AIRPORTS COMPANY SOUTH AFRICA

Metering Technical Specifications and Guidelines

AREA OF APPLICABILITY
ALL AIRPORTS

Division
Capital Infrastructure Asset Management (Infrastructure Asset Management)

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Control Disclosure:
Public

1. Purpose of the standard

This is a guideline for energy monitoring, metering data collection, analysis, and energy recoveries by providing - technical specifications and performance criteria for metering equipment. This will ultimately support energy optimization, metering and billing standardization, informed decision-making, and energy management initiatives throughout ACSA. Metering to be installed where there is none existing to collect data to assistant with energy performance certificate (EPC) implementation

The metering technical standard will help to ensure that meters can accurately capture and record energy consumption data for various portions of the building. This includes power demand, heating, cooling, and any other energy-related uses.
To receive an EPC, a building's energy usage must be comprehensively and accurately documented. The metering system data will help calculate energy performance metrics (e.g., total kWh/m²/year) for SANS 1544 certification.

Many airport users such as tenants, stakeholders and ACSA employees consume electricity at all ACSA sites. In keeping with the user pay principle, tenants and stakeholders must be billed for their energy utilisation. There is also a requirement for an energy balance across the site. .

These guidelines, aim to define the guidelines and technical details for the implementation of metering systems for all stakeholders involved in the procurement, implementation, and management of metering infrastructure.

The standard offers guidelines to comply with industry regulatory requirements by defining the technical specifications and performance criteria for electrical meters.

2. Scope of the standard

These metering technical specifications and guidelines include the criteria for metering systems under ACSA in terms of design, installation, operation, and maintenance. It includes specifications of meters used within the ACSA network, including water and electricity meters, along with its related equipments such as voltage transformers and current transformers, and monitoring software.
To guarantee precise measurement, data integrity, and operability, the metering systems must adhere to the standards, protocols, and performance requirements outlined in this document. It also describes the roles and duties of contractors, vendors, and operational teams among other parties engaged in the acquisition, setup, and upkeep of metering infrastructure.

This guide acts as a thorough reference for all metering-related matters within ACSA, promoting efficient energy management and metering procedures with clarity and uniformity.

3. Reference Standards

ACSA D100MAN – Standards and Guidelines for Energy Efficiency
ACSA D105MAN – Energy Self Generation Standards & Guidelines
ACSA D106MAN - Energy Performance Certificate Guideline
SANS 62051 - Electricity metering
NRS 071 - Automated meter reading for large power users.
NRS 057 - South African National Standard Code of practice for electricity metering
SANS 10142 part 1 & 2 - Code of Practice for the LV Installations
NRS 048 – Electricity supply
OHS Act 85 of 1993, Electrical Machinery Regulations

4. Definitions and Abbreviations

4.1 Definitions

Term	Definition
Company/Organisation	Airports Company South Africa SOC Limited
Low Voltage	Nominal voltage levels up to and including 1 000 V. [SANS 1019].
Medium Voltage	The set of nominal voltage levels greater than 1 000 V and up to and including 44 000 V. [SANS 1019]
Micro-grid	A local energy grid with control capability, which means it can disconnect from the traditional grid and operate autonomously.
Voltage Stability	The ability of a power system to sustain fixed tolerable voltage at every single bus of the network under standard operating conditions as well as after being subjected to a disruption.
Power balancing	The relationship between the electricity supply and consumption at a particular moment
Voltage magnitude	Voltage is an energy level difference between two points. This energy difference can be used to move charges around. The units of voltage are volts, abbreviated V
Frequency	The number of waves that pass a fixed place in each amount of time. So, if the time it takes for a wave to pass is 1/2 second, the frequency is 2 per second. If it takes 1/100 of an hour, the frequency is 100 per hour. Operating frequency in RSA is 50 Hz
Voltage and Current harmonics	Current and voltage harmonics both are generated due to nonlinear loads. But the difference is current harmonics are generated at the source side (eg input of rectifier) and the voltage harmonics are generated at output of nonlinear converters which output is AC.
Voltage Flicker	Voltage fluctuation is the response of the power system to fast changing loads. this can be seen via a visible change in brightness of a lamp.

