidence		
3.1.5.4.15	Mounting: Tenderer to state	State Compliance & Provide Evidence		
3.1.5.5	Covert/Disguised antenna (for metal kiosk)			
3.1.5.5.1	Frequency range: 800, 900, 1800 and 2100 MHz. Tenderer to state whether broadband or individual frequency bands	State Compliance & Provide Evidence		
3.1.5.5.2	Average gain: 2 dBi	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.5
3.1.5.5.3	VSWR: ≤ 2:1	State Compliance & Provide Evidence		
3.1.5.5.4	Maximum power rating: >10W	State Compliance & Provide Evidence		
3.1.5.5.5	Input impedance: 50 ohms	State Compliance & Provide Evidence		
3.1.5.5.6	Operating temperature range: -20° C to +60° C	State Compliance & Provide Evidence		
3.1.5.5.7	IP rating: IP65	State Compliance & Provide Evidence		
3.1.5.5.8	Connector/Termination: SMA (male) with 1m, 1.5m and 3m fly-lead (utilising 6mm co-axial as supplied in 3.2.1)	State Compliance & Provide Evidence		
3.1.5.5.9	Lighting Protection: Tenderer to state	State Compliance & Provide Evidence		
3.1.5.5.10	Casing material: Non-corrosive. Tenderer to state	State Compliance & Provide Evidence		
3.1.5.5.11	Physical dimensions: not greater than 170 x 70 x 60 mm	State Compliance & Provide Evidence		
3.1.5.5.12	Packaged weight: Tenderer to state	State Compliance & Provide Evidence		

3.1.5.5.13	Mounting: screwed with 20mm (M20 x 35mm) Screw and nut **7.1.1.1 Covert/Disguised antenna (for metallic surface)** **7.1.1.1.1** Frequency range: 800, 900, 1800 and 2100 MHz. Tenderer to state whether broadband or individual frequency bands **7.1.1.1.2** Average gain: 2 dBi **7.1.1.1.3** VSWR: ≤2:1 **7.1.1.1.4** Maximum power rating: >10W **7.1.1.1.5** Input impedance: 50 ohms **7.1.1.1.6** Operating temperature range: -20° C to +60° C **7.1.1.1.7** IP rating: IP65 **7.1.1.1.8** Connector/Termination: SMA (male) with 1m, 1.5m and 2m fly-lead (utilising 6mm co-axial as supplied in 3.2.1) **7.1.1.1.9** Lighting Protection: Tenderer to state	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.5
	7.1.1.1.10 Casing material: Non-corrosive. Tenderer to state **7.1.1.1.11** Physical dimensions: not greater than 170 x 70 x 60 mm **7.1.1.1.12** Packaged weight: Tenderer to state **7.1.1.1.13** Mounting: Either screwed or riveted onto a metal box			
3.1.5.6	Covert/Disguised antenna (for metallic surface)			
3.1.5.7.1	Frequency range: 800, 900, 1800 and 2100 MHz. Tenderer to state whether broadband or individual frequency bands	State Compliance & Provide Evidence		
3.1.5.7.2	Average gain: 2 dBi	State Compliance & Provide Evidence		
3.1.5.7.3	VSWR: ≤2:1	State Compliance & Provide Evidence		
3.1.5.7.4	Maximum power rating: >10W	State Compliance & Provide Evidence		
3.1.5.7.5	Input impedance: 50 ohms	State Compliance & Provide Evidence		
3.1.5.7.6	Operating temperature range: -20° C to +60° C	State Compliance & Provide Evidence		
3.1.5.7.7	IP rating: IP65	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.5
3.1.5.7.8	Connector/Termination: SMA (male) with 1m, 1.5m and 2m fly-lead (utilising 6mm co-axial as supplied in 3.2.1)	State Compliance & Provide Evidence		
3.1.5.7.9	Lighting Protection: Tenderer to state	State Compliance & Provide Evidence		
3.1.5.73.1.5.7.10	Casing material: Non-corrosive. Tenderer to state	State Compliance & Provide Evidence		
3.1.5.73.1.5.7.11	Physical dimensions: not greater than 170 x 70 x 60 mm	State Compliance & Provide Evidence		
3.1.5.73.1.5.7.12	Packaged weight: Tenderer to state	State Compliance & Provide Evidence		
3.1.5.73.1.5.7.13	Mounting: Either screwed or nailed onto a wooden pole	State Compliance & Provide Evidence		
3.1.5.7	Covert/ Disguised antenna (for wooden pole / non-metallic surface)			
3.1.5.7.1	Frequency range: 800, 900, 1800 and 2100 MHz. Tenderer to state whether broadband or individual frequency bands	State Compliance & Provide Evidence		
3.1.5.7.2	Average gain: 2 dBi	State Compliance & Provide Evidence		
