



METERING CODE

PO-KO-006

ver. 1.3

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METERING CODE

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1 Preface

1.1.1.1 The **metering code** sets out the minimum technical requirements for installing and using a commercial metering system with the purpose of enabling the electricity trading. It is one of the technical codes that is designed to provide a similar level access non-discriminatory and transparent to all parties that operate in competitive electricity market as well as associated services.

1.1.1.2 The metering system at the transmission network borders is installed, operated and managed in accordance with the Metering Code. The metering code establishes clear rules for the installation and use of metering system to ensure that production, transmission and consumption data is available to support the efficient settlement of electricity transactions.

1.1.1.3 Pursuant to the Law on Electricity, the Metering Code is developed by the **Transmission System Operator** and approved by the **Regulator**. When developing and changing the Metering Code, the **Transmission System Operator** is obliged to notify all stakeholders that changes have been proposed. Upon approval, the Metering Code is published on the KOSTT website.

1.1.1.4 The Metering Code clearly defines the technical requirements and regulatory aspects with regard to the manner of installation, operation and management of the metering system and its relation to Electricity Market Rules in Kosovo. To enable this:

- a) Any **customer** who wishes to purchase electricity from a **supplier** should be provided with adequate **metering system** capable of measuring their energy consumption to fulfill **settlement** requirements.
- b) Any generator who wishes to be paid for the electricity injected into the Transmission System must first be equipped with an adequate metering system to measure the electricity entering the system to meet the settlement requirements.
- c) In case of any differences between the provisions of this Code and the Market Rules regarding settlement requirements within Kosovo and the regional market, Market Rules shall prevail.
- d) The **Transmission System Operator** will be required to calculate the electricity flows for which they are due to receive **network access** payments. All such calculations will be carried out within the **settlement** process.

1.1.1.5 **Metering Code** defines:

- a) Technical features of metering equipment at metering points of network users;
- b) Features of metering equipment or standards to be met by metering equipment in order to enable management of demand and measurement of electricity consumption at different time intervals; and
- c) Determination of technical standards and selection of location to install metering systems for network users.

2 Glossary and Definitions

2.1.1.1 In this **Metering Code**, the following definitions apply:



Term	Acronym	Definition
Active Energy	Wh kWh MWh	A measure of electrical energy flow, being the time integral of the product of voltage and the in-phase component of current flow across a connection point , expressed in Watthours and multiples thereof.
Connection		The interconnection of two systems .
Connection Agreement		A bilateral agreement between a TSMO and a user that details the conditions for connection to the transmission system .
Connection Point		The connection (supply) point is the physical location where the user/customer is connected to the transmission system in which the general requirements are met, as stated in the Market Rules or this Code. Such locations are fully set out in the Connection Agreements .
Current Measurement Transformer	CMT	It is a transformer used by meters and/or protective relays, in which the secondary nuclei currents are within the permissible error limits and proportional to the currents applied to terminals of primary circuits.
Data Concentrator		A device that collects electricity data, packages it into intervals, holds a minimum of 45 days of data, and is capable of being accessed electronically by the TSMO , via a communication link. This device may be a separate item of equipment, or combined with the energy measuring components within one physical device.
De-energise		To remove voltage from an electrical installation by opening the final switch or removing a cut-out fuse. De-energised, de-energisation etc shall be construed accordingly.
Distribution System		Is as defined in the Law on Electricity (a combination of electricity power lines and electricity equipment of medium and low voltage to serve the distribution of electricity).
Distribution System Operator	DSO	A natural or legal person responsible for operating, ensuring the maintenance of and, if necessary, developing the distribution system in a given area and, where applicable, its interconnections with other systems and for ensuring the long-term ability of the system to meet reasonable demands for the distribution of electricity.

Term	Acronym	Definition
Customer		Is a customer who is free to purchase electricity from the supplier of their choice as defined in the Law on Electricity
Energise		To apply voltage to an electrical installation by closing the final switch or inserting a cut-out fuse. Energised, energisation etc shall be construed accordingly.
Energy Regulatory Office	ERO	Is the independent regulatory body established by the Law on the Energy Regulator . See regulator
Force Majeure		An act or natural or social event, such as earthquakes, lightning, cyclones, floods, volcanic eruptions, fires or wars, armed conflicts, rebellion, terrorist or military acts, which prevent the licensee to comply with its obligations under the license, as well as other acts or events that are beyond the reasonable control and that did not happen as a fault of the licensee and the licensee has been unable to avoid such act or event through the exercise of will, effort, skill and his reasonable care;
Generating Unit		A single set of apparatus that generates electricity
Generation		The production of electricity.
Interval reading Meter		It is a metering device that records the amount of electricity transmitted through it at any time intervals and enables remote reading, so that it can be determined the measurement of electricity transmitted into the meter during the settlement period . This measurement is provided to the MO within the time limit set by the Market Rules .
Law on Energy		Is law nr. 05/L-081 approved by the Assembly of Kosovo.
Law on the Energy Regulator		Is law nr. 05/L-0845 approved by the Assembly of Kosovo
Law on Electricity		Is law nr. 05/L-085 approved by the Assembly of Kosovo.
Licence		An authorization issued by the Energy Regulatory Office that allows the holder to perform an activity in the energy sector for which a Licence is required according to its provisions dealing with the energy sector;

Term	Acronym	Definition
Market Operator	MO	Natural or legal person, licensed by the Energy Regulatory Office, responsible for operation and organization of the electricity market in Kosovo;
Market Rules		The norms that regulate electricity trade between market participants and relations between parties of the electricity market, Market Operator and Transmission System Operator, with the purpose of maintaining the physical balance in the market;
Measurement Transformer		The generic name for both current metering transformers (CMT) and voltage metering transformers (VMT) .
Meter		A device that measures and records the production or consumption of electricity.
Metering Code		Is this code, which has been prepared by the TSMO and approved by the Energy Regulatory Office
Metering Data		Are the readings from meters which are provided to the Market Operator from a metering system by the TSO or DSO and which can be used to determine the electricity flowed
Metering Equipment		Instruments registered in the registry of metering equipment certified in Republic of Kosovo, which are used to measure the produced, transmitted, distributed, supplied and consumed energy
Metering System		A set of metering unit treated as a single installation for the purpose of measuring (active and reactive) electricity and (active and reactive) power, reading electricity at different intervals for settlement
Ministry		Ministry of Republic of Kosovo responsible for energy sector
Network Access		An arrangement in terms of which the Network Operators agree to provide the use of their transmission system or distribution system to any market participant.
Network Access Charges		The tariff established by the System Operator and approved by the Energy Regulatory Office which is used to charge system users for their use of the network.
System Operator	SO	Means operating with the transmission system or distribution system.

