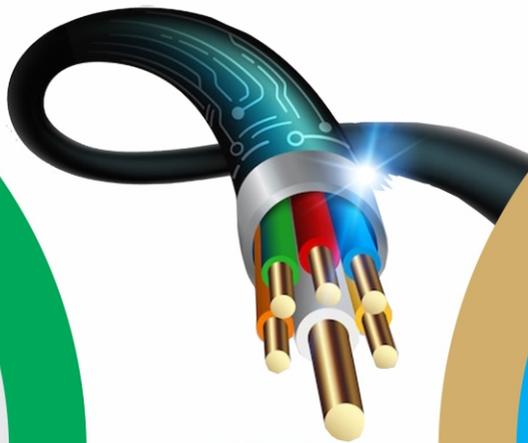




Securing Ghana's Energy Future Today

NATIONAL ELECTRICITY DISTRIBUTION METERING CODE

MAY, 2022



ENERGY COMMISSION



NATIONAL ELECTRICITY DISTRIBUTION METERING CODE

MAY 2022

PREFACE

In accordance with sections 26, 27, 28, and 56(1)(a)(v) of the Energy Commission Act, 1997 (Act 541), the National Electricity Distribution Metering Code has been developed and issued by the Energy Commission of Ghana to establish the framework that will guide and protect the right of both distribution and retail sale utility providers and customers of electricity.

The Metering Code sets out the minimum acceptable standards, technical and operational rules for entities involved in the procurement, installation, operation and maintenance of metering systems for the electricity distribution sector in Ghana. The Metering Code also prescribes the responsibilities and obligations associated with the functions involved in the supply and delivery of electrical energy by the distribution and retail sale utility.

In accordance with the mandate of the Energy Commission, the Metering Code is subject to periodic review to improve its quality and make it more amenable to its objects and functions as and when it deems necessary. The 2022 version is the first edition.

Finally, users of the Metering Code are highly encouraged to make submissions on any part that they consider needs improvement and refinement to assist in the establishment of a responsive, transparent, fair, and accurate metering and billing of consumers as per applicable tariff for the distribution and retail sale of electricity in Ghana. Submission of any relevant comments and ideas in this regard should be forwarded to:

**The Executive Secretary,
Energy Commission, PMB, Ministries Post Office, Accra, Ghana
Email: info@energycom.gov.gh and
Telephones: (233-302) 813763, 813762 or 813756.**

ACKNOWLEDGEMENTS

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We also wish to acknowledge the following stakeholders who provided relevant information and comments necessary to develop the first National Electricity Distribution Metering Code.

1. Ministry of Energy
2. Ministry of Justice and Attorney General's Department
3. Public Utilities Regulatory Commission
4. Ghana Standards Authority
5. Electricity Company of Ghana
6. Northern Electricity Distribution Company
7. Enclave Power Company
8. Volta River Authority
9. Ghana Grid Company Limited

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ABBREVIATIONS AND DEFINITIONS

AMR	Automatic Meter Reading
CT	Current Transformer
EC	Energy Commission
HT	High Tension
HV	High Voltage
IEC	International Electro-technical Committee
KVA	Kilovolt Ampere
kVar	Kilovar, or one thousand volt-amperes of reactive power
kW	Kilowatt or one thousand watts of active electric power
kWh	Kilowatt-hour or one thousand watt-hours of electrical energy
MD	Maximum Demand
NEDC	National Electricity Distribution Code
NEGC	National Electricity Grid Code
PURC	Public Utility Regulatory Commission
SA	Standards Authority
ToU	Time of Use
VAR	Volt Amperes Reactive
Wh	Watt-hour

DEFINITIONS

AC	means an electric current that reverses its direction of flow at periodic intervals of 50 times per second.
Active Power	means the product of voltage and the in-phase component of an alternating current that equates to true power measured in units of watts and standard multiples.
Accumulation meter	also known as a single-rate or flat-rate meter, it is a digital, dial, or clock face meter that measures how much electricity has been consumed by a customer by calculating the difference between the current and previous meter readings.
Automated Meter Reading	is a technology of automatically collecting consumption, diagnostic, and status data from energy metering systems using a communication infrastructure that links the meter at the customer's site with the Distribution Licensee and a data management infrastructure at the back end of the Distribution Licensee linked to accounting and invoicing systems.
Apparent Energy	means the integral of Apparent Power with respect to time and is measured in Volt Ampere hour and standard multiples.
Alternating Current	means an electric current that reverses the direction of the flow of current at periodic intervals of fifty times per second.
Ampere (amp)	is a unit of measurement for electric current and is proportional to the number of electrons flowing through a conductor past a given point in one second.
Apparent Power	means the product of the root - mean - square (RMS) of the current and the root - mean - square value of the voltage, but in the case of alternating current circuits or systems, it is the square root of the sum of the squares of the active and reactive power and is measured in kilo volt-ampere (KVA) or multiples.
Bi-directional Meter	means a meter that measures energy flow in two directions (import and export) and displays both imported and exported energy in separate registers.
Bulk Customer	means a customer that purchases or receives electric power and energy of such amount or level as the Commission may specify.
Check Metering System	means a meter which provides source data for comparison with the main meter.
Credit Meter	means a device for measuring electrical quantities after the quantities have been utilised for the purposes of planning and billing.

Commission	means the Energy Commission, established under the Energy Commission Act, 1997 (Act 541).
Connection Point	means the point of physical linkage to or with a distribution network to enable the flow of electricity as the boundary between the distribution system and a facility of a customer or a customer-generator.
Current Transformer	means an instrument transformer, with its primary winding connected with the conductor carrying current to be measured and which gives an accurate low-current indication in its secondary winding of the high amperage current in its primary winding where the low-current output is used for metering.
Customer	means a person who has a contract with the Distribution Licensee or Retail Sale Licensee to use electricity.
Customer-Generator	means a customer of a Distribution Licensee that generates electricity on the side of the metering system of the customer and that has a renewable energy generating facility primarily intended to offset part or all of the electricity consumption of the customer.
Defective Meter	is a meter that does not meet the relevant minimum accuracy standards;
Distribution Licensee	means an entity authorised by the Commission under the Act to operate and maintain a distribution system for the supply of electricity to the customers in an area or zone of supply.
Distribution System/Network	means a system of electric lines and associated equipment generally at nominal voltage levels of 36 kV or below, which the Distribution Licensee is licensed to use to distribute electricity for supply to customers, excluding public lighting assets.
Electrical Quantities	means an electrical unit of measurement in terms of; voltage, wattage, amperes, active energy, reactive energy, maximum demand, and power factor.
Embedded generator	means a generator that has generating units, whether conventional or renewable energy-based, directly connected to a distribution system for import or export of energy.
Energy Auditing and Accounting Meter	means a meter used for accounting for the supply of electricity to various segments of an electrical system to carry out an analysis to determine the consumption of electricity and the loss of energy over a specific period.