3.1.5.7.3	VSWR: ≤ 2:1	State Compliance & Provide Evidence		
3.1.5.7.4	Maximum power rating: >10W	State Compliance & Provide Evidence		
3.1.5.7.5	Input impedance: 50 ohms	State Compliance & Provide Evidence		
3.1.5.7.6	Operating temperature range: -20° C to +60° C	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.5
3.1.5.7.7	IP rating: IP65	State Compliance & Provide Evidence		
3.1.5.7.8	Connector/Termination: SMA (male) with 1m, 1.5m and 2m fly-lead (utilising 6mm co-axial as supplied in 3.2.1)	State Compliance & Provide Evidence		
3.1.5.7.9	Lighting Protection: Tenderer to state	State Compliance & Provide Evidence		
3.1.5.7.10	Casing material: Non-metallic & UV resistant. Tenderer to state	State Compliance & Provide Evidence		
3.1.5.7.11	Physical dimensions: not greater than 220 x 70 x 30 mm	State Compliance & Provide Evidence		
3.1.5.7.12	Packaged weight: Tenderer to state	State Compliance & Provide Evidence		
3.1.5.7.13	Mounting: Either screwed or nailed onto a wooden pole	State Compliance & Provide Evidence		
3.2	Cables and Connectors	State Compliance & Provide Evidence		
3.2.1	Cable: 6mm coaxial cable	State Compliance & Provide Evidence		
3.2.1.1	Attenuation per 100 metres better than:	State Compliance & Provide Evidence		
3.2.1.13.2.1.1.1	37dB @ 900 MHz	State Compliance & Provide Evidence		
3.2.1.13.2.1.1.2	48dB @ 1500 MHz	State Compliance & Provide Evidence		
3.2.1.13.2.1.1.3	53dB @ 1800 MHz	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.5
3.2.1.13.2.1.1.4	56dB @ 2000 MHz	State Compliance & Provide Evidence		
3.2.1.13.2.1.1.5	63dB @ 2500 MHz	State Compliance & Provide Evidence		
3.2.1.2	Radius bend: Less than 18mm	State Compliance & Provide Evidence		
3.2.1.3	Outer conductor: aluminium tape or copper (clad/tube)	State Compliance & Provide Evidence		
3.2.1.4	Inner conductor: copper clad aluminium or copper	State Compliance & Provide Evidence		
3.2.1.5	Dielectric: Foam Polyethylene (PE)	State Compliance & Provide Evidence		
3.2.1.6	Impedance: 50 ohm	State Compliance & Provide Evidence		
3.2.2.	Cable: 1/2 inch coaxial cable			
3.2.2.1	Attenuation per 100 metres better than:			
3.2.2.13.2.2.1.1	8dB @ 800 MHz	State Compliance & Provide Evidence		
3.2.2.13.2.2.1.2	8dB @ 900 MHz	State Compliance & Provide Evidence		
3.2.2.13.2.2.1.3	8.5dB @ 1000 MHz	State Compliance & Provide Evidence		
3.2.2.13.2.2.1.4	10.5dB @ 1600 MHz	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.5
3.2.2.13.2.2.1.5	11dB @ 1800 MHz	State Compliance & Provide Evidence		
3.2.2.13.2.2.1.6	12.5dB @ 2100 MHz	State Compliance & Provide Evidence		
3.2.2.13.2.2.1.7	13dB @ 2200 MHz	State Compliance & Provide Evidence		
3.2.2.13.2.2.1.8	14dB @ 2400 MHz	State Compliance & Provide Evidence		
3.2.2.13.2.2.1.9	15dB @ 2600 MHz	State Compliance & Provide Evidence		
3.2.2.2	Outer conductor: aluminium tape or copper (clad/tube)	State Compliance & Provide Evidence		
3.2.2.3	Inner conductor: copper clad aluminium	State Compliance & Provide Evidence		
3.2.2.4	Dielectric: Foam Polyethylene (PE)	State Compliance & Provide Evidence		
3.2.2.5	Impedance: 50 ohm	State Compliance & Provide Evidence		
3.2.3	Fly-lead: 6mm coaxial cable			
3.2.3.1	SMA (male) to N-type (male) – 0.5m, 1m and 1.5m lengths	State Compliance & Provide Evidence		
3.2.4	Fly-lead: 1/2 inch coaxial cable			
3.2.4.1	N-Type (male) to N-type (male) – 4m length	State Compliance & Provide Evidence		
3.2.5	Connector: N-female Straight 6mm			

Spec. clause number	Description	Schedule A: Eskom's minimum technical requirements	Schedule B: Supplier's statements of compliance	Supplier's Reference/Comment (Supporting Evidence.5
3.2.5.1	Compatible with 6mm cables tendered in 3.2.1	State Compliance & Provide Evidence		
3.2.5.2	Impedance: 50 ohm	State Compliance & Provide Evidence		
3.2.5.3	Ingress Protection: IP68 (with inner conductor)	State Compliance & Provide Evidence		