Term	Acronym	Definition
Operational Codes Governance Committee	OCGC	The committee established in accordance with the provisions of the rule on governance procedures for technical/operational codes to oversee the operation of technical and operational codes.
Party		Someone who operates in the organized electricity market of Kosovo or provides services to enable the market to operate.
Reactive Energy	VARh KVARh	Is defined integral with time limit of reactive power metered in volt-ampere reactive hours or its multiples.
Remote Data Centre	RDC	The main data reading centre set up by the TSMO in order to remotely read the data measured by the meter using one or more communication links
Regulator	ERO	Is the Energy Regulatory Office (ERO), the independent agency in energy sector, established by the Law on the Energy Regulator .
Rule on resolution of complaints and disputes in energy sector		A rule on dispute settlement procedure established by Energy Regulatory Office in accordance of the Law on the energy regulator for the resolution of disputes in the energy sector.
Rule on General Conditions of Energy Supply		A rule on general conditions of energy supply issued by the Energy Regulatory Office in accordance of the Law on the energy regulator .
Rule on Governance Procedures for Technical/Operational Code		A rule on governance procedures for technical and operational codes issued by the regulator in accordance with of the Law on the energy regulator .
Settlement		Is the collective name for processes used to determine usage of the system use by each party and the financial liabilities and subsequent payments derived from this
Settlement Day		Is the working day on which the Market Operator will undertake Settlement calculations in respect of any specified Settlement Period
Settlement Period		Is a one-hour period starting at HH:00:01 where HH is any hour when the delivery of measured energy is compared to the contracted energy.
Supplier		An electricity enterprise licensed to carry out the activity of supply.

Term	Acronym	Definition
System User		A natural or legal person supplying to, or being supplied by, a transmission or distribution system
Transmission		The transport of electricity, through high voltage systems and interconnected high voltage systems, with a view to its delivery to final customers, or to the operators of distribution system, but not including supply.
Transmission System and Market Operator	TSMO	It's Transmission System and Market Operator which is responsible for the planning, development, maintenance and operation of the transmission system of electricity in Kosovo, providing an open and non-discriminatory access and organization of electricity market.
Transmission System		The system comprising a combination of high voltage lines, substations and facilities, serving the transmission of electricity.
Universal Time Co-ordinated	UTC	Has the same meaning as in the document Standard Frequency and Time Signal Emission, International Telecommunication Union (CRTF.4609ISBN92-61-05311-4)
Voltage Measurement Transformer	VMT	It is a transformer used by meters and/or protective relays, in which the voltage of secondary windings is within the permissible error limits and proportional to the voltage applied to terminals of primary circuits.
Working day	WD	Any day other than Saturdays, Sundays and the holidays normally observed in Kosovo.

3 General conditions

3.1 Terminology

3.1.1.1 In addition to special meanings contained in the Glossary and Definitions above, within this document certain words and phrases have the following meanings:

- References to the masculine shall include the feminine and references in the singular shall include references in the plural and *vice versa*,
- Where this **metering code** specifies written information or written confirmation to be given then any other suitable means of electronic transfer that enables the recipient to retain the information – such as electronic mail or FAX - fulfils this requirement,
- Except where explicitly stated otherwise all references to section shall be a reference to a section in this metering code,

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- All clock times or other references to time, shall refer to the standard time in Kosovo, which is one hour in advance of Universal Time Co-ordinated (UTC),
- Any reference to a law or regulation shall be a reference to that law or regulation applicable in Kosovo or, following the replacement of that law or regulation the new law or regulation from the date it comes into force.

3.2 Unforeseen circumstances

3.2.1 Taking actions

3.2.1.1 If circumstances arise that the provisions of this **metering code** could not reasonably have foreseen, the **TSO** shall consult promptly with all affected **parties** and the **operational codes governance committee (OCGC)** in an effort to reach agreement as to what actions, (if any) to the extent reasonably practicable in the circumstances. If agreement between the **TSO** and those parties cannot be reached in the time available, the **TSO** acting as a reasonable shall determine what actions, should be taken. The **TSO** shall notify the **parties** and the **regulator** of its decision and the reasons for it as soon as practicable.

3.2.1.2 Whenever the **TSO** takes a decision, it shall do so having regard, to the reasonable views expressed by the other parties.

3.2.1.3 After the event the **TSO** shall promptly refer all such unforeseen circumstances and any such decisions to the **operational codes governance committee** for consideration in accordance with paragraph 3.2.3.

3.2.2 Affecting the ability of parties to comply with this code

3.2.2.1 Where a **party** is unable to comply with its obligations under this code for a **force majeure** event, the party must send a writing notice to all affected **parties** and to the **Energy Regulatory Office** detailing the reasons for it being unable to meet its obligations, why it believes these reasons are a **force majeure** event and the time during of the **force majeure**.

3.2.2.2 During the period of force majeure, the party's obligations shall be suspended.

3.2.2.3 If any party believes that the declaration for **force majeure** is unreasonable, he may refer the matter to the **regulator** for review and the decision of the **regulator** shall be final. In the event that the **regulator** determines that the reasons for non compliance were not a **force majeure** event, then the obligations of the **party** claiming **force majeure** will not be considered to have been suspended.

3.2.3 Management of the metering code

3.2.3.1 The **metering code** has been prepared by the **TSMO** in accordance with its obligations under the Transmission System Operator License approved by the **Energy Regulatory Office**. It lays down the conditions that have to be met by all **parties** in the circumstances covered by this code.

3.2.3.2 Revisions to this metering code will be reviewed by the **operational codes governance committee** established in accordance with the **rule on governance procedures for technical/operational codes** approved by the **Energy Regulatory Office**. The **TSMO** shall take responsibility for incorporating any amendments that are agreed by the **OCGC** and approved by the **Energy Regulatory Office** and will issue amended versions of the code as required.

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3.3 Disputes

3.3.1 General

3.3.1.1 The provisions of this **metering code** are mandatory and are generally specific covering most of the situations that arise in the areas covered by the **metering code**. All **parties** should in the implementation of this code act at all times in good faith. The aim should be to try, as far as is possible, to ensure that disputes do not occur.

3.3.2 Disputes procedure

3.3.2.1 Disputes arising from the operation of this **metering code** shall be dealt with in accordance with the **rule on resolution of complaints and disputes in energy sector** approved by the **regulator** as a means for resolving disputes arising between parties in energy sector.

4 Introduction

4.1.1.1 This **metering code** is intended to form the basis for the commercial metering of electricity in the electricity market in Kosovo.

4.1.1.2 Accurate metering data is crucial for the **settlement** function and to ensure non discriminatory access to **Transmission System**. This **metering code** describes the rights and obligations of the **parties** with regard to the metering of electrical energy measurement to ensure that metering data can be obtained so that all market participants can have equal rights.

5 Objectives

5.1.1.1 The **metering code** describes the metering equipment required for all **connection points** between two system, between the **transmission system** and **generating units**, between the **transmission system** and customers. It defines the rights and obligations that each of the **parties** have, especially those of the **network operators**, and including those of the **Energy Regulatory Office**. It covers issues regarding the security of systems, access and the confidentiality data.