Fault	means an event occurring on an electric system that will affect the integrity of the meter.
Frequency	means the number of alternating current cycles per second expressed in Hertz at which a system is running.
Interoperability	means the ability of a prepayment system to communicate with each other without any interference to the entire electrical system.
Interval Meter	means a meter that records electricity usage electronically and periodically and transmits the data to the electricity distributor or retailer.
Main Actors	includes the Distribution Licensee, a bulk customer, and a customer of a Distribution Licensee; Others actors includes Retail Sale Licensee, operators of off-grid distribution systems, and embedded electricity generators.
Main Meter	means the primary meter installed by a Distribution Licensee at the premises of a customer and which provides source data for the accounting and billing functions.
Maximum Demand	means the maximum value of the average kVA drawn at the point of connection of the supply of the Customers at the customer's premises during any consecutively scheduled periods in the month or a time specified by the Commission.
Meter	means a device used for measuring and recording units or electrical quantities.
Meter Test Station	means an accredited or approved place where meters are tested or calibrated.
Metering Data	means the data obtained from a metering system, the processed data, or secondary data.
Metering System	means any form of a meter or metering device, consisting of the Main Meter or Backup Meter and the associated instrument transformers and metering protection equipment and low voltage electrical circuitry and associated ancillary equipment relating to a metering point.
Metering Point	means the physical location at which the metering system is connected.
Overall Accuracy	the combined accuracy of a meter, associated instrument transformers, and cabling for a given metering system.

Prepayment Meter	means a meter that requires customers to make deposits or payments that mimic tariff to be used in a predefined period ahead of usage and with a timer that will reset at the end of every billing cycle.
Power Factor	means the ratio of active power or active energy to the apparent power or apparent energy.
Reactive Energy	means the integral with respect to time of the instantaneous reactive power produced, flowing, or supplied by an electric circuit measured in units of VARh or standard multiples.
Reactive Power	means the product of voltage and current and the sine of the phase angle between them measured in units of volt-amperes reactive and standard multiples.
Retail Sale Licensee	means a person licensed under the Energy Commission Act, 1997 (Act 541) to sell electricity to the general public.
Routine Test	means a test carried out on a meter produced by a manufacturer to verify if the components or systems of the meter meet specifications in terms of performance.
Time of Day/Time of Use Meter	means a meter that allows a special rate of tariff to be charged depending on a particular time during the day that the energy is utilised.
Type Test	means an element of conformity assessment to determine whether a meter complies with the requirements of a specification, technical standard contract, or regulation.
Voltage	means the electronic force or electric potential difference between two points that give rise to the flow of electricity.
Voltage Transformer	means a transformer for use with meters and protection devices in which the voltage across the secondary terminal is, within the prescribed error limits, proportional to and in phase with the voltage across the primary terminals.
Watt	means the electrical measuring unit for active power corresponding to the rate of consumption of energy in an electrical circuit where the potential difference is one volt and the current one ampere.
Watt-hour (Wh)	means the unit of electrical energy equal to one watt of power supplied to or taken from an electric circuit steadily for one hour.
Whole Current Meter	means a meter used to measure energy consumed in which the whole current to be measured flows directly through the meter.

PART A: GENERAL PROVISIONS

SECTION 1

PREAMBLE

Purpose

Art 1.1. This National Electricity Distribution Metering Code, herein referred to as “the Metering Code”, sets out the minimum acceptable standards, technical and operational rules for entities involved in the procurement, installation, operation and maintenance of metering systems for the electricity distribution sector in Ghana herein referred to as “the Main Actors”.

Art 1.2. The National Electricity Distribution Metering Code is issued by Energy Commission based on the under listed provisions that work together to ensure fair, transparent, non-discriminatory, safe, reliable, secure, cost-efficient, accurate accounting and billing of electrical energy.

(a) Sections 26 – Licence for Distribution and Sale of Electricity and Natural Gas

(b) Sections 27 – Standards of Performance for Public Utilities

(c) Sections 28 - Technical and Operational Rules of practice and

(d) Section 56(1)(a)(v) - Protection of Life and Property and General Safety

Art 1.3. The Metering Code

(a) specifies the technical and operational rules, including the procedures to be complied with by Distribution Licensees and other Main Actors in discharging their obligations for the provision of metering systems and services;

(b) sets out standards for metering systems of Distribution Licensees at the points of connection to the operational areas or zones, customers' connection points and connection points to customer-generators, managed by a meter accuracy, safety, energy consumption, data exchange, and symbols; and

(c) defines the roles and responsibilities of the Main Actors in the provision of metering systems and services.

Structure of The Metering Code

Art 1.4. The Metering Code comprises the following parts:

- (a) Part A covers General provisions, which states the purpose, structure, compliance, transition, and responsibilities of Main Actors;
- (b) Part B defines minimum technical requirements and establishes the general specifications for consumer and energy accounting and audit metering systems;
- (c) Part C provides for the metering service requirements and covers certification of metering systems, installation, inspection, operation and maintenance;
- (d) Part D covers metering data services and data management and security systems; and
- (e) Part E provides for miscellaneous matters covering the Metering Code review, reporting, and mechanism for dispute resolutions.

SECTION 2

APPLICATION AND KEY PRINCIPLES OF METERING CODE

Application

- Art 2.1 Unless otherwise stated in a regulation, rule, license, or code issued under the Energy Commission Act, 1997 (Act 541), the conditions apply to metering systems-related transactions and interactions amongst the Main Actors.
- Art 2.2 Nothing in this Metering Code precludes the application of evolving technologies and processes as they become available.
- Art 2.3 The minimum standards prescribed in the Metering Code are not conclusive; in all cases, the latest edition, including amendments, shall apply

Key Principles

The key principles embodied in this Metering Code are:

- Art 2.4 The Distribution Licensee is responsible for providing a metering system to every customer in the designated area of supply and shall own the metering systems.
- Art 2.5 Each connection point for a customer must have a metering system.
- Art 2.6 Metering systems must be secure, safe, and easily accessible by the Distribution Licensee.
- Art 2.7 The Retail Sale Licensee shall operate the metering system for billing purposes.

SECTION 3**COMPLIANCE AND TRANSITIONAL PROVISIONS****Compliance**

Art 3.1 The Distribution Licensee shall ensure that all metering systems are certified by the Standards Authority (SA) or a designated entity authorised by the Commission in consultation with Public Utilities Regulatory Commission (PURC).

Transitional Provisions

Art 3.2 All metering systems that are in operation within the distribution network before the coming into force of this Metering Code, despite its non-compliance or deficiency, shall be accepted and operated as part of the distribution network for not more than sixty months.

Art 3.3 During the period, the Distribution Licensee shall capture all non-compliant metering systems under Art 3.2 in a “Non-Compliance List” within twelve months of the coming into force of this Metering Code and make provision for their replacement on or before the expiration of the sixty-month transitional period.

Art 3.4 Each metering system not included in the “Non-Compliance Listing” shall be deemed to be fully compliant.

