

Title: **STANDARD FOR AIR  
CONDITIONING IN  
TRANSMISSION SUBSTATION  
BUILDINGS AND  
TELECOMMUNICATION SITES**

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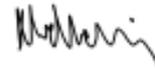
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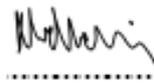
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## **1. Introduction**

Air Conditioners are used in Transmission Substations and Eskom Telecommunication sites, to provide and maintain good indoor air quality, a safe environment for occupants and to provide adequate cooling for the efficient operation of the control equipment within the control rooms.

This document is intended to standardise the air conditioning requirements for Transmission Substations and Eskom Telecommunication sites. This standard forms part of the documents issued for tender enquiry.

## **2. Supporting clauses**

### **2.1 Scope**

This document standardises the requirements for the manufacture, supply, and delivery of air conditioning systems used at Transmission Sub stations and Eskom Telecommunication sites.

#### **2.1.1 Purpose**

This document standardises the technical requirements for the air conditioners systems used in the Transmission substations and Telecommunication sites. And it will be used for tender enquiry.

#### **2.1.2 Applicability**

This document shall apply throughout Eskom holdings 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.

Suppliers are responsible for obtaining the latest copies of the South African national standards (SANS) and international standards referred to in this document. Copies of the latest revision of Eskom documents will be supplied by the purchaser and will form part of the enquiry documentation.

### **2.2.1 Normative**

- [1] ISO 9001 Quality Management Systems.
- [2] SANS 532 – 2009 Standard and specifications for industrial, medical, propellant, food and beverage gases, refrigerants and breathing gases
- [3] SANS 1125 – 2004 2.03 Room air conditioners and heat pumps
- [4] SANS 54511 – 1 - 2010. Air Conditioners, Liquid Chilling Packages And Heat Pumps With Electrically Driven Compressors For Space Heating And Cooling - Part 1: Terms and Definitions
- [5] SANS 54511 – 2 - 2010. Air Conditioners, Liquid Chilling Packages And Heat Pumps With Electrically Driven Compressors For Space Heating And Cooling - Part 2: Test conditions
- [6] SANS 54511 – 3 - 2010. Air Conditioners, Liquid Chilling Packages And Heat Pumps With Electrically Driven Compressors For Space Heating And Cooling - Part 3: Test methods
- [7] SANS 54511 – 4 - 2010. Air Conditioners, Liquid Chilling Packages And Heat Pumps With Electrically Driven Compressors For Space Heating And Cooling - Part 4: Requirements
- [8] SANS 60335-2-40 - 2006 Household and similar electrical appliances – Safety - Part 2: Particular requirements for electrical heat pumps, air conditioners and dehumidifiers.
- [9] SANS 10086-1, The installation, inspection and maintenance of equipment used in explosive atmospheres.

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- [10] SANS 10400-O, The application of National Building Regulations – Part O: Lighting and Ventilation
- [11] SANS 10400-V, The application of National Building Regulations – Part O: Space heating
- [12] SANS 10142-1, The wiring of premises Part 1: Low voltage installations.
- [13] SANS 1424, Filters for use in air-conditioning and general ventilation.
- [14] SANS 10147, Refrigerating Systems including plants associated with air conditioning Systems.
- [15] SANS 10173, The installation, testing, and balancing of air-conditioning duct work

### **2.2.2 Informative**

None

## **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**

<b>Abbreviation</b>	<b>Description</b>
<b>ACU</b>	Air conditioner Condenser Unit
<b>AHU</b>	Air Handling Unit
<b>COP</b>	Coefficient of Performance
<b>ET</b>	Eskom Telecommunication
<b>KW</b>	Kilowatt
<b>VRS</b>	Variable Refrigerant System

## **2.5 Roles and responsibilities**

Transmission Substation designers, Eskom Telecommunication designers, and Project managers who are involved in the designing and installation of air conditioners shall adhere to this standard when selecting air conditioners and going out on tender.

## **2.6 Process for monitoring**

Not applicable.

## **2.7 Related/supporting documents**

Not applicable.

### **3. Requirements of Air Conditioners**

#### **3.1 Air conditioning**

##### **3.1.1 Environmental Operating Conditions**

- 1) Rated system voltage: 230VAC – single phase and 400VAC - three phase.
- 2) Rated frequency: 50 Hz
- 3) Outdoor Operating Temperatures:
  - a) Maximum: 45°C
  - b) Minimum: -10°C
- 4) Indoor Operating Temperatures:
  - a) Maximum: 27°C
  - b) Minimum: 18°C
- 5) Relative humidity: 10% to 85% non-condensing