5.1.1.2 This **metering code** details the minimum standards for the measuring and recording of electricity to be used during the process selling and purchasing electricity in the electricity market – including those necessary for electricity trading inside or outside Kosovo. It sets out the provisions relating to the installation, testing, maintenance and operation of **metering systems** including the associated communication links. It defines the accuracy requirements, the parameters to be measured and the maintenance and testing requirements.

6 Scope

6.1.1.1 This **metering code** sets out the requirements of the metering equipment to be provided and the procedures to be followed to ensure reliable metering and accurate recording of electricity for **settlement** purposes within Kosovo's electricity network.

6.1.1.2 The provisions of this **metering code** shall apply to all network connections where such connections are:

- a) Connection points between the **transmission system** and the **distribution system**,

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- b) Connection points between the Transmission System of Kosovo and Interconnection Transmission Systems of neighbouring countries;
- c) Connection points (generation connections) where electricity generation enters the the TSO's network from the network of a system user;
- d) Connection points (supply connections) where the electricity supply of a user is realized through the connection point of the existing TSO user, , and
- e) Connection **points** where electricity is provided to the **DSO** network by the network of a customer receiving electricity from the **transmission system**.

6.1.1.3 The provisions of this **metering code** shall apply to all legal or natural persons who are:

- a) Holders of a licence to undertake any of the licensed activities associated with the electricity industry in Kosovo,
- b) Electricity customers, and
- c) Owners or operators of any electrical network that is connected to the **Transmission System Operator** network.

7 Responsibilities for metering systems

7.1 Installation and safety of metering equipment

7.1.1.1 As stipulated in the **Law on Electricity**, the **Transmission System Operator** determines the type, number and location of mounting metering equipment, as well as the appropriate control and communication modes. When determining the mounting location, the **Transmission System Operator** should ensure that access to the meter is made available for purposes of maintenance and reading metering equipment.

7.1.1.2 The **Transmission System Operator** installs metering equipment at connection points between the **Transmission System** and the **Distribution System**. When consumers or manufacturers require permission to choose the model and type of metering equipment, the **Transmission System Operator** should permit the installation of such equipment provided that it is specified in writing that this is done in accordance with the Metering Code.

7.1.1.3 Following commissioning of the metering system, the **system user** shall report any suspected problems with the metering equipment to the **System Operator**.

7.1.1.4 The **system user** shall ensure that the chosen location remains a suitable location for metering equipment taking particular account of the requirements for access to and the security of equipment outlined in paragraph 10.1.1.1.

7.1.1.5 Where the **system user** believes that it the location chosen by the **System Operator** is an unreasonable position for the **metering equipment** to be installed, the **system user** may refer the issue to the disputes procedure according to the **Rule on the Resolution of Complaints and Disputes in Energy Sector**.

7.1.1.6 Obligations for maintenance, control and reading of metering point:

- a) For **metering** at the boundary between **Transmission System** and **Distribution System**, **generators**, **direct customers** responsible for **metering system** is **TSO**;

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- b) Boundary between network of a consumer who receives energy from the **Transmission System** and **Distribution System** shall be corresponding connection point with corresponding system. The responsible for metering between customer and **Transmission System** is **TSO** whereas between customer and **Distribution System** is **DSO**;
- c) Where electricity is provided by consumer's network for **Distribution System**, shall be considered as connection between customers and **DSO**, therefore **DSO** shall be responsible for **metering system**, including and periodical reading for **Market Operator's** requirements in order of **settlement**.

7.1.1.7 For metering at the boundary between the electricity network of Kosovo and any other electricity network it shall be the responsibility of the **Transmission System Operator** that holds a licence approved by the **regulator** to ensure that the **metering system** meets the requirements of all relevant laws and regulations of Kosovo, including this code and the relevant interstate agreement.

7.1.1.8 In the substations and facilities that are **TSO** property, for metering of self expenses of substations/facilities of **TSO** that are supplied by **DSO** network, responsible for **metering system** is **DSO**. Accuracy level of meters shall be 0.2 or 0.5 (for active) and 0.5 or 1.0 (for reactive). It is sufficient that for these metering points to install only one meter and that the main one.

7.2 Derogations and planned upgrade of metering systems

7.2.1 General

7.2.1.1 Where **metering systems** that are currently in service and do not meet the requirements of this code and/or of other current regulations their continued use will be permitted in accordance with the following arrangements until the **metering systems** can be upgraded in a planned manner. No derogations shall be permitted for **metering systems** commissioned after the date this **metering code** is approved unless the **metering system** fails to comply with the provisions of an amendment to this **metering code** that comes into force after the date of commissioning of the **metering system**. In that case it shall be permitted to issue a derogation in respect of that amendment and any other subsequent amendment.

7.2.1.2 The principles for further use of such **metering systems** are:

- a) The **system user** shall not be damaged because the **System Operator** is not able to improve the **metering systems**.
- b) The **system user** shall have the opportunity to request the replacement of **metering systems** in accordance with the provisions of the **Law on Electricity** and the connection conditions set out in the **Rule on general conditions of electricity supply** and wait for such a replacement to take place within a reasonable time period.
- c) The **System Operator** shall expect a reasonable return on its investment in the installation of **metering system** as specified by the **regulator** in the **network** access tariff and that the **System Operator** and **system user** generally should be protected from having to pay for frequent changes to the **metering systems** installed at the premises of any one **system user**.

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7.2.2 Registration of metering systems not fully compliant

7.2.2.1 The **System Operator** shall maintain a register of all **metering systems** that are not fully compliant with the requirements of this code, other regulations and the tariff requirements of the **system user**. This register shall include details of all **metering system** deficiencies.

7.2.2.2 By 1 February in each year a report detailing all **metering system** deficiencies shall be prepared by the **System Operator** and submitted to the **market operator** who will make recommendations regarding the continuation in service of the deficient metering systems to the **Energy Regulatory Office**. The **Energy Regulatory Office** will review the report and determine whether the continued use of the **metering system** should be permitted beyond 1 February of the following year. The **regulator** shall instruct the **Market Operator** and the **System Operator** accordingly.

7.2.2.3 So that **metering systems** are brought up to the standard required by this code and other regulations in a phased manner, the **System Operator** shall establish a metering upgrade programme to ensure:

- a) In the case of **metering systems** that did not comply with the requirements of the applicable rules and regulations on the date of their first installation, that they shall meet the required standards within one year of the deficiency becoming apparent.
- b) In the case of **metering systems** that did comply with the requirements of the applicable rules and regulations on the date of their first installation, that they shall meet the required standards within the periods established in paragraph 7.2.2.4.

7.2.2.4 Where **customers** are obliged by the certificate of eligibility issued by the **Energy Regulatory Office** to install a **metering system** or **metering systems** compliant with the requirements of this code, then they must be installed within the timescale established in the certificate of eligibility issued by **Energy Regulatory Office**.