Art 3.5 A Non-compliance List shall contain the following:

- (a) the date of the Code publication against which the non-compliance applies;
- (b) identification of the metering system, which shall comprise the manufacturer of the meter, model number, serial number, and location identity; and
- (c) the date the metering system is to be replaced.

SECTION 4

RESPONSIBILITIES OF DISTRIBUTION LICENSEE AND A CUSTOMER

Responsibility of a Distribution Licensee

- Art 4.1 The Distribution Licensee shall ensure that its metering system meets the general technical requirements specified in the standards listed in Schedules D, E, and F.
- Art 4.2 The Distribution Licensee shall ensure that each metering system installed in its Distribution System is certified, in working condition, and tested for accuracy by the SA or an accredited test facility recognised by the SA.
- Art 4.3 The Distribution Licensee shall, within six months of the coming into force of this Metering Code, develop Operation and Maintenance procedures for all metering systems registered by the Distribution Licensee in accordance with the specification of the manufacturer.
- Art 4.4 The Distribution Licensee shall retrieve and process data from each metering system, other than a metering system with a prepayment facility, installed on its distribution system for billing and settlement.
- Art 4.5 The Distribution Licensee shall ensure that the metering system meets the calibration, testing, and commissioning requirements specified in Schedule A.
- Art 4.6 The Distribution Licensee shall ensure that all outdoor meters are installed in a protective casing in accordance with GSIEC 60529 (IP 54) and with a transparent front part for easy viewing.
- Art 4.7 The Distribution Licensee shall ensure that all metering systems are properly sealed to prevent tampering and accidental contact.
- Art 4.8 The Distribution Licensee shall, where applicable, make provision for online or remote vending or any third-party system for electricity sale.
- Art 4.9 The Distribution Licensee shall ensure that any metering system installed is issued with an installation certificate that includes the information in Schedule C (1.2.4).

Art 4.10 The Distribution Licensee shall ensure that all metering systems are maintained in accordance with the manufacturer's specifications.

Art 4.11 The responsibilities of the distribution licensee under this section should be read in conjunction with other responsibilities of the Distribution Licensee in other sections of this code.

Responsibilities of a Customer

Art 4.12 The customers shall make available the required space for the metering system.

Art 4.13 The customer is responsible for the safety of the metering system installed on the premises of the customer.

Art 4.14 The customer shall ensure that a certified electrical wiring professional executes any wiring installation in accordance with Electrical Wiring Regulation 2011, LI 2008.

Art 4.15 The customer shall permit the Distribution Licensee access to premises at any reasonable time to install a metering system.

Art 4.16 Where the customer opts to provide a Check Metering System, the customer shall procure the Check Metering System in accordance with the specification of the Distribution Licensee.

**PART B:
MINIMUM TECHNICAL REQUIREMENTS**

SECTION 5

GENERAL SPECIFICATIONS

- Art 5.1 A metering system shall generally have a minimum service life of ten years without maintenance.
- Art 5.2 The maximum service life of a metering system with maintenance shall be as specified by the manufacturer of the metering system, but in any case, for not more than twenty years unless otherwise authorised by the Commission.
- Art 5.3 A metering system shall be contained in a suitable casing with the necessary pre-wiring and shall be provided by the Distribution Licensee.
- Art 5.4 A whole current meter in a metering system shall be capable of recording active energy (kWh) and shall be of an accuracy class of 2.0 or better.
- Art 5.5 An instrument transformer or CT/PT operated meter in a metering system shall be capable of recording active energy, reactive energy, and maximum demand (KVA) where the applicable tariff exists.
- Art 5.6 The accuracy class of a meter in a
- (a) Low voltage CT metering system shall be 2.0 or better;
 - (b) Medium Voltage (11kV) CT/PT operated metering system shall be 1.0 or better;
 - (c) High Voltage (33kV) CT/PT operated metering system shall be 0.5S or better;
- Art 5.7 Despite Art 5.6 (c), the Distribution Licensee shall install a metering system with meters of an accuracy class of 0.2s or better for all loads of 5MVA and above.
- Art 5.8 The prescribed limits of accuracy for the following classes of meters shall be as follows:
- (a) $\pm 0.5\%$ for class 0.2S static watt-hour meters;
 - (b) $\pm 1.0\%$ for class 0.5S static watt-hour meters;
 - (c) $\pm 1.3\%$ for class 0.5S watt-hour meters;
 - (d) $\pm 1.5\%$ for class 1.0 S watt-hour meters; and
 - (e) $\pm 2.5\%$ for class 2.0S watt-hour meters.
- Art 5.9 The Distribution Licensee shall ensure that the metering system is secured using a device or method that, to the standard of good electricity industry practice, hinders unauthorised access to the metering installation and enables unauthorised access to be detected.

SECTION 6

TYPES OF METERS

Consumer Meter

- Art 6.1 A consumer meter in a metering system is classified as either an accumulation or an interval meter.
- Art 6.2 A consumer meter shall comply with Section 5 and shall meet relevant accuracy, safety, and energy consumption standards set out in Schedule D.
- Art 6.3 In addition to Art 6.2 an Interval meter shall meet the relevant minimum data exchange standards set out in Schedule E.

Energy Auditing and Accounting Meter

- Art 6.4 The Distribution Licensee may install an energy auditing and accounting metering system at particular locations to facilitate the accounting of the energy distributed, consumed, and lost in the various segments of the power system.
- Art 6.5 An energy auditing and accounting metering system shall comply with Section 5 and shall meet the relevant standards set out in Schedules D and E.
- Art 6.6 An energy auditing and accounting metering system shall comply with IEC 61557-12, which specifies the requirement for metering and monitoring devices that measure and monitor electrical quantities within the distribution system.
- Art 6.7 Where relevant, an energy auditing and accounting meter shall comply with Art 5.7.

SECTION 7

SPECIAL FUNCTIONS AND FEATURES OF METERING SYSTEMS

Special Function Metering System

- Art 7.1 The Distribution Licensee shall use a bi-directional meter for a customer who applies for and qualifies to be a customer-generator.
- Art 7.2 The Distribution Licensee may, with the prior approval of the PURC and in consultation with the Commission, install a metering system with special functions such as time of use and prepayment metering system for a customer within its concession.
- Art 7.3 The metering system referred to in Art 7.2 shall comply with the relevant tariff of the PURC.
- Art 7.4 Where tariffs for the sale of electricity to a customer are based on different rates according to the time of day, the Distribution Licensee shall install a meter that:
- (a) includes a clock in compliance with IEC 1038, or
 - (b) includes a time switch with tolerance timekeeping of +/- 30 minutes for multiple-rate induction type meters.
- Art 7.5 The meter in a metering system with special functions shall have the requirements specified in Section 5 and meet the relevant minimum acceptable standards set out in Schedules D and E.