4.2 Abbreviations

Abbreviation	Description
AC or ac	Alternating Current
CB	Circuit Breaker
CT	Current Transformer
DC or **dc**	Direct Current
EPC	Energy performance certificate
HV	High Voltage
LV	Low Voltage
MV	Medium Voltage
PF	Power Factor
POC	Point of Connection
POS	Point of Supply
QOS	Quality of Supply
SAGC	The South African Grid Code
SEF	Sensitive Earth Fault
VT	Voltage Transformer
AMR	Automated meter reading
MD	Maximum demand
NER	National energy regulator

5. Design Basis and Considerations

5.1 System Architecture

Determine the overall design of the metering system, including centralized or decentralized data collection, and the use of wired or wireless communication networks.

5.2 Meter Selection

Criteria for selecting meters based on application, type of energy or resource being measured, accuracy requirements, and compatibility with existing systems. The meters should be smart meters integrated with AMR /energy management system and remote data acquisition.

5.3 Data Management

Define the data collection frequency, storage requirements, data transmission protocols, and integration with data management systems or energy management systems.

5.4 Scalability & Flexibility

Ensure the metering system can be easily expanded or replicated to accommodate future needs or changes in the infrastructure.

5.5 Integration with Existing Systems

Consider how the new metering system will integrate with current building management systems (BMS), and other relevant infrastructure that might be installed as part of airport future developments.

5.6 Data Security

Establish requirements for data security, including encryption, user authentication, and protection against tampering or unauthorized access.

5.7 Maintenance and Calibration

Outline the maintenance schedules, calibration procedures, and accessibility for routine inspections and servicing.

No annual calibration shall be required to maintain this accuracy. Calibration shall be performed as outlined in SANS 62051 and NRS 057

- 5 Yearly Calibration (>10 MVA)
- 10 Yearly Calibration (1 MVA - 10 MVA)
- 20 Yearly Calibration (<100 kVA)

5.8 Cost Considerations:

Evaluation of the cost implications of various design choices, including initial installation, operational costs, maintenance, and potential cost savings from improved energy management shall be done before conclusion of design stage.

6. Guidelines for design trade-offs

At design stage, a due diligence shall be conducted to justify the chosen type of meters. This section deals with tradeoff considerations to demonstrate the best technology option at optimized cost has been chosen.

6.1 Technology Complexity vs. Ease of Implementation

More advanced metering technologies may offer additional features and capabilities but may also require more complex installation, configuration, and maintenance procedures.

6.2 Wired vs Wireless Connectivity

- All for ACSA new installations, smart meters to be implemented
- Wired metering systems offer robust and reliable communication but may require extensive cabling infrastructure, which can be costly and labour-intensive to install. Wireless metering systems provide flexibility and scalability but may be subject to interference and security concerns. Choosing between wired and wireless connectivity depends on factors such as installation environment, coverage requirements, and budget constraints.

6.3 Data Resolution vs Storage Capacity

- Higher data resolution allows for more detailed monitoring and analysis but may require larger storage capacity and bandwidth for data transmission.
- Determining the optimal data resolution depends on the organization's data analysis requirements, storage capabilities, and communication infrastructure limitations.

6.4 Maintenance requirement vs Reliability

- Implementing metering systems with advanced diagnostic capabilities and remote monitoring features can facilitate proactive maintenance and troubleshooting but may increase complexity and maintenance overhead.
- Striking a balance between maintenance requirements and reliability involves selecting metering solutions that minimize downtime and operational disruptions while minimizing maintenance costs and effort.
- All systems shall have the main system (master) and back-up system (N+1) (slave – check meter) that is not supplied from the same point.

7. Local Content

- The guideline shall promote the use of local goods, services and resources in order to develop new industries and strengthen the economic base.
- For system procured from abroad, as a minimum ACSA need a local agent with a capability to perform end to end maintenance and troubleshooting of asset.
- As far as possible the design in a form of new installations, calibrations and replacements shall hire and be aligned to Local Content Policy and designed threshold.

8. Deliverable design information or minimum design outputs

The detail design deliverables shall align to the conditions as stipulated in FIPDM Stage 3.

9. Preferred Equipment Specifications

9.1 General

- The power meter shall of a compact design that makes it ideal for saving space in switchgear and control panels.
- Meter shall have the same maximum depth as the panel at the substation to avoid protrusion.
- The power meter shall be backlit and powered with auxiliary control power:
    i. Voltage range 220V/400 VAC (+/- 20%),
    ii. Frequency of 50 Hz
- It shall provide measurement of the value for voltage for single-phase with neutral / three-phase with or without neutral network: 50/80 VAC to 330/570 VAC, and if associated with external voltage transformer, it should go up to 1 MV.
- The meter shall have In = 6 A, withstanding 10 A continuously.
- The Power Meter shall be associated with current transformers: x/5A or x/1A.
- It must measure the values of: I, In, U, V, PQS, PF, Hz, active/reactive/apparent energy import and export, power/current demand, present and peak demand, min-max and THD (up to 15th harmonic).
- The power meter shall be equipped with anti-tamper security feature to ensure the integrity of the measurements.
- The power meter shall be able to log energy values by interval in an internal memory.