7.2.3 Upgrade periods of metering systems

7.2.3.1 All **meters** that do not meet the requirements of this code and any other existing regulations, but used to meet the requirements in force when they were first put into operation, shall be replaced by meters that meet the requirements of this code by the end of their verification period.

7.2.3.2 If, on the date when the amendments to this code are approved by the Energy Regulatory Office, the meters used to meet the requirements in force when they were first put into operation but do not meet the new requirements and their verification period has already ended shall be replaced by meters that meet the new requirements within a five-year period.

7.2.3.3 If **CMTs** or **VMTs** do not meet the requirements of this code or other regulations but did comply with the requirements in force on the date of their first commissioning and their replacement will require the replacement of a significant item of main plant, then they may continue in use until such time as the item of main plant is replaced at which point the relevant **CMTs** and **VMTs** must be replaced with equipment that their technical characteristics complies with this code.

7.2.3.4 If **CMTs** or **VMTs** do not meet the requirements of these rules or other regulations, but did comply with the requirements in force on the date of their first commissioning and their replacement will not require the replacement of a significant item of main plant, then they must be replaced by compliant metering equipment within a period not exceeding five years (from the date

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of approval of amendments of this code by the **Energy Regulatory Office**. The **System Operator** is required to agree a phased correction programme with the **Energy Regulatory Office** such that an approximately equal number of **metering systems** will become compliant by virtue of the replacement of their **CMTs** or **VMTs** in each year of the upgrade period.

7.2.4 Estimation during upgrade periods

7.2.4.1 If it is necessary to estimate the energy consumption at a **connection point** that is subject to the planned upgrade provisions of paragraphs 7.2.2.4 such estimate will be carried out in accordance with the **Market Rules**.

7.2.5 Exemptions

7.2.5.1 Where the **System Operator** is able to demonstrate in the satisfaction manner to the **Energy Regulatory Office** that a **metering system** that does not fully meet the requirements of this code but does meet

- a) the requirements of all other regulations and meets the requirements of paragraphs 8.2.3.2 and article 10,
- b) the tariff requirements of the **system user**, and
- c) is within its verification period.

then the **metering system** may remain in service without modification until the end of the verification period or until such time as significant work is undertaken on the **metering system** whichever is earlier.

8 Metering systems

8.1 Minimum metering requirements

8.1.1.1 All metering points shall have at least one interval meter that would record both the active and reactive electricity and would have a screen to display the total energy recorded.

8.1.1.2 **Interval meters** shall be installed at:

- a) **Connections points** between the **transmission system** and transmission systems of other neighbouring countries and connection points between the **Transmission System** and the **Distribution System**,
- b) **Connection points** between the **transmission systems** and **generating units**,
- c) **Connection points** between the **Transmission System** and end **customers** directly connected to the **transmission network**, and
- d) Any other point where the **Energy Regulatory Office** deems it necessary to install an **interval reading meter**.

8.1.1.3 **System users** who operate within Kosovo and who are required to be equipped with interval meters shall place such interval meters, where the reading interval is the final settlement period set forth by the Market Rules. System users trading electricity outside of Kosovo shall be equipped with interval meters in accordance with the provisions of the Market Rules and ENTSO-E Operation Handbook in order to meet the requirements of the final settlement in the regional market or in cases where such a period is not specified otherwise than a 15-minute period.

8.1.1.4 The interval meter shall measure, record and store the information on the amount of energy flow for each final settlement period and be suitable for local and remote reading. Each interval meter shall store metering data of at least 45 days for each final settlement period. This metering shall be stored in a memory which is integrated within the same box as the meter.

8.1.1.5 Each model of meters shall be approved by the Ministry by means of issuing an approval certificate in accordance with paragraph ERROR! REFERENCE SOURCE NOT FOUND.. All metering systems shall comply with the relevant technical standards specified in paragraph ERROR! REFERENCE SOURCE NOT FOUND. and meet the accuracy class requirements detailed in paragraph ERROR! REFERENCE SOURCE NOT FOUND..

8.2 Capacity and electricity measurements

8.2.1.1 The **metering equipment** installed at each connection point shall be capable of measuring, recording and storing the power and electricity measurements shown in the table below, which are required for purposes of final settlement and connection to the network.

Capacity and electricity measurements	Active Energy (lagging) kW and kWh	Active Energy (leading) kW and kWh	Reactive Energy (Lagging) kVAr and kVArh	Reactive Energy (Leading) kVAr and kVArh	Interval Reading Meter
Connections Points between the transmission system and other interconnection systems	Yes	Yes	Yes	Yes	Yes
Connections Points between transmission system and distribution system	Yes	Yes	Yes	Yes	Yes
Generating units	Yes	Yes	Yes	Yes	Yes
Connection Point of customers with capacity 1MW and above	Yes	Yes	Yes	Yes	Yes
Connection Point of customers capacity below 1MW	Yes	No	Yes *	No	Yes

* in the case of these **connection points**, the measurement and recording of kW, kVAr and kVArh is only necessary if required by the **network access** tariff appropriate to the **connection point**.

8.2.1.2 **Metering equipment** shall be installed at the **connection point** between the networks of different system operators or at the **connection point** between the network of a **System Operator** and that of a **system user**.

8.2.1.3 Where it is not practicable to install **metering equipment** at the boundary between networks as detailed in paragraph 8.2.1.2, the **metering equipment** shall be installed as close as practicable to the network border. In such cases, the correction factors agreed between the **parties** responsible for the networks of each side of the **connection point** and the **System Operator** shall be determined. If the **parties** disagree on the appropriate corrective factors, the issue shall be referred to the dispute resolution process.

8.2.1.4 Where correction factors are applied they shall, wherever possible, be applied to the meters so that the data displayed on the meter register shall reflect the obligations of the parties. Where it is not possible to apply correction factors at the meters, they may be applied to the metering data either in any data concentrator out station associated with the meter or by the **AMR. (Automatic Meter Reading)**

8.2.1.5 The main and control **meters** for measuring **active energy** shall be employed at each connection point, where electricity flows are of particular importance **settlement** process that will provide the accurate metering data.

8.2.1.6 The main and control **meters** shall be installed as shown in the table below. The following table also shows where to place **CMTs** and **VMTs** to operate both the main meter and the control meter:

Use of main and control meters	Main meter	Control meter	CMT	VMT
Connections Points between the transmission system and other interconnection system	Yes	Yes	Yes	Yes
Connection Point between transmission system and distribution systems	Yes	Yes	Yes	Yes
Generating units	Yes	Yes	Yes	Yes
Connection Point of customers with capacity 1MW and above	Yes	Yes	Yes	Yes
Connection Point of customers with capacity below 1MW	Yes	No	Yes	No

Where **CMTs** or **VMTs** are required separately, it shall be sufficient to provide **CMTs** or **VMTs** with separate cores or secondary for measurement until the primary side terminal is common.