Provision of Additional Features or Equipment to Standard Metering System

- Art 7.6 The Distribution Licensee shall, at the request of a customer, arrange to install a metering system with additional features to those specified in this Metering Code, provided that the customer concerned agrees to pay the full cost of the additional features or equipment, including the costs for installation, operation, maintenance, repairs, and replacement.
- Art 7.7 The additional features or equipment shall be compatible with the rest of the metering system and shall not lead to any degradation of the capability of the metering system that would cause the metering system to fail to meet relevant standards contained in this Metering Code.

Art 7.8 The additional features shall not impede the performance of the entire distribution system.

Anti-Tampering Features of a Metering System

Art 7.9 The meter in a metering system shall have the capacity to register energy even when the return path of the load current is not terminated back at the meter, and in such a case, the circuit shall be completed through the earth, but in the case of metallic bodies, the earth terminal shall be brought out and provided on the outside of the case.

Art 7.10 A Single-phase metering system shall not get damaged or rendered non-functional even if any phase or neutral are interchanged.

Art 7.11 The registration under Art 7.9 must occur whether input phase or neutral wires are connected properly or are interchanged at the input terminals.

Art 7.12 The metering system shall work correctly irrespective of the phase sequence of supply only for three-phase systems.

Art 7.13 Where a whole current meter or an LV CT-operated meter is installed, the meter shall record energy correctly even if input and output terminals are interchanged.

Art 7.14 The meter shall have the capacity to record occurrences of a missing potential only for PT operated meters and its restoration with the date and time of the first occurrence and last restoration along with the total number and duration of such occurrences during the period for all phases.

Art 7.15 Additional anti-tampering features, including logging of tampers such as current circuit reversal, current circuit short or open, and the presence of an abnormal magnetic field, may be provided by the manufacturer.

**PART C:
METERING SERVICES REQUIREMENTS**

SECTION 8

CERTIFICATION OF A METERING SYSTEM

Certification of a New Metering System

- Art 8.1 The meter type intended to be used in a metering system shall be certified after the conduct of an appropriate type test by the SA or any other meter test station approved by the SA to perform the type test.
- Art 8.2 The approving body shall confirm the specific characteristics and prove that the metering system complies with the requirements of the relevant standards set out in Schedule D and the accuracy class set out in Section 5.
- Art 8.3 Certification of a metering system shall be confirmed by the attachment of a seal or certification sticker for the individual components of the metering system.
- Art 8.4 The certification of a metering system shall be valid as long as the certifications of all metering system components remain valid.
- Art 8.5 The Distribution Licensee shall keep and maintain a register of every certified metering system.
- Art 8.6 The Register of certified metering systems shall be available for inspection by the Commission, PURC, SA, or any other person authorised by the Commission.
- Art 8.7 The certification of a metering system issued by a manufacturer or an authorised meter test station shall be issued for a predefined period, which shall:
- (a) not exceed twenty years, and
 - (b) clearly indicate the minimum required calibration tests and the required frequency to maintain the validity of the metering system.
- Art 8.8 The Distribution Licensee shall retain test certificates whilst the metering system is in use.
- Art 8.9 Where a metering system is no longer in use, the relevant test certificate shall be retained for at least five years after the metering system has been decommissioned and rendered obsolete or non-compliant.

- Art 8.10 The Distribution Licensee shall submit copies of test certificates upon request by the Commission.
- Art 8.11 On request by the Commission, customers, or persons authorised by the Commission, the Distribution Licensee shall provide a copy of the relevant test certificate to the Commission, customer, or such person authorised by the Commission.
- Art 8.12 The SA and the Distribution Licensee shall keep and maintain a register of authorised meter test stations, accredited to perform:
- (a) Type Tests certification;
 - (b) Routine Tests certification;
 - (c) Calibration Test certifications; or
 - (d) Endorsement of manufacturer's certifications (pattern approval).
- Art 8.13 The Distribution Licensee shall, in consultation with the SA, establish procedures to be applied and tests to be conducted to:
- (a) Issue a Type Test certification;
 - (b) Issue a Routine Test certification;
 - (c) Issue a Calibration Test certification; or
 - (d) Endorse a manufacturer's certification (pattern approval).
- Art 8.14 The procedures shall specify a predefined percentage of meters that shall comply with more stringent accuracy in cases of sampling testing of more than one meter.
- Art 8.15 Calibration reports shall be required as part of the input to certification reports for metering systems, which shall demonstrate that the overall accuracy requirements set out in this Metering Code are met.

Verification of Certification of a New Metering System

- Art 8.16 The Distribution Licensee shall conduct a verification test on twenty percent of each batch of meters.
- Art 8.17 The Distribution Licensee shall reject the entire batch if two percent of the twenty percent sampled fail the test.
- Art 8.18 Where any of the meters referred to in Art 8.17 representing less than two percent of the twenty percent sampled meters fail the test, the Distribution Licensee shall ensure the manufacturer replaces the failed meters.

Certification of an Existing Metering System

- Art 8.19 A metering system that is already installed in the distribution system before the coming into force of this Metering Code shall be considered certified if the installed metering system has undergone calibration or verification tests that are considered compatible with the provisions of this Metering Code.
- Art 8.20 The certification period shall be determined by the additional period that the certification will remain valid.
- Art 8.21 A metering system that is not in compliance with Art 8.19 shall be considered uncertified.
- Art 8.22 The Distribution Licensees shall ensure that uncertified metering systems are replaced within the transitional period of sixty months referred to in Art 3.2.

Re-certification

- Art 8.23 Before the expiration of the test certificate issued for a metering system or any component of a metering system, the metering system shall require re-certification by an authorised meter test station accredited to perform calibration tests certifications.
- Art 8.24 The expiration of a component of a metering system certified independently shall only require a re-certification of the expired component unless the certification covers the entire system of components.
- Art 8.25 The component Art 8.24 shall be recertified by way of removal, testing manually, or online, or replacement, as appropriate.
- Art 8.26 If any part of the wiring of a metering system is modified, or if additional components are connected to the metering system other than testing or monitoring equipment temporarily connected by the test block, the certification of the metering system shall be deemed to be invalid until the tests and checks prescribed by this Metering Code have been satisfactorily carried out by an authorised meter test station.
- Art 8.27 The Distribution Licensee shall ensure that every metering system is certified and verified in the case of a new meter and, upon expiry, recertified if it is an existing meter.

SECTION 9

CERTIFICATION OF A METERING SYSTEM INSTALLATION AND REPAIR

Certification of Metering System Installation

- Art 9.1 A metering system installation shall be deemed certified if the requirements in Art 9.5 and Art 9.6 are met and Art 3.2 is complied with.
- Art 9.2 Meters in metering systems shall, where required, be mounted on a meter board by authorised staff of the Distribution Licensee.
- Art 9.3 All service lines to the meter board shall be laid exposed.
- Art 9.4 All meters shall be installed at appropriate locations to avoid damage.
- Art 9.5 The entire metering system shall be provided with the appropriate earth protection systems in accordance with the Electrical Wiring Regulations 2011, LI 2008.
- Art 9.6 Earth protection devices shall be installed where the earth loop impedance is above the value specified in the Electrical Wiring Regulations, 2011, LI 2008.
- Art 9.7 To avoid any error in connections by a staff of the Distribution Licensee, a standard wiring diagram shall be indelibly printed inside the terminal cover plate of all meters.
- Art 9.8 Metering panels in a multi-story building shall:
- (a) only be located on the ground floor and
 - (b) be easily accessible by the staff of the Distribution Licensee.
- Art 9.9 A multi-story building shall
- (a) have a separate metering cubicle for the building as a whole and, where necessary, for individual customers, and
 - (b) be sealed separately.