9.2 Accuracy

For power meters with CT ratio x/5A, the measurement accuracy shall be:

- Active energy: Class 0.5S
- Reactive energy: Class 2
- Current: +/-0.3% from 0.5A to 6A
- Voltage: +/-0.3% from 50V to 330V (Ph-N)
- Active/apparent power: +/-0.5%
- Reactive power: +/-2%
- Power factor: +/-0.005 from 0.5A to 6A
- Frequency: +/-0.05% from 45 to 65 Hz.

For power meters with CT ratio x/1A, the measurement accuracy shall be:

- Active energy: Class 1
- Current: +/-0.5% from 0.1A to 1.2A
- Active/apparent power: +/-1%
- Power factor: +/-0.005 from 0.1A to 1.2A

9.3 Front Panel Display

- The power meter shall be equipped with a display with separate lines for measurement and for configuration. All information shall be available from the display. It shall be possible to perform the setup via the display, no dip switches or other hardware adjustments shall be required for setup.
- The display shall be able to indicate normal and alarm situations with the help of a symbol as well as the display blinking. An error code for diagnosis shall be displayed in case of error.
- The power meter shall also be equipped with an indicator indicating the meter in flashing and counting / OFF and not counting/ ON and over-counting due to error in configuration or overload.
- The display shall indicate power/current demand, present and peak demand.

9.4 Communication and Alarms

- The meter shall have a Modbus communication/ DLMS COSEM Protocol port via RS485 not USB to enable ACSA laptops to connect and download the logs.
- An indicator should be available for communication diagnosis.
- The meter shall have configurable and time-stamped alarms.

9.5 Inputs and Outputs

- The meter shall have a configurable digital output for remote transfer of metered pulse (kWh) and another configurable digital output for remote transfer of metered pulse (kVarh).
- The outputs shall be solid state and:
    - The number of pulses per kWh shall be configurable.
    - Pulse length shall be configurable with a minimum length of 50ms.
    - Maximum current shall not be greater than 50 mA.

- Maximum voltage shall not exceed 5-40VDC, and the pulse output shall be able to have direct connection to a 24 V DC (<30 V DC) input on a PLC.

9.6 Environment

- The power meter shall be IP40 front panel, IP20 casing.
- To ensure safety of goods and people, the installation category of the power meter shall be III, and the degree of pollution 2. The consumption will not exceed 10 VA.
- The meter shall be rated for an operating temperature range of -25°C to +55°C.

10. Panel Mount Power Meters Specifications

10.1 General Features

The power meter shall have the following general features:

- All setup parameters required by the power meter shall be stored in non-volatile memory and retained in the event of a control power interruption.
- The power meter may be applied in single phase, three-phase, three- or four-wire systems in WYE mode.
- The power meter shall be capable of being applied without modification at nominal frequencies of 50Hz.
- The power meter shall have a real-time clock with battery back-up with at least 1 year ride-through time without external power.
- All devices shall be synched to a central reference source.

10.2 Mechanical

The power meter shall have the following mechanical characteristics:

- The power meter unit shall have removable connectors for voltage inputs, control power, communications, input and outputs.
- The power meter unit shall be easily mounted in the pre-made cut-out without tools.
- Power meter shall be sized to fit into the existing panel without any need for modifications.

10.3 Sampling and Harmonics Resolution

The current and voltage signals shall be digitally sampled at a rate high enough to provide true rms accuracy to the 31st harmonic (fundamental of 50 Hz). The power meter shall provide continuous sampling at a minimum of up to 64 samples/cycle, simultaneously on all voltage and current channels in the meter.

10.4 Current inputs

The current inputs shall be:

- 0-10A with 5A nominal input from CT secondary.
- The power meter may be applied in three-phase, three- or four-wire systems.
- Residual current shall be calculated by vectorial addition of the phase currents.
- A fourth CT input shall be available to measure neutral or ground current.

10.5 Voltage inputs

The voltage inputs shall be:

- Nominal of 400 V L-N / 690 V L-L.
- Maximum of 480 V L-N / 828 V L-L.

