

Annex No. (1)
Electricity Meters

First: Efficient Electric Energy meters

Article (1-1) Symbols used in electric energy meters

No.	Code	Meaning in English	Meaning in Arabic
1	I		Electric current passing through the Meter
2	I_n	Specified reference current	The specified reference current value adopted for the design of the Meter operated by a transformer.
3	I_{st}	The lowest declared value of	The lowest declared current value at which the Meter registers the effective electrical energy at a power factor of one (multiphase meters at balanced load)
4	I_{min}		The smallest value of current at which the error value falls within the MPE limits (multiphase meters at balanced load)
5	I_{tr}		The value of current which is greater than the amount of error that falls within the minimum MPE corresponding to the degree of accuracy of the Meter
6	I_{max}		The maximum value of the current for which the error value falls within the MPES.
7	U	Voltage of electricity supplied to the Meter	Voltage value of the electricity supplied to the Meter
8	U_n	The specified reference voltage	Specified reference voltage

9	F	The frequency of the voltage supplied to the Meter	Frequency of voltage supplied to the Meter
10	F _n	The specified reference frequency	Specified reference frequency
11	PF	Power Factor	Power factor = cos Q = cosine of phase angle Q between I and U

Article (2-1) Accuracy

The Manufacturer shall specify the accuracy of the Meter, in accordance with one of the following accuracy grades: (A), (B), (C) and (D).

Article (3-1) Operational Conditions

1. The Manufacturer shall specify the normal operating conditions of the Meter, specifically the values of (f_n), (U_n), (I_n), (I_{st}), (I_{min}), (I_{tr}) and (I_{max}) applied to the Meter.
2. For the specified current values, the Meter shall meet the conditions provided in Table (1.1).

Table (1.1) Operating conditions of the Meter

		Class A	Class B	Class C
Directly connected meters	I _{st}	≤0.05 I _{tr}	≤0.04 I _{tr}	≤0.04 I _{tr}
For direct-connected meters	I _{min}	≤0.5 I _{tr}	≤0.5 I _{tr}	≤0.3 I _{tr}
	I _{max}	≥ 50 I _{tr}	≥ 50 I _{tr}	≥ 50 I _{tr}
Meters that operate with a transformer	I _{st}	≤0.06 I _{tr}	≤0.04 I _{tr}	≤0.02 I _{tr}
	I _{min}	≤ 0.04 I _{tr}	≤ 0.02 I _{tr} (*)	≤ 0.02 I _{tr}
For transformer-operated meters	I _n	= 20 I _{tr}	= 20 I _{tr}	= 20 I _{tr}
	I _{max}	≥ 1.2 I _{tr}	≥ 1.2 I _{tr}	≥ 1.2 I _{tr}
(*) For Class B electromechanical meters I _{min} ≤ 0.04 I _{tr} shall apply.				

3. Table (1.1) shows the range of voltage, frequency and power factor over which the Meter shall meet the MPE requirements, and for each range the general characteristics of the electricity supplied to the public distribution system shall be considered.

4. The voltage and frequency range shall be at least:

$$0.9 \times U_n \leq U \leq 1.1 \times U_n$$

$$0.98 \times f_n \leq f \leq 1.02 \times f_n$$

5. The power factor range is at least (0.5=cosp) to (inductive) to (0.8=cosp) capacitor.

Article (4-1) Maximum Permissible Errors (MPES).

1. The effects of different readings and influencing quantities (a, b and c) are assessed separately, while all other measurements and influencing quantities remain relatively constant at their reference values, and the measurement error shall not exceed the MPE as specified in Table (4-1) and calculated as follows:

$$\text{Error of measurement} = a^2 + b^2 + c^2 \dots$$

2. When the Meter operates under variable load current, the error percentage shall not exceed the limits provided in Table (2.1).

Table (4-1): Permissible error percentage at normal operating conditions, load current levels and specified operating temperatures

	Operating temperatures (°C)											
	5 to 30			-10 to 5 Or 30 to 40			-25 to -10 Or 40 to 55			-40 to -25 Or 55 to 70		
Meter class	A	B	C	A	B	C	A	B	C	A	B	C

Single phase meters or multi phase meters in balanced load operation

$I_{min} \leq I < I_{tr}$	3.5	2	1	5	2.5	1.3	7	3.5	1.7	9	4	2
$I_{tr} \leq I \leq I_{max}$	3.5	2	0.7	4.5	2.5	1	7	3.5	1.3	9	4	1.5

Multi-phase meters in case of operation with a single-phase load

$I_{tr} \leq I \leq I_{max}$	4	2.5	1	5	3	1.3	7	4	1.7	9	4.5	2
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Note: When the Meter operates within different temperature ranges, the relevant MPE Values shall be applied.