Faulty Metering Systems

- Art 9.10 If an installed meter that has been certified in accordance with this Metering Code subsequently records error margins as indicated in Art 5.8, the meter shall be deemed to be faulty.
- Art 9.11 The Distribution Licensee shall repair or replace the metering system referred to in Art 9.10 in accordance with Electricity Supply and Distribution (Standards of Performance) Regulations, 2008, LI 1935.
- Art 9.12 The procedure for assessment of consumption in case of a metering system referred to in Art 9.10, and the resolution of disputes in respect of a customer shall be governed by procedures specified by the PURC in consultation with the Commission.
- Art 9.13 The Distribution Licensee shall ensure that relevant data is obtained or estimated for the period when a component of the metering system becomes faulty until the completion of the repair or replacement in accordance with Electricity Supply and Distribution (Standards of Performance), Regulations, 2008, LI 1935.
- Art 9.14 The Distribution Licensee shall record details of the relevant components of a metering system that require replacement.
- Art 9.15 A Metering system that is repaired or replaced shall require re-certification.

Repair or Replacement of Faulty Meters

- Art 9.16 Where a test conducted in accordance with this Metering Code demonstrates that a metering system is faulty, the Distribution Licensee shall repair the metering system.
- Art 9.17 Where the metering system referred to in Art 9.16 requires to be replaced, it shall be done in accordance with Electricity Supply and Distribution (Standards of Performance) Regulation 2008, LI 1935.
- Art 9.18 The Distribution Licensee shall maintain an inventory of spare meters in sufficient quantity to replace faulty meters.

SECTION 10**INSPECTION, TESTING AND CALIBRATION OF A METERING SYSTEM****Installed Meter Testing**

- Art 10.1 The Distribution Licensee shall take the initiative to conduct tests on a metering system or at the request of a customer.
- Art 10.2 In the event of any request for testing of the metering system by a customer, the metering system shall be tested in accordance with the operating and maintenance procedures developed by the Distribution Licensee.
- Art 10.3 Where it is established that the overall accuracy is within limits specified in this Metering Code or malfunction caused by the customer, the customer shall pay for the cost of the test requested in Art 10.2.
- Art 10.4 Where it is established that the overall accuracy is not within limits specified in this Metering Code or malfunction is caused as a result of activities of the Distribution Licensee, the Distribution Licensee shall take steps to compensate the customer in accordance with procedures approved by the PURC.
- Art 10.5 An authorised officer of the Distribution Licensee may use a portable or handheld test set to test a metering system.
- Art 10.6 The Distribution Licensee shall maintain records of a test for five years.

Inspection and Periodic Tests

- Art 10.7 The Distribution Licensee shall ensure that each metering system is inspected and calibrated according to the frequencies specified in Schedule B.
- Art 10.8 The Distribution Licensee may carry out a periodic, random, and unannounced inspection or testing of any metering system and associated data to ascertain whether the metering system complies with the requirements of this Metering Code.
- Art 10.9 The Distribution Licensee shall, within fifteen days, make the results of any inspection or test conducted under this paragraph available to any requesting party.

SECTION 11

SECURITY OF A METERING SYSTEM

Records of Seals and Applications

- Art 11.1 The Distribution Licensee shall maintain a register or record of all seals and the authorised persons to whom these are issued.
- Art 11.2 The Distribution Licensee shall maintain the security of the metering data stored in or obtained from each metering system so far as is practicable.
- Art 11.3 An appropriate seal shall be applied to every essential component of the metering system installed at the premises of a customer, and the seal shall be replaced following works requiring the removal of any seal per the procedures of the Distribution Licensee for the control of the seal.
- Art 11.4 Security of a seal shall remain the responsibility of the customer where the metering system is installed within the premises of the customer.
- Art 11.5 Security of a seal shall remain the responsibility of the Distribution Licensee where the metering system is installed outside the premises of the customer.
- Art 11.6 A customer has the right to limit access to the meter or the metering system to any officer of a Distribution Licensee unless the officer from the Distribution Licensee is appropriately identified by showing an identification card.
- Art 11.7 The procedure for sealing a meter shall be as set out in Schedule C.

SECTION 12

INTEROPERABILITY (PREPAID)

Ease of Access to Electricity Credit Vending Stations

- Art 12.1 Regardless of the geographical location, a customer shall be able to purchase credits or units and recharge when it a prepaid meter.
- Art 12.2 The Distribution Licensee shall ensure that the vending system and the various meters from different manufacturers enable functionality that allows information about the purchase and sale of electricity to be exchanged when necessary.
- Art 12.3 The Distribution Licensee shall ensure that the personal data of customers are secured, safeguarded, and protected.
- Art 12.4 The vending system shall be capable of creating and storing links between data in different geographical zone information systems to detect multiple identities, with the dual purpose of facilitating identity checks and combating identity fraud.

**PART D:
METERING DATA SERVICES**

SECTION 13

METER DATA MANAGEMENT AND SECURITY SYSTEM

Meter Data Management

Art 13.1 The Distribution Licensee shall maintain historical metering data for each customer in a metering database for twelve months, in an accessible format and for five years, in an archive.

Art 13.2 Where a meter has been installed for a bulk customer or a customer-generator by a Distribution Licensee, the Distribution Licensee shall keep a metering database of the meter readings for the Bulk Customer or Customer-generator for:

- (a) twenty-four months in an accessible format; and
- (b) five years in an archive.

Data Security

Art 13.3 The Distribution Licensee shall use reasonable endeavours to maintain the security and confidentiality of the metering data against unauthorised access, use, and loss of information.

Art 13.4 The Distribution Licensee shall

- (a) develop and implement a backup strategy for the information system equipment; and
- (b) implement cybersecurity protocols, including anti-virus and firewall protection systems.

Remote Metering Equipment

Art 13.5 The Distribution Licensee may install a metering system with special functions such as AMR.

Art 13.6 The Distribution Licensee shall ensure that the data communication protocols of the relevant metering system meet the minimum acceptable standards as set out in Schedule E.

Art 13.7 Where the Distribution Licensee installs a metering system with remote reading capability, the Distribution Licensee shall specify the type of equipment to be used for communication with the metering system.