10.6 Control Power (device)

The monitoring device control power shall be:

- 100-415 VAC L-N ±10% or 125-250 ± 20% VDC
- 110-480 ±10%, VAC or 125-250 ± 20% VDC
- Operating temperature range for meter: -25 to 70 °C
- Operating temperature range for display: -20 to 70 °C

10.7 Accuracy

The measurement accuracy shall be:

- Use four-quadrant metering.
- Sample current and voltage simultaneously without gaps with 64 samples per cycle (zero blind).
- Accuracy for active energy of the power meter shall be class 0.5S
- Accuracy for reactive energy of the power meter shall be class 2.
- No annual calibration shall be required to maintain this accuracy.

10.8 Inputs and Outputs

The power meter shall support 2 digital inputs for demand interval synch pulse, time synch input, conditional energy control, and 2 relay outputs.

10.9 Energy Quantities

The power meter shall:

- Provide cumulative quantities for real, reactive and apparent energies shall be stored in non-volatile memory.
- Allow the user to pre-set the energy quantity at any value within the register range via communications, to match a unit being replaced in the field.
- Provide the user the ability to reset the cumulative energy quantities from the display of the unit or via communications.

10.10 Logging

- The power meter shall provide for on-board data logging. Each power meter shall be able to log data, alarms and events. Logged information to be stored in each power meter include the following: data logs, min/max log files of selected parameter values, alarm logs for each user-defined alarm or event.
- The meters shall offer the following on-board non-volatile memory: 256KB
- The power meter shall have on-board memory big enough to log 2 values every 30 minutes for 60 days
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10.11 Communication

The power meter shall communicate via serial RS-485 Modbus /DLMS COSEM Protocol or Jbus protocol

10.12 Display

- The power meter display shall be backlit dot-matrix LCD for easy viewing. Display shall also be anti-glare and scratch resistant with a minimum of 128x128 pixels.

- The power meter display shall be capable of allowing the user to view four values on one screen at the same time. A summary screen shall also be available to allow the user to view a snapshot of the system.

- The power meter display shall allow the user to change the language to English.

10.13 Measured Values

- The power meters shall provide the following, true RMS metered quantities. In addition, the power meters shall record and save in non-volatile memory the minimum and maximum values of all selected parameter values since last reset based on internal memory capacity and settings.

- The power meters shall also record and save in non-volatile memory the interval minimum, maximum, and average of any of the values pre-defined over a user specified interval.

10.14 Real Time Readings

The following real time alarm events requirements shall be provided:

- Current – A (per-phase, 3-phase average, % unbalanced)
- Voltage – Volt (L–L per-phase, L-L 3-phase average, L–N per-phase, 3-phase average, % unbalanced)
- Real power - kW (per-phase, 3-phase total)
- Reactive power - KVar (per-phase, 3-phase total)
- Apparent power - kVA (per-phase, 3-phase total)
- Power factor - unit (3-phase total)
- Frequency - hz

10.15 Energy Readings

The following energy readings shall be provided:

- Accumulated energy (real kWh, reactive kVARh, apparent kVAh)
- Active energy delivered for 4 independent rates
- Reactive energy delivered for 4 independent rates

10.16 Energy Demand Readings

The following demand readings shall be provided:

- Demand current calculations (per-phase, 3-phase average, neutral)- present and peak
- Real power
- Reactive power
- Apparent power

11. Commissioning, Maintenance and Handover Requirements

11.1 Minimum Commissioning- Criteria

Near completion, inspecting and testing of all elements of the installation and associated control system shall be verified in accordance with the grid codes and standards, Occupational Health and Safety Act 85/1993 and the employer technical specifications. Qualitative and quantitative requirements shall be satisfied for the required system through the following:

Description of Commissioning Requirement	Requirement Met	
	Yes	No
1. **Functional Verification** • All metering devices are installed correctly as per the design specifications. • Meters are correctly calibrated and verified to meet accuracy standards. • All communication interfaces and data loggers are fully operational and correctly configured. • Data collection, storage, and retrieval systems are functioning as intended		
2. Performance Testing • Meters consistently and accurately measure the specified parameters (e.g., electricity, water, gas, or thermal energy) within the acceptable tolerance levels. • The system demonstrates stable and reliable performance under various operational conditions. • Data transmission from the meters to the central monitoring system is consistent, timely, and accurate. • Data integrity and consistency are maintained across all system components.		
3. Compliance and Standards • All metering equipment meets the required industry standards and regulatory compliance. • The installation complies with safety standards and electrical codes. • Environmental and sustainability standards are adhered to, where applicable.		
4. Documentation • All project documentation, including user manuals, technical specifications, and calibration certificates, are complete and provided. • As-built drawings and installation records are accurate and up to date.		