*For multi-phase electromechanical meters, the current range for single-phase load only applies to: $5I_{tr} \leq I \leq I_{max}$

Article (5-1) Permissible Interference Effect

1. General:

A. The electric energy meter is connected directly to the main electricity outlet as well as the main current as one of the measurements.

B. The Meter shall comply with the electromagnetic environment (E2) and additional requirements in the material of the operating conditions.

C. In the event of prolonged interference from an electromagnetic environment, this shall not affect the accuracy at critical change values or cause a malfunction in the functionality or characteristics of the Meter.

D. Where there is a foreseeable risk of lightning or high voltage supply network, the measuring characteristics of the Meter shall be protected from these factors.

2. Long-term jamming effect:

Table (3.1): Critical change values for long-term noise

Disruption:	Critical percent change values for precision meters		
	A	B	C
Reverse phase series	1.5	1.5	0.3
Unbalanced voltage (applies to multiphase meters only)	4	2	1
Harmonic parts in electric current circuits *	1	0.8	0.5
DC and harmonics in AC circuit*	6	3	1.5
Fast Transient Explosions	6	4	2

Electromagnetic fields, high frequency electromagnetic fields (radiated radio frequencies), interference from radio frequency fields, oscillating shielded waves	3	2	1
*In the case of electromechanical electrical meters there are no known critical change values for the harmonic contents in the current circuit and for the direct current and harmonic contents in the current circuit.			

3. Permissible influence of transient electromagnetic phenomena:

A. The effect of electromagnetic interference on the electric energy meter shall be during and immediately after the interference:

- Any output intended for measuring the accuracy of the Meter and does not produce pulses or signals corresponding to energy values greater than the critical change value and within a reasonable time after the interference the Meter shall achieve the following:

- (1) Restore the operating mode within the MPE limits.
- (2) Save all measurement functions in safe mode.
- (3) Allow recovery of all measurement data found before the interference.
- (4) There is no indication that the recorded energy values have changed beyond the critical change value.
- (5) The critical change value in kWh is $(10^{-6} \cdot M \cdot U_n \cdot I_{max})$ where:

M: Number of measuring elements in the Meter

U_n : in volts

I_{max} : in amperes

B. The critical value of overcurrent change is (1.5%).

Article (6-1) Appropriateness

1. The Meter shall be suitably mountable so that it will operate in any location and the direction of meter installation (vertical, horizontal or any other direction) is specified by the Manufacturer on the Meter and in a non-removable manner.

2. The positive error in the Meter shall not exceed (10%) below the nominal value level of the operating voltage.

3. The total electrical energy display shall have a sufficient number of digits to ensure that when the Meter operates for (4,000) hours at full load ($I=I_{max}$, $U = U_n$, $PF = 1$). The Meter reading shall not return to the initial value and shall not be resettable during use.

4. The measured electrical energy quantity shall remain available for reading for at least four months in the event of a power failure in the circuit.

5. **No-load operation:** When a voltage is applied without current flowing in the current circuit (the current circuit is an open circuit) the Meter shall not record energy values for any voltage within ($U_n \times 1.1$) and $U_n \times (0.8)$.

6. **Start-up: The Meter** shall start and continue recording at (U_n) and ($1=PF$) (multiphase meter with balanced load) and current equal to (I_{st}).

Article (7-1) Requirements for the Status of Use

1. In the event that it is mandatory to measure the electrical energy consumed for domestic purposes, these measurements are permitted using meters of class (A), and in special cases it is permissible to use meters of class (B).

2. If it is mandatory to measure the electrical energy consumed for commercial purposes or light industries, these measurements may be permitted to be made using Class (B) meters, and in special cases it may be permitted to use Class (C) meters.

3. It must be ensured that current range requirements are specified by the Supplier or person legally appointed to install the meter so that the meter used is ensured to be suitable for making correct measurements of current or expected consumption.