Main Actors with Right of Access

Art 13.8 The following persons are entitled to access metering data from a metering system:

- (i) the Distribution Licensee who is responsible for the supply and installation of the metering system;
- (ii) the Transmission Licensee if such data is required for system planning purposes;
- (iii) the customer of the Distribution Licensee, including the Customer-generator of electricity;
- (iv) the Retail Sale Licensee or any other person who currently has an agreement to supply electricity to the Customers associated with the metering system.
- (v) the Commission and the PURC if such information is required for an investigation or planning purpose; and
- (vi) any other person authorised by a law enforcement body for the reason of investigation or similar purpose.

Art 13.9 In relation to subparagraph (iv) of Art 13.8, the person must present written authorisation from the customer to the Distribution Licensee before the data is provided.

**PART E:
MISCELLANEOUS PROVISIONS**

SECTION 14

METERING CODE REVIEW AND REPORTING

Submission of Proposal for Review

- Art 14.1 A proposal for the revision of this Metering Code may be made by any entity bound by this Metering Code.
- Art 14.2 A proposal for the revision of this Metering Code shall be submitted in writing to the Commission.
- Art 14.3 The Commission shall receive and acknowledge every submission.
- Art 14.4 Despite Art 14.1, the Commission may initiate the review of the Metering Code when necessary.

Process of Review

- Art 14.5 The Commission shall notify all main actors bound by this Metering Code upon receipt of any proposed request to review this Metering Code.
- Art 14.6 The Commission shall consider every proposal made for the review of the Metering Code at any time when the Commission commences a review.
- Art 14.7 The Standards referred to in this Metering Code may be updated, amended, replaced, repealed, consolidated, or otherwise reviewed from time to time.

Requirement for Reports

- Art 14.8 The Distribution Licensee and the Retail Sale Licensee shall report on the activities and operations related to the metering system in their jurisdiction in accordance with licences issued by the Commission.
- Art 14.9 The Commission shall determine the procedure for reporting.

SECTION 15

SANCTION AND MECHANISM FOR DISPUTE RESOLUTION

Sanction

- Art 15.1 Where a Distribution Licensee breaches this Metering Code, the Distribution Licensee shall remedy the breach as soon as practicable.
- Art 15.2 The inability or unwillingness of a Distribution Licensee to comply with the relevant minimum acceptable standards shall constitute a breach of the Metering Code for which sanctions may be applied.
- Art 15.3 Where a Distribution Licensee has not informed the Commission of the inability to comply with any provision of this Metering Code, but the Commission concludes that the Distribution Licensee is not in compliance, the Distribution Licensee shall be deemed to have breached the Metering Code, and the prescribed sanctions may apply.

Mechanism for Dispute Resolution

- Art 15.4 Any dispute relating to metering with a customer or a Distribution Licensee shall be settled in accordance with Dispute Resolution Procedures provided in the National Electricity Distribution Code.
- Art 15.5 The National Electricity Grid Code dispute resolution procedures shall govern any dispute relating to metering at the Transmission-Distribution inter-face point.
- Art 15.6 In the case of an unresolved dispute, the matter shall be referred to the Commission.

SCHEDULES TO THE METERING CODE

SCHEDULE A:

COMMISSIONING TESTS

1.1 General

This section sets out relevant tests and checks to be included in the metering system commissioning program.

1.2 Instrument Transformers

1.2.1 For all installations with new or replaced instrument transformers, the Distribution Licensee or retail utility or customer shall ensure that after site or factory tests and inspections, the following are confirmed and recorded:

- (a) details of the installed units, including serial numbers, rating, and accuracy classes.
- (b) CT ratio and polarity for selected tap; and
- (c) PT ratio and phasing for each winding.

1.2.2 For installations with existing instrument transformers, the Distribution Licensee or retail utility or customer shall ensure that where practical, items set out in subparagraphs (a), (b), and (c) of paragraph 1.2.1 are implemented but must confirm and record PT and CT ratios, and where it is not possible to confirm, the CT ratio on-site must be recorded in the commissioning record and details must be obtained from any other relevant party.

1.3 Instrument Transformers Leads and Burdens

For all installations, the Distribution Licensee or customer shall, wherever practical:

- (a) confirm that the PT and CT connections are correct;
- (b) confirm that the PT and CT burden ratings are not exceeded; and
- (c) determine and record the value of any burdens, including any non-commercial metering burdens necessary to provide evidence of the overall metering accuracy.

1.4 Metering

General Tests and Checks

1.4.1 The following tests and checks may be performed on-site, at a factory, meter test station, or laboratory:

- (a) record the metering system details required by the Data Collection System;

- (b) confirm that the PT or CT ratios applied to the meter agree with the site instrument transformer ratios;
- (c) confirm the correct operation of meter test terminal blocks where the blocks are fitted;
- (d) check that all cabling and wiring of the new or modified installation is correct and clearly marked and or colour-coded;
- (e) confirm that meter registers (and that output pulses are produced for meters which are linked to separate outstations) for import and, where appropriate, export flow directions;
- (f) confirm meter operation separately for each phase current and normal polyphase current operation;
- (g) where separate outstations are used, confirm the meter of the outstation channel allocations and that the meter units per pulse values or equivalent data are correct; and
- (h) confirm that the local interrogation facility (Meter or outstation) and local display operate correctly.

Site Checks and Tests

1.4.2 The following checks and tests shall be performed on-site:

- (a) check site cabling and wiring, connections not previously checked under paragraph 1.4.1 of this Schedule;
- (b) confirm that the meter clock is set to Greenwich Meantime (GMT);
- (c) check that the voltage and the phase rotation of the measurement supply at the meter terminals are correct;
- (d) record meter start readings;
- (e) where practicable, a primary prevailing load test or, where necessary, a primary injection test shall be performed to confirm that the meter is registering the correct primary energy values and that the overall installation and operation of the metering system are correct;
- (f) where for practical or safety reasons, the previously mentioned site test under subparagraph (e) is not possible, the reason shall be recorded on the commissioning record, and a secondary prevailing load or injection test shall be performed to confirm that the meter registration is correct, including, where applicable, any Meter PT or CT ratios and in such cases the PT or CT ratios shall have been determined separately as detailed;
- (g) record the values of the meter displayed or stored data (at a minimum one complete half-hour value with the associated date and time of the reading) on the commissioning record; and
- (h) confirm the operation of metering system alarms (not data alarm or flags in the transmitted data).

SCHEDULE B:

PERIODIC INSPECTION AND CALIBRATION

The purpose of this section is to describe the frequency of inspection, testing, and calibrations of a metering system:

Table: 1 Frequency of Inspection

Type of Metering System	Frequency
Medium and High Voltage	Once every year
Low Voltage (Industrial Customers)	Once every two years

Table: 2 Frequency of Testing and Calibration

Type of Metering System	Frequency
Medium and High Voltage	
Connection Capacity above 10 MW	At least every four years.
Connection Capacity below 10 MW	At least every eight years
Low Voltage (Industrial Customers)	At least every ten years

SCHEDULE C:

SEALING PROCEDURES

1.1 Sealing Procedure at the Meter Test Laboratory

- 1.1.1 Every meter cover shall be sealed after certification at the laboratory by the Meter Test Officer. For a maximum demand (MD) meter, the meter terminal covers and reset pushbutton shall also be sealed.
- 1.1.2 The meter test station shall keep records of the seals fixed on meters certified by the Station.