3.2.5.4	Connector to be crimp type or re-usable type. If crimp type then the tenderer must state which crimping tool (specialised or generic) to be used.	State Compliance & Provide Evidence		
3.2.5.5	Tenderer to supply full datasheet with test results of certified laboratory	State Compliance & Provide Evidence		
3.2.6	Connector: N-male Straight 6mm			
3.2.6.1	Compatible with 6mm cables tendered in 3.2.1	State Compliance & Provide Evidence		
3.2.6.2	Impedance: 50 ohm	State Compliance & Provide Evidence		
3.2.6.3	Ingress Protection: IP68 (with inner conductor)	State Compliance & Provide Evidence		
3.2.6.4	Connector to be crimp type or re-usable type. If crimp type then the tenderer must state which crimping tool (specialised or generic)to be used.	State Compliance & Provide Evidence		
3.2.6.5	Tenderer to supply full datasheet with test results of certified laboratory	State Compliance & Provide Evidence		
3.2.7	Connector: N-female Straight ½ inch			
3.2.7.1	Compatible with ½ inch cables tendered	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.5
3.2.7.2	Impedance: 50 ohm	State Compliance & Provide Evidence		
3.2.7.3	Ingress Protection: IP68 (with inner conductor)	State Compliance & Provide Evidence		
3.2.7.4	Connector to be crimp type or re-usable type. If crimp type then the tenderer must state which crimping tool (specialised or generic) to be used.	State Compliance & Provide Evidence		
3.2.7.5	Tenderer to supply full datasheet with test results of certified laboratory	State Compliance & Provide Evidence		
3.2.8	Connector: N-male Straight ½ inch			
3.2.8.1	Compatible with ½ inch cables tendered in 3.2.1.6	State Compliance & Provide Evidence		
3.2.8.2	Impedance: 50 ohm	State Compliance & Provide Evidence		
3.2.8.3	Ingress Protection: IP68 (with inner conductor)	State Compliance & Provide Evidence		
3.2.8.4	Connector to be crimp type or re-usable type. If crimp type then the tenderer must state which crimping tool (specialised or generic) to be used.	State Compliance & Provide Evidence		
3.2.8.5	Tenderer to supply full datasheet with test results of certified laboratory.	State Compliance & Provide Evidence		
3.2.9	Connector: SMA female Straight 6mm			
3.2.9.1	Compatible with 6mm cables tendered in 3.2.1	State Compliance & Provide Evidence		
3.2.9.2	Impedance: 50 ohm	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.5
3.2.9.3	Ingress Protection: IP68 (with inner conductor)	State Compliance & Provide Evidence		
3.2.9.4	Connector to be crimp type or re-usable type. If crimp type then the tenderer must state which crimping tool (specialised or generic) to be used.	State Compliance & Provide Evidence		
3.2.9.5	Tenderer to supply full datasheet with test results of certified laboratory.	State Compliance & Provide Evidence		
3.2.10	Connector: SMA male Straight 6mm			
3.2.10.1	Compatible with 6mm cables tendered in 3.2.1	State Compliance & Provide Evidence		
3.2.10.2	Impedance: 50 ohm	State Compliance & Provide Evidence		
3.2.10.3	Ingress Protection: IP68 (with inner conductor)	State Compliance & Provide Evidence		
3.2.10.4	Connector to be crimp type or re-usable type. If crimp type then the tenderer must state which crimping tool (specialised or generic) to be used.	State Compliance & Provide Evidence		
3.2.10.5	Tenderer to supply full datasheet with test results of certified laboratory.	State Compliance & Provide Evidence		
3.2.11	Bulkhead Adapter			
3.2.11.1	N-type (female) / N-type (female)	State Compliance & Provide Evidence		
3.2.12	Surge arrestor bulkhead N-female/N-female	State Compliance & Provide Evidence		
3.2.12.1	Frequency range: 700 MHz – 2700 MHz	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.5
3.2.12.2	Insertion loss: < 0.1 dB	State Compliance & Provide Evidence		
3.2.12.3	Tenderer to supply full datasheet with test results of certified laboratory.	State Compliance & Provide Evidence		