11.2 Maintenance Requirements

The requirements at project close out phase for any metering related works are tabulated below.

Description of Maintenance requirement	Requirement Met	
	Yes	No
The manufacturer's recommendation with regard to the routine servicing and maintenance of all equipment shall be included in the manual. This data shall include: The recommended service interval and the estimated hours required for each type of service, Routine tests which the Original Equipment Manufacturer would suggest are carried out A list of spares, tools and testing equipment supplied under this Contract. for each item of equipment, together with a list of agents/contractors authorized to carry out service/maintenance. For identified systems, plant and equipment, a proposed maintenance schedule shall be provided by the specialist for a period of 36 months after final delivery A list of spares and testing equipment that are not supplied under this Contract, but which may be required for future maintenance or testing.		
A list of "Nameplate Data" giving full particulars of serial numbers and other descriptive data pertaining to the equipment installed Bill of materials used		
Operating Instructions and Training		
Detail system operating instructions and procedures for control and operations, communications protocol. A complete description of all operating procedures and safety measures shall be included in the manual. A basic "Fault Finding Guide" shall also be included. Training shall be given to staff operating machinery and plant together with maintenance personnel. Training certificates shall be signed by all staff that has received training. Letter of warrantees Disposal certificate of all lights if it was retrofitting		
Recurring failures and troubleshooting guides Technology guarantee and licensing requirements FMEA study and outcomes RAM study Competency and skill sets of the operations and maintenance personnel. Include certification as needed		

11.3 Handover Requirements

The requirements at project close out phase for any metering related works are tabulated below.

Item No	Description of Handover requirements	Requirement Met	
		Yes	No
1	Design Reports include design calculations with respect to the floor plan Electronic datasheets of equipment purchased		
2	An electronic and hard copy of all routine tests results, and measurements as recorded during site and factory testing		
3	Complete sets of drawings (one electronic and three hard copies) of the entire project shall be included in the as built documentation. The set shall include: • Architectural drawings and details • Electrical wiring diagrams indicating all cable sizes, control units, site cable reticulation and schematic wiring diagrams applicable to the works • The electronic records are to be handed to the Asset Information Office at site.		

12. Process for Monitoring

The effective implementation and monitoring of this manual shall be done through relevant committees and reviews. Self-assessment by Maintenance Engineering (level 1) and Operational Governance (level 2) shall be conducted to determine compliance, implementation and effectiveness of this procedure. In order to ensure compliance to statutory requirements, audits on annual basis or per audit plan shall be conducted to determine compliance status.

MONITORING CONTROLS	PURPOSE	RESPONSIBLE	FREQUENCY
COE Oversight Compliance Matrix	Oversight compliance	Group Manager: ME (as delegated)	Real Time
Internal Audits	Determine the effectiveness of the procedure and test the outcome of the manual.	Internal Audit	Annually
Operations Management Manco	Measure adequacy and implementation of the manual	Operations Management	Planned Interval
Energy Managers	Responsible for overseeing energy consumption and ensuring that metering systems are in compliance with standards	EDM Engineers and ME managers	Real Time
Compliance	Monitors adherence to regulatory requirements and ensures that metering practices align with national standards.	EDM Engineers and ME managers	Planned Interval
Maintainability	Ensures that all meters are functioning correctly and are regularly maintained.	Electrical /ME Managers (delegation of Senior ME Managers)	Annually

Note: This manual shall be reviewed in three (3) years cycle and if there is a need to review the manual before three (3) years cycle laps due to any circumstances being legal requirements, changes in the businesses, the need to reflect current practices or activities, the procedure shall be unlocked for review accordingly.

Disclaimer: In instances where document links are not accessible, directly access the documents on the Policy Management Document Store on the Airports Company South Africa SOC Limited intranet.

13. Accountabilities and Responsibilities

13.1 Accountabilities

The overall accountability for the development of this standard and guidelines lies with the Group Executive: Capital Infrastructure Asset Management with the support of the Group Manager: Infrastructure Asset Management. However, in the absence the designated person the acting person shall assume responsibility as per delegation of authority. The overall accountability for the effective implementation and adherence of this procedure lies with the Group Executive: Operations Management with the support of the Senior Manager: Maintenance Engineering. However, in the absence the designated person the acting person shall assume responsibility as per delegation of authority.