1.2 Sealing Procedure at Point of Installation

- 1.2.1 Every meter terminal cover shall be sealed after installation at the premises of the customer.
- 1.2.2 In the case of MD meters, the terminal cover, test terminal block, CT terminal, PT terminals, voltage fuse holders, meter boxes, or cubicle shall be sealed by the meter installer.
- 1.2.3 The sealing procedure described in paragraphs 1.2.1 and 1.2.2 shall be witnessed by the customer or the representative of the customer.
- 1.2.4 A certificate duly signed by both the Meter Installer and the customer or the representative of the customer after installation shall include the following information:
 - (a) Seal serial number,
 - (b) Date of sealing
 - (c) Meter serial number
 - (d) Location, address or Ghana Post Code
 - (e) Meter Manufacturer and model number
 - (f) Name and signatures of Meter Installer
 - (g) Name and signature of the customer or the representative of the customer.

1.3 Sealing Procedure at Point of Maintenance, Recalibration, Inspecting, and Site Testing of Meters

- 1.3.1 For any of the purposes under paragraph 1.1 or 1.2, breaking of seals shall be done in the presence of the customer or the representative of the customer.
- 1.3.2 All the sealable points where seals were broken in paragraph 1.3.1 shall be resealed in the presence of the customer or the representative of the customer, and an updated seal certificate issued.
- 1.4 Seals Specifications

The seal

Type - Compressible or non-compressible type

Material - Plastic or lead with embossed serial number

Temperature Range - To withstand operating temperatures of up to 70°C

Colour - To be of any colour

Wire Dimension - Not more than 2.5mm² cross-sectional area.

Average Break Strength - Reasonably large break strength

SCHEDULE D

GENERAL METER SPECIFICATIONS

The following specification applies to all meters (Paragraph 7.2.2)

Description	Required Standards	Title	Purpose and application
Acceptance Inspection	GSIEC 62058-11	Electricity metering equipment (AC) - Acceptance inspection - Part 11: General acceptance inspection methods	This standard specifies the general acceptance inspection methods which apply to newly manufactured electricity meters produced and supplied in lots of 50 and above. It describes general inspections, Lot-by-lot inspection by attributes, isolated lot inspection, skip-lot inspection, and Lot-by-lot inspection by variables.
	GSIEC 62058-21	Electricity metering equipment (AC) - Acceptance inspection - Part 21: Particular requirements for electromechanical meters for active energy (classes 0,5, 1 and 2)	This standard specifies particular requirements for acceptance inspection of newly manufactured direct connected or transformer operated electromechanical meters for active energy (classes 0,5, 1, and 2) delivered in lots in quantities above 50. It describes the inspection procedures of various tests to be conducted.
	GSIEC 62058-31	Electricity metering equipment (AC) - Acceptance inspection - Part 31: Particular requirements for static meters for active energy (classes 0,2 S,0,5 S, 1 and 2)	This standard specifies particular requirements for acceptance inspection of newly manufactured direct connected or transformer operated static meters for active energy (classes 0,2 S, 0,5 S, 1, and 2) delivered in lots in quantities above 50. It describes the inspection procedures of various tests to be conducted and the criteria for lot acceptance or non-acceptance and disposal of the unacceptable lot.

Accuracy	GSIEC 62052-11	Electricity metering equipment - General requirements, tests, and test conditions - Part 11: Metering equipment	<p>This standard details functional, mechanical, electrical, and marking requirements, test methods, and test conditions, including immunity to external influences covering electromagnetic and climatic environments.</p> <p>It specifies requirements and associated tests, with their appropriate conditions for Type testing of AC and DC electricity meters.</p>
	GSIEC 62053-21	Electricity metering equipment - Particular requirements - Part 21: Static meters for AC active energy (classes 0,5, 1 and 2)	<p>This standard applies to the Type Tests only of static watt-hour meters of accuracy for classes 0,5, 1, and 2 for the measurement of alternating current electrical active energy in 50 Hz or 60 Hz networks.</p>
	GSIEC 62053-22	Electricity metering equipment - Particular requirements - Part 22: Static meters for AC active energy (classes 0,1S, 0,2S and 0,5S)	<p>This standard applies to the Type Tests only of transformer operated static watt-hour meters of accuracy classes 0,1 S, 0,2 S, and 0,5 S for the measurement of alternating current electrical active energy in 50 Hz or 60 Hz networks.</p>
	GSIEC 62053-23	Electricity metering equipment - Particular requirements - Part 23: Static meters for reactive energy (classes 2 and 3)	<p>This standard applies only to Type Tests of static var-hour meters of accuracy classes 2 and 3 for the measurement of alternating current electrical reactive energy in 50 Hz or 60 Hz networks.</p>
	IEC 62053-24	Electricity metering equipment - Particular requirements - Part 24: Static meters for fundamental component reactive energy (classes 0,5S, 1S, 1, 2 and 3)	<p>This standard applies only to type tests of static var-hour meters of accuracy classes 0,5 S, 1 S, 1, 2, and 3 for the measurement of alternating current electrical reactive energy in 50 Hz or 60 Hz networks.</p>

Description	Required Standards	Title	Purpose and application
Safety	GSIEC 62052-31	Electricity metering equipment (AC) – General requirements, tests, and test conditions – Part 31: Product safety requirements and tests	<p>This standard specifies product safety requirements for equipment for electrical energy measurement and control.</p> <p>It applies to newly manufactured metering equipment designed to measure and control electrical energy on 50 Hz or 60 Hz networks with a voltage up to 600 V, where all functional elements, including add-on modules, are enclosed in or form a single.</p> <p>It also applies to metering equipment containing supply and load control switches, but only those which are electromechanical in operation and apply to the auxiliary input and output circuits.</p>
Energy Consumption	GSIEC 62053-61	Electricity metering equipment (a.c.) - Particular requirements - Part 61: Power consumption and voltage requirements	<p>This standard details the power and voltage requirements of newly manufactured “combined meters”, measuring more than one type of electric energy (e.g. active and reactive) and meters integrating additional functions related to maximum demand indicator, time switches, ripple control, or radio receivers, etc.</p>
Symbols	GSIEC 62053-52	Electricity metering equipment (AC) - Particular requirements - Part 52: Symbols	<p>This standard applies to letters and graphical symbols intended for marking and identifying the function of electromechanical or static a.c. electricity meters and their auxiliary devices.</p>
Environmental compliance	GSIEC 60068	Environmental Testing	<p>This standard details a series of environmental testing methods along with their appropriate severities and prescribes various atmospheric conditions for measurements and tests designed to assess the ability of specimens to perform under expected conditions of</p>