Second: Requirements for smart Electricity Meters:

Article (1-2) Accuracy requirements

1. The manufacturer must determine the accuracy class of smart electricity meters so that it is one of the categories (A), (B), (C), (D) or the classifications specified in the international specifications (IEC 62052-11, IEC 62053-11,21,22, 23,24) which is (0.2S, 0.5S, 1,2)).

2. When the Manufacturer specifies that the Meter is capable of power flow in both directions, the Meter shall correctly handle both positive and negative power flow, and the Meter shall meet the requirements of GSO OIML R46-1&2 for power flow in both directions.

Article 2-2) Limits of Maximum Permissible Error (MPE)

For confirmation purposes, the permissible error limits in the Meter shall not exceed the limits stated in Table No. (2.2.1) specified in Clause (3) of the GSO OIML R46-1&2 standard specification, and are expressed as a percentage, noting that the maximum errors for the purposes of type approval and confirmation are subject to the items specified in Appendix (B) of the GSO OIML R46-1&2 standard specification, and it is also possible to rely on the international specifications issued by the International Electrotechnical Commission.

(IEC 62052-11, IEC 62053-11,21,22,23,24, IEC 62058) when meter classifications (0.2S, 05S, 1,2) are adopted). Or (50470-MID EN) or equivalent international specifications.

Table No. (2.2.1)

Quantity		MPES (%) for Meters of class			
Current	Power factor	A	B	C	D
$I_{tr} \leq I \leq I_{max}$	One	± 2	± 1	± 0.5	± 0.2
	0.5 inductive to 1 to 0.5 capacitor(1)	± 2.5	± 1.5	± 0.6	± 0.3
$I_{min} \leq I \leq I_{TR}$	One	± 2.5	± 1.5	± 1	± 0.4
	0.5 H to 1 to 0.5 capacitor	± 2.5	± 1.8	± 1	± 0.5
$I_{ST} \leq I \leq I_{max}$		$\pm 2.5 I_{min}/I$	$\pm 1.5 I_{min}/I$	$\pm 1.0 I_{min}/I$	$\pm 0.4 I_{min}/I$

(1)	The Owner may specify that the power factor requirement is from 0.5 to 1 to 0.5 capacitor.				

Article (3-2) Software Identity

The data and software related to the Meters shall be protected, misuse prevented, data transmission means, and meter fault log examination shall be in accordance with the provisions of Clause (3.6) of the standard specification (GSO OIML R46-1&2).

2.3.1 Data storage and transmission through communication systems

2.3.1.1 General requirements

- A. The stored or transmitted measurement value shall be accompanied by all necessary relevant information for its future legal use.
- B. The data shall be protected by software to ensure the validity, integrity and accuracy of the information related to the measurement time.
- C. The programme modules that prepare data for storage or transmission or that check data after it has been received and read are linked to the part of the programme related to legal aspects.

2.3.1.2 Automatic data storage

- A. When data storage is required, the measurement data shall be stored automatically when the measuring process is completed, i.e. when the final value is reached. When the final value is defined by calculations, all calculation data deemed necessary shall be automatically stored with the final value.
- B. The storage device shall be suitable and have enough storage memory to accommodate any other applications.
- C. Data may be deleted if it is settled or printed by printers subject to legal control provided that the deletion is carried out in accordance with the conditions stated in clause (3.6.7.2.4) of the standard specification (GSO OIML R46-1&2).

2.3.1.3 Data transfer

- A. The measuring process shall not be rejected due to delay in data transmission.

B. It shall be ensured that legally relevant measurement data is not affected if network services become unavailable.

2.3.1.4 Timeline Report

The Timeline Report is read by the device clock and is legally set with appropriate protection measures.

2.3.1.5 Maintenance and reinstallation of software

When performing maintenance or reinstallation of meter software, the following shall be considered:

A. Modify the electric meter, when exchanging software with another approved version, or repair the electric meter, when reinstalling the same version.

B. Metrological confirmation shall be carried out by the entity responsible for Metrological confirmation if maintenance operations affect meter measurements or require cutting seals or stickers, if any.

C. Only legal versions of the software that comply with the approved type are allowed to be used.

D. Software update can be performed directly on the device or remotely via the network and the effectiveness of the update shall be confirmed immediately. The Meter is not allowed to be used after the update unless confirmation has been carried out and the Meter is guaranteed to meet the Metrological confirmation requirements.