8.2.1.7 For **VMTs** of metering systems, fuses shall be installed as close as possible to the endpoints of the secondary winding.

8.2.1.8 Where the main and control meters share the same measurement voltage and where the cable coming out from the fuses mounted at the **VMT** terminals to the meter is more than 30 meters long, the metering voltage for the main and control meters shall be protected by separate fuses and as close to the **VMT** secondary terminals as practicable.

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8.2.1.9 Where metering data collected from the main meter are not taken into account, the data collected from the control meter shall be used instead, in accordance with the provisions of the Market Rules. Where there are differences beyond the normal limits of accuracy between the values recorded by the main and control meters, the **System Operator** shall review and recommend measures to be taken in accordance with the Market Rules.

8.2.1.10 Where the **system user** disagrees with the decision of the **System Operator** following the review conducted in accordance with paragraph ERROR! REFERENCE SOURCE NOT FOUND., the system user shall then be entitled to request an expert appointed by the **Energy Regulatory Office** to consider the difference of values.

8.2.2 Technical specification of metering equipment

8.2.2.1 The **metering equipment** should be accurate within the prescribed limits for such **metering equipment** referred to or set out in this **metering code**.

8.2.2.2 All **active** energy meters should meet the requirements of IEC 60687 or IEC 61036 and the relevant parts of IEC 62053 as appropriate.

8.2.2.3 All reactive energy meters should meet the requirements of IEC 61268 and the relevant parts of IEC 62053 as appropriate.

8.2.2.4 All meters shall be labelled with a unique identifier and this information together with the technical details and specifications shall be recorded by the **System Operator**.

8.2.2.5 All **voltage measurement transformers** (VMTs) and current measurement transformers (CMTs) shall meet the requirements of the relevant parts of IEC 60044.

8.2.2.6 The total burden on the secondary winding of a **VMT** or **CMT** shall in no circumstances exceed the rated burden of that winding.

8.2.2.7 **VMT** and **CMT** secondary winding intended for metering shall be used exclusively for metering purposes. In exceptional operating cases and in emergency situations with a short period to resolve the situation, it shall be permitted to share the use of windings with other equipment provided that the requirements of sections 8.2.2.6, 8.3.1.1 and 8.3.1.2 are met and the Market Operator is notified in writing. Once a written notice of shared use has been sent, the load will not be changed on any of the **CMT** and **VMT** windings without again notifying the **Market Operator** in writing.

8.2.2.8 The metering panels with meters shall be placed in the most suitable premises within the substation building, while also adhering to the metering circuit load criteria. Due to the better conditions and the possibility of surveillance within the facility, metering panels with meters shall be installed in the Main Control Room.

8.2.3 Existing measurement transformers

8.2.3.1 Measurement transformers shall comply with the Metering Code. Where existing metering transformers installed are not fully compliant with the requirements of paragraph **ERROR! REFERENCE SOURCE NOT FOUND.**, those existing measurement transformers may continue to be used provided that they meet the requirements of paragraph ERROR! REFERENCE SOURCE NOT FOUND..

8.2.3.2 Where subsequently a significant alteration to the primary plant is carried out, new **measurement transformers** meeting the full requirements of this **metering code** shall be provided.

8.3 Metering equipment accuracy

8.3.1.1 The permissible error limits for **meters** recording **active energy** shall be:

Metering Accuracy	Current (relative to rated current)	Power Factor	Error limit allowed
Connections between the transmission system and other interconnection systems and Generating units - 100MW and above	From 10% to 120%	1	± 0.2%
	From 5% to 10%	1	± 0.2%
	From 1% to 5%	1	± 0.5%
	From 10% to 120%	0.8 lead 0.5 lag	± 0.20% ± 0.2%
Customer connection point with capacity over than 10MW	From 10% to 120%	1	± 0.2%
	From 5% to 10%	1	± 0.2%
	From 1% to 5%	1	± 0.5%
	From 10% to 120%	0.8 lead 0.5 lag	± 0.2% ± 0.2%
Customer connection point with capacity between 1MW and 10MW	From 10% to 120%	1	± 0.2%
	From 5% to 10%	1	± 0.5%
	From 10% to 120%	0.8 lead 0.5 lag	± 0.2% ± 0.2%
	From 10% to 120%	0.8 lead 0.5 lag	± 1.0% ± 1.0%
Customer connection point with capacity - below 1MW	From 20% to 120%	1	± 1.0%
	From 5% to 20%	1	± 1.0%
	From 10% to 120%	0.8 lead 0.5 lag	± 1.0% ± 1.0%
	From 10% to 120%	0.8 lead 0.5 lag	± 1.0% ± 1.0%

8.3.1.2 The permissible error limits for **metering** recording **reactive energy** shall be:

Metering Accuracy	Current (relative to rated current)	Power Factor	Error limit allowed
Connections between transmission system and other systems, and	From 10% to 120%	1	± 0.5%
	From 20% to 120%	0.9 lag	± 1.0%

Metering Accuracy	Current (relative to rated current)	Power Factor	Error limit allowed
Generating units with capacity 100MW and above , and Customer connection point with capacity 1MW and above		0.9 lead	± 1.0%
		0.9 lead	± 1.0%
Customer connection point with capacity below 1MW	From 20% to 100%	1	± 1.0%
		0.9 lag	± 2.0%
		0.9 lead	± 2.0%

8.3.2 Metering equipment accuracy class

8.3.2.1 The accuracy class for **metering equipment** shall be:

Metering Equipment Accuracy	Meter		Measurement transformer	
	Active	Reactive	CMT	VMT
Connections point between the transmission system and other interconnection systems, and Generating units – with capacity 100 MW and above	0.2S	0.5 or 1.0	0.2S	0.2
Connections point between transmission system and distribution system , Generating units below 100 MW, and Customer connection point with capacity 10MW and above	0.2S	0.5 or 1.0	0.2S	0.2
Customer connection point with capacity 1MW and above	0.2S	1.0	0.2S	0.2
Customer connection point with capacity below 1MW.	0.5	1.0	0.5	0.5

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8.4 Interval meter data requirements

8.4.1 Data storage

8.4.1.1 **Metering data** for **interval meters** shall be stored at the metering point as specified in paragraphs 8.1.1.3. The data transmitted from the meter to the **Automatic Meter Reading (AMR)** shall be in a format and protocol supported by the **Automatic Meter Reading (AMR)**.

8.4.1.2 The meter shall be normally examined and the measured data shall be collected by the Automatic Meter Reading (AMR) on a daily basis. However repeated collection of **metering data** shall be possible throughout the meter **data** collection period. No 'reading' operation shall delete or change any of the cached data stored. The meter must provide any piece of data stored at the request of the **Automatic Meter Reading (AMR)**.