Equipment casing and protection	GSIEC 60529: AMD2:2019	Degrees of Protection provided by enclosures (IP Code)	transportation, storage, and all aspects of operational use. This standard establishes the classification of degrees of protection provided by enclosures for electrical equipment with a rated voltage not exceeding 72,5 kV.
Current Test	GSIEC 60947-2:2016+AMD1: 2019 CSV Consolidated version	Low-voltage switchgear and control gear - Part 2: Circuit-breakers	This standard is for the Load Current tests for circuit-breakers intended to be connected to circuits with the rated voltages which do not exceed 1 000 V a.c. or 1 500 V d.c.; It also contains additional requirements for integrally fused circuit-breakers.
Immunity Test	GSIEC 61000-4-11	Testing and measurement techniques – Voltage dips, short interruptions, and voltage variations immunity tests for equipment with input current up to 16 A per phase	This standard defines the Immunity test methods and the range of preferred test levels for electrical and electronic equipment connected to low-voltage power supply networks for voltage dips, short interruptions, and voltage variations.
	IEC 61000-4-28	Testing and measurement techniques - Variation of power frequency, immunity test for equipment with input current not exceeding 16 A per phase	This standard establishes a reference for evaluating electric and electronic equipment's immunity tests when subjected to variations of the power frequency.
	IEC 61326-1	Electrical equipment for measurement, control, and laboratory use - EMC requirements - Part 1: General requirements	This standard specifies requirements for immunity and emissions regarding electromagnetic compatibility (EMC) for electrical equipment operating from a supply or battery of less than 1000 V a.c. or 1500 V d.c. or from the circuit being measured.

SCHEDULE E

ADDITIONAL SPECIFICATIONS

Description	Required Standards	Title	Purpose
Prepayment Systems	GSIEC 62055-31	Electricity metering - Payment systems - Part 31: Particular requirements - Static payment meters for active energy (classes 1 and 2)	This standard applies to newly manufactured, static watt-hour payment meters of accuracy classes 1 and 2 for direct connection, for the measurement of alternating current electrical energy consumption of a frequency in the range 45 Hz to 65 Hz that includes a load switch for the purpose of interruption or restoration of the electricity supply to the load in accordance with the current value of the available credit maintained in the payment meter.
	GSIEC 6205-51	Electricity metering - Payment systems - Part 51: Standard transfer specification (STS) - Physical layer protocol for one-way numeric and magnetic card token carriers	This standard specifies a physical layer protocol of the standard transfer specification (STS) for transferring units of credit and other management information between a point-of-sale (POS) system and an STS-compliant electricity payment meter.
	GSIEC 62055-52	Electricity metering - Payment systems - Part 52: Standard transfer specification (STS) - Physical layer protocol for a two-way virtual token carrier for	This standard specifies a physical layer protocol of the STS for transferring units of credit and other management information between a client (typically an HHU) and a server (an STS-compliant electricity payment meter), typically over a direct local connection.

		direct local connection	
	GSIEC 62055-41	Electricity metering - Payment systems - Part 41: Standard transfer specification (STS) - Application layer protocol for one-way token carrier systems	This standard specifies the application layer protocol of the standard transfer specification (STS) used for transferring units of credit and other management information from the point of sale (POS) system to an STS-compliant payment meter in a one-way token carrier system.
Data Exchange	GSIEC 62056-21	Direct local data exchange	This standard describes hardware and protocol specifications for local meter data exchange.
	GSIEC 62056-41	Data exchange using wide area networks: Public switched telephone network (PSTN) with LINK+ protocol.	This Standard describes data exchange architecture used for communication with large industrial and commercial customers' metering equipment (aiming, in particular, at the remote reading of these meters for billing purposes)
	GSIEC 62056-46	Datalink layer using HDLC protocol	This standard specifies the data link layer for a connection-oriented, HDLC-based, asynchronous communication profile.
	GSIEC 62056-47	COSEM transport layers for IPv4 networks	This standard specifies the transport layers for COSEM communication profiles for use on IPv4 networks.
	GSIEC 62056-51	Application Layer Protocols	This standard specifies the protocols to be applied for the application layer to communicate with metering equipment.
	GSIEC 62056-52	Communication Protocols Management Distribution Line Message Specification (DLMS) Server	This standard provides all the information specific to the management DLMS Server of the protocols described in IEC 62056-31, IEC 62056-41, and IEC 62056-51.

			Companion Specification for Energy Metering (COSEM) application layer	This standard specifies the COSEM application layer in terms of structure, services, and protocols for COSEM clients and servers and defines how to use the COSEM application layer in various communication profiles.
	GSIEC 62056-53		Object Identification System (OBIS)	This standard specifies the overall structure of the identification system and the mapping of all data items to their identification codes.
	GSIEC 62056-61		Mapping between the Common Information Model message profiles (IEC 61968-9) and DLMS/COSEM (IEC 62056) data models and Protocols	This standard describes how in the utility environment, an ERP system or a third-party system can exchange information with a metering system.
	GSIEC 62056-6 9:2016		Wired and wireless M-Bus communication profiles for local and neighbourhood networks	This standard specifies DLMS/COSEM wired and wireless M-Bus communication profiles for local and neighbourhood networks. It is restricted to aspects concerning the use of communication protocols in conjunction with the COSEM data model and the DLMS/COSEM application layer.
	GSIEC 62056-7-3:2017		Local data transmission profiles for Local Networks (LN)	This standard specifies DLMS/COSEM communication profiles for transmitting metering data modelled by COSEM interface objects through a Local Data Transmission Interface (LDTI).
	IEC 62056-7-5:2016		The 3-layer, connection-oriented HDLC based communication profile	This standard specifies the DLMS/COSEM 3-layer, connection-oriented HDLC-based communication profile.
	IEC 62056-7-6:2013			

SCHEDULE F

SCHEDULE F: INSTRUMENT TRANSFORMERS

Type of Instrument Transformer	Required Standards	Title	Purpose
Current Transformers	GSIEC 61869-2	Instrument transformers - Part 2: Additional requirements for current transformers	This standard sets the requirements and specifications of newly manufactured inductive current transformers for use with electrical measuring instruments and/or electrical protective devices having rated frequencies from 15 Hz to 100 Hz It covers the provision of Type Tests, Routine tests, special tests for measurement of capacitance and dielectric dissipation factor and also internal arc fault tests.
Voltage Transformers	IEC 61869-3	Instrument transformers - Part 3: Additional requirements for inductive voltage transformers	This standard applies to new inductive voltage transformers for use with electrical measuring instruments and electrical protective devices at frequencies from 15 Hz to 100 Hz. It covers the provision of Type Tests, Routine tests, special tests for measurement of capacitance and dielectric dissipation factor and also internal arc fault tests.
Combined Transformers	IEC 61869-4:2013	Instrument transformers - Part 4: Additional requirements for combined transformers	This standard sets the requirements and specifications of newly manufactured combined transformers for use with electrical measuring instruments and electrical protective devices at frequencies from 15 Hz to 100 Hz. It covers the provision of Type Tests, Routine tests, special tests for measurement of capacitance and dielectric dissipation factor and also internal arc fault tests.

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