##### **3.1.2 General Requirements**

- 1) The AHU and ACU shall be separate.
- 2) Split type air conditioner or VRS type air conditioners with an inverter driven compressor shall be used in Transmission Substations.
- 3) The mid wall split type air conditioner with an inverter driven compressor shall be used in Transmission Substations control building offices and Eskom Telecommunication (ET) sites.
- 4) At Transmission Substations and ET sites a minimum of two units shall be installed in each room.
- 5) At the Control building office only one Air conditioner shall be installed.
- 6) At Transmission Substations control rooms where a VRS unit is installed, two equal sized outdoor units to all the indoor units shall be installed.
- 7) At ET sites the air conditioner shall be cooling only.
- 8) The air conditioner shall be fitted with a de-frost/anti-ice thermostat.
- 9) The air conditioner shall have auto restart functionality, on restart the unit shall return to its default settings.
- 10) The air conditioner shall be fitted with a wired remote control only.
- 11) All steel items exposed to the weather shall be galvanised. In coastal environments all outdoor units shall be treated with a high quality anti-corrosion coating.
- 12) VRS systems for Control buildings shall be off a heat pump system.
- 13) Office blocks at Transmission substations where the VRS type is used the system shall be of a heat recovery system.

##### **3.1.3 Technical Requirements**

- 1) Airflow volume shall be 350m<sup>3</sup>/hr – 1200m<sup>3</sup>/hr
- 2) Noise level for indoor units shall be between 32 and 48dB
- 3) Noise level for outdoor units shall be between 46 and 60dB
- 4) Coefficient of performance shall be between 3.2 and 4.5
- 5) The housing of the indoor and outdoor unit shall be galvanised steel and cold rolled steel.

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- 6) The refrigerant coolant used shall be R410A.
- 7) The condenser shall be copper.
- 8) Aluminium name plate shall be used on outdoor and indoor units and pop riveted to the unit.
- 9) The following information is required on all air conditioners.
  - a) Manufacturer's name
  - b) Model number
  - c) Serial number
  - d) Manufacturing date
  - e) Installation date
  - f) Nominal voltage
  - g) Normal current
  - h) Total input power
  - i) Cooling capacity in kW

#### **3.1.4 Packaging**

- 1) The air conditioner shall be packed in such a manner that they are adequately protected to avoid damage during transport and storage.
- 2) A suitable label bearing Eskom's order and item number, the quantity and the delivery address shall be securely attached to the packaging. The markings on the label shall not be destroyed during storage and transport.
- 3) Each consignment shall be clearly marked with a durable label using an indelible font indicating following information.
  - a) Eskom order number.
  - b) Eskom SAP number
  - c) Manufacturer's name
  - d) Content of the packaging (i.e. parts list)
  - e) Overall dimensions of the packaging
  - f) Total mass of each packaging
  - g) Pictograms/symbols showing correct storage of packaging.

#### **3.1.5 Off-loading and storage**

- 1) A copy of storage and handling procedure shall be submitted to Eskom at tender stage. The procedure shall stipulate the maximum recommended period of storage, as well as recommended actions to be taken if a longer storage period is required.
- 2) The supplier shall contact the relevant personal for delivery of air conditioners at least one week before delivery.
- 3) At the time of off-loading at an Eskom facility, the supplier shall ensure the air conditioners are off-loaded properly and safely.

#### **3.1.6 Installations**

- 1) The supplier shall submit an installation method statement to Eskom at tender stage.
- 2) The air conditioners shall be installed according to the manufacturer specifications.

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- 3) It is the air conditioner installer's sole responsibility to ensure the integrity of all piping connections, pipe sizes, wiring and unit switch settings.
- 4) The air conditioner installer shall have a level 4 national certificate: air conditioning, refrigeration and ventilation.

### **3.1.7 Testing and Commissioning Requirements**

The following tests shall be performed in accordance with the methods, conditions and requirements of SANS 54511-2, SANS 54511-3, SANS 54511-4.

- 1) Starting test
- 2) Test at maximum operating conditions
- 3) Freeze-up test
- 4) Complete power supply failure test
- 5) Condensate draining and enclosure sweat test
- 6) Defrosting test
- 7) A representative of the manufacturer of the air conditioner installed shall perform a quality inspection and pre-commission test, before the air conditioning installation is commissioned by the installer
- 8) A copy of the test and commissioning sheet shall be handed over to the site representative.
- 9) A copy of the Certificate of compliance for the electrical work done, shall be handed over to the site representative.

### **3.1.8 Documents required at tender stage**

The supplier shall provide the following documentation with the tender:

- 1) Technical data sheet.
- 2) Drawings.
- 3) Test certificates and reports.
- 4) Storage and handling procedure of air conditioners.
- 5) Installation method statement.
- 6) Test and commissioning method statement.
- 7) Commissioning report.

### **3.1.9 Documents required at delivery stage**

The supplier shall provide the following documentation when delivering the air conditioners:

- 1) Operating manual
- 2) Installation manual
- 3) Inspection manual
- 4) Maintenance manual
- 5) Commissioning report

## 4. Authorization

This document has been seen and accepted by:

Name and surname	Designation
Subhas Maharaj	Senior Manager Substation Engineering
Andile Maneli	Manager Substation Engineering

## 5. Revisions

Date	Rev	Compiler	Remarks
April 2021	2	AR Naude	Revised document
Oct 2014	1	AR Naude	New document

## 6. Development team

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

- Anton Naude

## 7. Acknowledgements

Not applicable.