8.4.1.3 The **meter** shall provide an external alarm signal to the **Automatic Meter Reading (AMR)** in the event of a power outage. To take care of on-going power outages, the clock, calendar and all data shall be kept for a period of 45 days without an external supply connection.

8.4.2 Time synchronization

8.4.2.1 Time synchronization requirements of the **Automatic Meter Reading (AMR)** and the local **metering systems** shall be as detailed in the following paragraphs.

8.4.2.2 All measured settlement periods shall be related to the time point 00:00:00 in accordance with the national time standard.

8.4.2.3 Time synchronization of the **AMR** shall only be performed by means of an integrated receiver and synchronized radio signal and synchronization shall be undertaken every six hours.

8.4.2.4 Where portable equipment is used by the **AMR** to collect data from a data concentrator in the event of a communications failure, time synchronization of the portable equipment shall be performed by means of an integrated receiver and synchronized radio signal or by a synchronizing reference signal from the main systems of the **AMR**. Time synchronization must be undertaken either immediately before and immediately after being taken to collect data or, if these events are separated by more than 24 hours, at least once every 24 hours.

8.4.2.5 Time synchronization of the **meter** shall be performed by means of an integrated receiver and a synchronized radio signal or by a reference signal synchronized by the **Automatic Meter Reading (AMR)**.

8.4.2.6 In any case where the **AMR** system requires data from a meter, the time recorded by the meter shall be checked against the time recorded by the **AMR** systems and, if the difference is greater than 2 seconds and less than 9 seconds, the **AMR** system shall automatically correct the time recorded by the meter. Where the time difference is greater than 9 seconds, the time recorded by the meter shall not be corrected and the data collected shall continue to be processed, while the cause of the discrepancy shall be investigated and its effect on the data collection shall be understood.

8.4.3 Meter monitoring

8.4.3.1 Meter monitoring shall be provided for each of the following situations:

- a) Defect in functionality of meter and/or data collector,
- b) Monitoring of the battery and DC supply of the meter,

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- c) Check of meter memory,
- d) Problems in supply of meters by **VMTs**,
- e) Access to the local data port by the meter.

8.4.3.2 Any of the above failures shall be reported at least by a common indication alert when data is retrieved by the **AMR** and when the local acquisition port is accessed. The alarm should be tagged to the relevant **settlement** period.

8.4.4 Communications equipment

8.4.4.1 Each **meter** or **data collector** shall contain local equipment that enables data to be retrieved from specific ports.

8.4.4.2 The **Communication equipment** shall be installed such a way that both the reading and the re-programming of **metering data** held by the **metering system** is made possible by local or remote access, maintaining an appropriate level of security controlled by means of appropriate passwords.

8.4.5 Obtain local data

8.4.5.1 An RS485 data port and an optical port for receiving data shall be located on each meter to allow a local data terminal, such as a laptop computer to connect for the following reasons:

- a) Commissioning, maintenance and troubleshooting,
- b) Transfer of metering data in the event of a remote communications failure, and
- c) Time synchronization when this cannot be done remotely or automatically.

8.4.6 Remote data acquisition

8.4.6.1 Each **meter** shall be equipped with an internal or external communications interface such, for instance, a modem that supports data exchange for local and remote requests in accordance with DLMS, IEC 61107 communication protocol or relevant parts of IEC 62056. A primary communication connection through OPGW shall be provided to enable the acquisition of metering data by **AMR**. This connection may also be used by the **System Operator** for operating, maintaining and investigating errors related to the **metering system**.

8.4.6.2 A secondary communication connection over the GSM/GPRS network shall be established using dedicated or dial-up equipment, but it shall not be permitted for metering data to pass through any IT network system where data can be manipulated during transit to **AMR**.

9 Metering data and remote data collection

9.1 Metering database

9.1.1.1 The **System Operator** shall have a database of all metering points in its network. This database shall record all of the fixed metering data listed below:

- a) A unique metering point identifier,
- b) Supplier,
- c) **Interval reading meters**,

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- d) Voltage level,
- e) **Meter** manufacturer,
- f) **Meter** model,
- g) Accuracy (**active/reactive**) **meter** class,
- h) Date and time of installation or removal,
- i) Verification date,
- j) Re-verification date,
- k) Last test date,
- l) Next test date,
- m) **CMT** and **VMT** accuracy class,
- n) Location of **CMT** and **VMT** deficiency data

9.1.1.2 The **meter** reading data to be held in the **metering database** shall be:

- a) Previous and current states of meters and metering period data required for **settlement**,
- b) The last advised cumulative consumption readings plus the time and date on which they were read,
- c) The last advised cumulative consumption readings confirmed by the **System Operator** plus the time and date on which they were read,
- d) The calculated advance from the previously advised cumulative consumption readings confirmed by either the **System Operator** plus the times and dates between which the consumption took place.

9.1.1.3 The **System Operator** shall be free to determine whether the metering fixed data and meter reading data should be held in a common database or on two or more separate databases.

9.1.1.4 The **System Operator** shall institute appropriate security measures in accordance with paragraph 10.4, of the **Market Rules** and other regulations to protect the data from unauthorised access or eventual amendments.

10 Security of metering systems

10.1 Equipment location

10.1.1.1 It is only possible to keep **metering systems** secure from physical damage if they are installed in a suitable location.

10.1.1.2 The location chosen for the installation of **metering systems** must at all times be:

- a) protected from access by unauthorised persons, by animals or by insects that may cause damage,
- b) kept free of combustible materials for a distance of 1.5 metres in all directions,
- c) freely accessible by representatives of the **System Operator** from the point at which they take access to the property, and

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- d) in cases where equipment is designated for outdoor use, the environment must be clean and dry.

10.2 Sealing of metering equipment and secondary metering circuits

10.2.1 General

10.2.1.1 In addition to the calibration seal fitted by the organisation responsible for calibration of the meter, installation seals shall be fitted to ensure that possible interference to the integrity of metering equipment will be detected.

10.2.1.2 All **metering equipment** shall be sealed following initial **energisation** and shall be resealed following any subsequent works that require the removal of seals. To ensure that old seals cannot be refitted to secondary measuring equipment or circuits in such a way that they disguise unauthorised interference, all old seals shall be removed from site and destroyed by the **System Operator** responsible for their removal.

10.2.1.3 In this context, the aim is to protect against unauthorized access to all: meter terminal covers, secondary metering circuits, secondary metering voltage fuses, **CMT** and **VMT** secondary terminal boxes. Where a number of these components are located in a common cabinet, it shall be permissible to seal the door of that cabinet instead of sealing each individual component within it.

10.2.2 Form of seal

10.2.2.1 An installation seal shall be comprised of two parts – a short piece of wire and a strong plastic sealing piece - which, when fitted together and closed, will prevent the removal of a seal without clear evidence of that removal. The following specification for the seal is intended to ensure that it cannot reasonably be accidentally broken or removed.