Authorities	Group Lead: Infrastructure Asset Management	Regional General Manager	Group Executive: CIAM	Senior Site Manager: Maintenance Engineering	Chief Engineer: EDM	EDM Engineer/ Electrical Manager
Has overall accountability for development of this standard	*Responsible*	-	*Accountable*	*Consulted*	*Responsible*	*Consulted*
Has overall responsibility for implementation and adherence of this standard	-	*Consulted*	-	*Accountable*	*Consulted*	*Responsible*
Consulted at the time of an exception and adherence of this standard.	*Consulted*	*Informed*	*Consulted*	*Accountable*	*Consulted*	*Responsible*
Has overall responsibility for adherence, implementation and performance of a given task.	-	-	-	*Accountable*		*Responsible*
Has responsibility for approval and authorization of the standard	*Responsible*	*Informed*	*Accountable*	*Informed*	*Responsible*	*Consulted*
Communicate the standard to all impacted stakeholders or employees.	*Accountable*	*Consulted*	-	*Responsible*		*Informed*

13.2 Roles and Responsibilities

Senior Site Manager

- Line Manager shall ensure that all meters adhere to this standard

Employees

- The representative of an employee can be energy team member, approved consultant, or design engineer
- Ensure that all connections adhere to the minimum requirements of this standard and guidelines
- Ensure that all works conforms EAM 003 of this document before commissioning

14. Reporting of Non-Conformance

Any deviation from this manual shall be identified and registered with corrective and preventative measures for continual improvement in accordance with Reporting of Non-Conformance Procedure Document - Z001 001M.

15. Related Policy Documents

Document Control Procedure - Z001 006M
Record Keeping Requirements Procedure - Z001 008M
D060MAN Standards and Guidelines for Energy Efficiency
D061MAN Minimum Technical and Functional Requirements for Electricity Distribution Guidelines

16. Related Legislation and Standard

- Electricity Regulation Act 4 of 2006, as amended.
- Occupational Health and Safety Act No 85 of 1993.
- South African Distribution Code (all parts).
- South African Grid Code (all parts).
- NRS 047-1, Electricity supply – Quality of service – Part 1: Minimum standards.
- NRS 048-2, Electricity Supply – Quality of Supply Part 2: Voltage characteristics, compatibility levels, limits and assessment methods.
- NRS 048-4, Electricity Supply – Quality of Supply Part 4: Application guidelines for utilities.
- NRS 054, Rationalized User Specification – Power Transformers.
- **SANS 474 (NRS 057), Code of practice for electricity metering.**
- **NRS 071, Automated meter reading for large power users.**
- SANS 1019, Standard voltages, currents and insulation levels for electricity supply.
- SANS 62053-23, Electricity metering equipment (a.c.) – Particular requirements –Part 23: Static meters for reactive energy (classes 2 and 3).
- SANS 62052-11, Electricity metering equipment (a.c.) – General requirements, tests and test conditions – Part 11: Metering equipment.
- SANS 62051, Electricity metering – Glossary of terms.
- SANS 60044-1, Instrument transformers – Part 1: Current transformers.
- SANS 60044-2, Instrument transformers – Part 2: Inductive voltage transformers.
- SANS 60044-3, Instrument transformers – Part 3: Combined transformers.
- SANS 60044-5, Instrument transformers – Part 5: Capacitor voltage transformers.
- SANS 1524-1, Electricity Payment Systems – Part 1: Prepayment meters. Amdt 1
- SANS 1799, Watt-hour meters – AC electronic meters for active energy.

17. Change Control and Verification Procedure

This manual shall only be verified and changed with the authorization of the Group Executive: Capital Infrastructure Asset Management in accordance with Change Control and Verification Procedure – Z001 003M.

18. Records

Record Name	Storage Location	Record Number	Responsible Person	Retention Time

19. Revision History

Date last revised	Revision Status	Compiler	Summary of changes
14 Aug 2024	First Issue	**Chief Engineer: EDM** **Name and Surname** Tshego Ntombela	

CONTRIBUTIONS

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20. Endorsement (See Master in Policy Management Storage Room)

Activity	Name	Signature	Date
Compiler	**Chief Engineer:** EDM **Name and Surname** Tshego Ntombela		
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