10.2.2.2 The wire rope shall be 150 mm long, have a minimum diameter of 0.9 mm, have a breaking load of at least 880 N and be manufactured from 7 strands of zinc coated steel wire.

10.2.2.3 Plastic part of the seal shall be square shape, where the under part of the seal shall have circular shape, with dimensions between 2.0 x 2.5 cm to 2.5 x 3.0 cm, with a diameter between 5.0 and 8.0 mm, be constructed such that at no point seal width is not less than 0.8 mm.

10.2.2.4 Each seal shall be identified with its own serial number, the number that shall be visible and figure on one of two sides of plastic part of the seal. Through serial number of the seal shall be much easy referring to relevant data that have to do with date and installation time, installation location, then date and time of disassemble, reason, etc. Seals besides serial number shall have **TSO's** logo and Barcode, within which electronically are hidden seal data, with a will of the other party additional seal can be set, standards of which shall be in accordance with requirements of this paragraph.

10.2.2.5 Seals shall be visible if installed in different points of a same metering system. It is sufficient that this difference between seals to be visual, changing only the colour of the seal in different points of a same **metering system**.

10.2.3 Control of sealing tools

10.2.3.1 Sealing tools must be provided by **System Operators** for each authorised person to remove and replace installation seals. Except when undertaking emergency work, otherwise no

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person who has not been provided with a sealing tool is permitted without reason to remove an installation seal.

10.2.3.2 If emergency work necessitating the removal of a seal has been undertaken, the System Operator shall ensure that the work that has been undertaken is subsequently inspected by a person who is authorised to remove and replace installation seals and that the installation is resealed by that person. The System Operator shall provide the authorised person who re-seals the installation with reasonable access to the installation, work records and those who undertook the work so that the authorised person can reasonably satisfy himself of the integrity of the installation being resealed.

10.2.3.3 Compression dies must not be transferred between authorised persons and no System Operator shall hold duplicate sets of dies. Where an authorised person will no longer seal equipment on behalf of the **System Operator**, the **System Operator** must immediately destroy the compression dies issued to that person.

10.2.3.4 Compression dies that no longer make legible marks must not be used and must be immediately destroyed by the **System Operator**. The **System Operator** may require that a replacement set of dies with the same identifier are manufactured and issued to the authorised person or alternatively issue a replacement sealing tool with a different identifier to the operative.

10.2.3.5 The **System Operator** shall keep a record of when a sealing tool is issued to an authorised person or sent for repair. For dies in use, this record shall show:

- a) The identification mark of each set of dies held,
- b) The name or the person to whom the dies were issued or the person or company to whom they have been sent for repair,
- c) The dates of issue and return.

10.2.3.6 For dies destroyed this record shall show the date and reason for their destruction.

10.2.3.7 For dies that have been lost or stolen, a record shall be kept showing the date and area of loss.

10.2.3.8 All records kept in accordance with section 10.2.3.4 shall be saved for a period of 10 years following the destruction or loss of the dies and shall be made available to the **Energy Regulatory Office** on request.

10.2.3.9 The **System Operator** must be ready to provide the required seals for **Energy Regulatory Office** on request.

10.3 Software equipment

10.3.1 Password protection

10.3.1.1 To protect **metering data** from unauthorised access and to ensure that modifications to the meter options can only be undertaken by suitably authorised persons, for local and remote access, which does not require the removal of the sealed metering cover in accordance with the requirements of section 10.2, it may only be entered by entering the correct password.

10.3.1.2 The communications protocol shall ensure that access is only available to those areas determined by the password that is entered. Where possible, level 1 and level 2 passwords shall be stored in the systems used for data recovery in such a way that they are not readable by data recovery operators.

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10.3.1.3 The number of times during each attempt to access metering data via local and remote ports and in any case when the password is entered incorrectly, shall be counted by the equipment. If the number of unsuccessful attempts to enter the correct password reaches 5 attempts, then the access process will be disabled until the end of that hour.

10.3.1.4 Provision of security to access a meter with a minimum of 4 security levels.

10.3.2 Level 0

10.3.2.1 The level 0 passwords will provide access only to:

- a) Reading the time and date of the meter,
- b) Reading the values of the metered energy registers,

with no change option in:

- a) Data concentrator or meter identifier
- b) values for each settlement period as established in section 8.2;
- c) Cumulative energy transfer values as established in section 8.2;
- d) Maximum capacity value (kW and/or kVArh);
- e) Cumulative active energy as required for tariff purposes between the system user and supplier;
- f) Measurement transformer ratios where appropriate;
- g) Alarm indications; and
- h) Data concentrator date and time.

10.3.3 Level 1

10.3.3.1 In addition to level 0 access, the level 1 password will also provide access to:

- a) Reading and correcting the date and time in meters by the **automatic meter reading (AMR)**;
- b) Reading load profile (kW and/or kVArh);
- c) Reading and monitoring of the meter vector diagram.

10.3.4 Level 2

10.3.4.1 In addition to the previous access level 1, the level 2 password will also provide access to:

- a) Program displays and tariff registers arrangements as outlined in paragraphs 10.3.2.1;
- b) Passwords for levels 0, 1 and 2.

10.3.5 Level 3

10.3.5.1 In addition to the previous access level 2, the level 3 password will also provide access to:

- a) Changing meter parameters;
- b) Calibrate the **metering equipment** where this may be undertaken without breaking a seal;

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- c) Setting measurement transformer ratios, inside the meter, where appropriate;
- d) Setting correction factors (if any); and
- e) Passwords for levels 0, 1, 2 and 3.

10.4 Safety database measurement

10.4.1.1 The **System Operator** shall implement controls to ensure that all data held in the metering database remains confidential and shall restrict access to those employees whose responsibilities include operating or auditing the database. Only to the extent that it is essential for the provision of IT support will IT support staff be deemed to be involved in the operation of the database.

10.4.1.2 To minimize the risk of errors or fraud, the **System Operator** shall restrict access to:

- a) Software and data, including both system and application levels,
- b) Computer hardware used for operating the database, including terminals, cables, disk drives and backup tapes, and
- c) shall implement effective monitoring and review procedures to ensure that unauthorised access cannot take place.

10.4.1.3 To minimize the risk of interruption to the operation of the database, the **System Operator** shall establish:

- a) appropriate training for all staff;
- b) appropriate maintenance arrangements for hardware, software and all relevant documentation;
- c) appropriate IT support arrangements and facilities;
- d) virus detection and prevention measures;
- e) system performance monitoring;
- f) formal change control procedures;
- g) documented security procedures that are subject to regular review.

10.5 Failure Restoration Requirements

10.5.1.1 To ensure a speedy restoration of breakdowns, the **System Operator** must have its computer systems in place to ensure that data is correctly recovered and that data processing is correctly resumed as soon as practicable. In particular, the **System Operator** shall:

- a) archive and back-up data in such a manner as allows its restoration with the minimum of retrospective processing;
- b) retain all processed data in such a manner that it can be reprocessed with the minimum of delay;
- c) establish and periodically test disaster recovery procedures;

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- d) ensure that its operating systems safeguard data integrity in the event of system failure, including transaction logging provisions.

11 Testing of Metering Systems

11.1 General

11.1.1.1 Testing of **metering systems** as a whole and of the individual components of **metering systems** is undertaken at various stages:

- a) Prior to type approval being given;
- b) On calibration and verification of the individual components at or immediately prior to installation;
- c) Re-verification at various stages during the life of the equipment determined by the generic component type or specific component type, whichever is the shorter;
- d) In the case of **metering systems** at **connection points** where the energy transfer is large, a calibration check will be undertaken at regular intervals.

11.1.1.2 The **System Operator** shall make operational plans for each calendar year to carry out checking and testing of meters at all **connection points**. The results obtained from these tests shall be stored and maintained in a specified testing database for a period of 5 years.

11.2 Approval of types of measuring equipments

11.2.1.1 It shall be the responsibility of the **ministry** to approve the use of specific types of **metering equipment** as components of commercial **metering systems** in Kosovo. Prior to issuing an approval certificate, the **ministry** shall undertake such type approval tests as are required by law or that the **ministry** deems to be appropriate in the circumstances.

11.2.1.2 The **ministry** shall instruct a suitably accredited laboratory to undertake type approval tests on its behalf.

11.2.1.3 Where metering equipment is equipment of a pattern for which a European Union pattern approval has been granted and not revoked by any member State of the European Union or any other State in the European Economic Area, then the ministry shall issue an approval certificate without any further testing being undertaken.

11.2.1.4 In the event that type approval of any **meter** is revoked by the **ministry**, then the **System Operator** shall replace the **meters**, within 6 months of receipt of the notice of revocation.

11.3 Calibration and verification

11.3.1.1 All **meters**, **VMTs** and **CMTs** shall be calibrated and verified in accordance with the laws of Kosovo prior to the first commencement of commercial operation.

11.3.1.2 Where **metering equipment** bears the European Union initial verification mark and/or is sealed by the calibration seals of a test laboratory authorised to calibrate and verify metering equipment in any member State of the European Union or any other State in the European

Economic Area, then the equipment will be recognised as being calibrated and verified also in Kosovo.

11.4 Periodic calibration and re-furbishment

11.4.1.1 Electronic static **Meters** shall be tested and re-verified periodically and be used according to requirements at intervals as laid out in the initial verification certificate or as determined by the **Ministry**.

11.4.1.2 Periodic calibration and re-calibration of Etalon test equipment for meter testing shall be performed as required by the Law on Metrology. The calibration and re-calibration period of the etalon test equipment shall be in accordance with the sub-legal acts (Administrative Instructions) which determine the calibration and re-calibration period of the test equipment (Etalons).

11.4.1.3 The first verification and periodic re-verification of meters shall be done according to the requirements arising from the Law on Metrology and other sub-legal acts (Administrative Instructions).

11.4.1.4 The date and results of all tests must be entered in the metering register. From time to time, special tests over and above the scheduled tests may also be required.

11.5 Routine testing at connections with large transfer capacities

11.5.1.1 In addition to any re-verification requirement, in each 10 year period, the **System Operator** shall undertake an accuracy check on 20% of each type of **meter** installed at connection points on its network where the output capacity exceeds 1 MW or more. These tests will be scheduled so that there is as equal a spread of test on each meter type over the 10 year period as is practicable.

11.5.1.2 The test undertaken will demonstrate that the overall accuracy is within the percentage error limit shown below:

Accuracy Standards for Site Tests		Percentage Error Limits of Meter
Class of meter under test	Test Equipment Maximum Overall Uncertainty %	Meter
0.2	±0.1	±0.2
0.5	±0.1	±0.5
1.0	±0.1	±1.0

11.5.1.3 In the case of active energy **meters**, test can be carried out by means of an injection test or load test, providing the load current is between 10% and 120% in the case of **CMT** operated **meters** and between 10% and 100% in the case of non **CMT** operated **meters** and the power factor is between 0.5 lag and 0.8 lead. Injection tests shall be carried out at a power factor of 1.0 and using an injected current between 5% and 120% in the case of **CMT** operated **meters** and between 5% and 100% in the case of non **CMT** operated **meters**.

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11.5.1.4 Reactive **meters** shall only be tested using an injection test that shall be carried out using an injected current between 20% and 120% in the case of **CMT** operated **meters** and between 20% and 100% in the case of non **CMT** operated **meters** at zero power factor.

11.5.1.5 If a site accuracy test shows that the **meter** does not meet the required error limits then, unless it can be demonstrated that the additional error is a test error caused by fluctuating load currents, the **meter** shall be replaced and recalibrated in an authorised laboratory.

11.5.1.6 Each year the **system operator** shall compare the test results for all **meters** of each type tested during the previous two years. Where it is demonstrated that the **meter** errors for a particular type of **meter** do not fit within an unbiased normal distribution curve, in such circumstances they will be required to be drawn from use.

11.6 Measurement transformers

11.6.1 General

11.6.1.1 All **measurement transformers** will be subject to the following calibration and testing requirements.

11.6.2 Initial calibration

11.6.2.1 New **measurement transformers** shall be calibrated prior to being put into commercial operation on any site, in accordance with appropriate regulations and this **metering code**. Evidence shall be made available for inspection in the form of test certificates, to show that **measurement transformers** comply with their accuracy class and error limits. This information shall be provided for inclusion in the metering register.

11.6.3 Periodic testing

11.6.3.1 Periodic testing of **measurement transformers**, is not normally required unless a high incidence of failure with a specific type is encountered. In that case, the **ministry** will establish a test routine and the maximum time period between tests. To minimize the effect of main system outages, it is expected that any routine tests will be arranged to coincide with regular maintenance of the main items of electric plant. Other tests are only required when an obvious failure has occurred or there is reason to believe that there has been a failure.

12 Payment for metering systems

12.1.1.1 All costs relating to the installation, maintenance and metering data reading (including any communications costs) shall be taken into account according to **Transmission Connection Charging Methodology**.

12.1.1.2 Where, in accordance with the provisions of the **Law on electricity** and, where appropriate, the **rule on general conditions of energy supply**, a **system user** requests a change in **metering equipment** more frequently than once in any period of twelve months, the **System Operator** shall be entitled to wait until the **metering equipment** installed following the earlier request has been in operation for a minimum period of twelve months before replacing it with **metering equipment** to meet the requirements of the later request unless the **system user** agrees to pay the costs associated with the later equipment change. Where a **system user** so chooses to pay for a change in **metering equipment** to be undertaken less than twelve months following an

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earlier change, the equipment will remain the property of the **System Operator** in accordance with the **Law on electricity**.

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