E. Traced Update is applied as specified in clauses (3.6.8.3.1) to (3.6.8.3.7) of the standard specification (OIML R46-1&2).

Article (4-2) Security Requirements

For the purposes of requirements related to security in the exchange of information and communication protocols, reference is made to the legislation in force in the State and the standard specifications issued by the International Electrotechnical Commission (IEC).

Article (5-2) confirmation of the Validity of Smart Electricity Meters

The validation of the Meter software and data is carried out in accordance with Article (4.3) of the standard specification (GSO OIML R46-1&2) and covers the following requirements:

- A. Software identity definition.
- B. Prevent misuse.
- C. Protection from tampering.
- D. Data protection.
- E. Separate electronic devices and sub-assemblies.
- F. Separate software parts.
- G. Data storage and transmission through communication systems.
- H. Protection of data related to measurement time.
- I. Automatic storage.
- J. Data transfer delay.
- K. Data transmission interruption.
- L. Timeline Report
- M. Maintenance and reprogrammaming.

Article (6-2) Type Declaration Documents

Documents submitted with the application for type declaration shall include the following:

2.6.1 Definition of type includes:

- A. Name or brand and type design.
- B. Version number of computer, accessories and software
- C. Nameplate shape.

2.6.2 metrological properties of the Meter include:

- A. Description of the measurement principle.
- B. Metrological specifications such as accuracy class and rated operating conditions.
- C. Steps shall be taken before testing the Meter

2.6.3 Technical specifications of the Meter, including:

- A. Block diagram with description of function of components and devices.
- B. Drawings, diagrams, general software information, and explanation of installation and operation including interconnection.
- C. Description and location of seals and protective devices.
- D. Documents relating to tolerance and durability characteristics.

E. Any other document or evidence which proves that the design and construction of the Meter conforms to the requirements of the standard on which it is based.

Annex No. (2)

Gas Meters and Volume Conversion Devices

Article (1) Symbols used in Gas Meters

No.	Code	Meaning in English	Meaning in Arabic
1	–	Conversion device	The conversion device is a device installed on the Gas Meter that automatically converts the measured quantity at the measuring conditions into a calculated quantity at the base conditions.
2	Q _{min}	Minimum Flowrate	Minimum Flowrate is the lowest Flowrate at which the Gas Meter gives readings that meet the requirements for MPE.
3	Q _{max}	Maximum Flowrate	Maximum Flowrate is the highest Flowrate at which the Gas Meter gives readings that meet the requirements for MPE.
4	Q	Transitional Flowrate	Transitional Flowrate is the flow that occurs between the Minimum Flowrate and the Maximum Flowrate, at which the Flowrate range is divided into two ranges, the lower range and the upper range, each of which has a different MPE Value from the other range. Specific requirements - Gas Meters
5	Q	Overload Flowrate	Overload Flowrate is the highest Flowrate at which the Gas Meter can operate for a short period of time without causing any damage.
6	–	Base conditions	Base conditions are the specific conditions under which the measured quantity is calculated.

First: Gas Meters

Article (2) Operational Conditions

The Manufacturer shall define the operating conditions of the Gas Meter, considering the following:

1. The gas Flowrate range shall meet at least the conditions provided in Table (1.2):

Table (1.2): Shows the degree of accuracy of the Meter and the range of gas Flowrate.

Class Accuracy	Flowrate range		
	Gas Flowrate range		
	Q_{max}/Q_{min}	Q_{max}/Q_t	Q_r/Q_{max}
1.5	≥ 150	≥ 10	1.2
1.0	≥ 20	≥ 5	1.2

2. The gas temperature range shall not be less than (40°C).

3. The fuel/gas related condition

The Gas Meter shall be designed for the gases and pressures used in the State, and the Manufacturer shall indicate the following:

A. A family or group of gases that can be measured by a meter.

B. Highest operating pressure.

4. The minimum temperature range of the surrounding atmosphere shall not be less than (50°C).

5. Nominal value of the AC voltage supply and/or DC voltage supply limits.

Article (3) Maximum Permissible Errors (MPES).

1. The MPE of the Meter, whether measuring the volume or mass of the gas passing through it, under the measuring conditions in which it operates, is as shown in Table (2.2).

Table (2.2): MPES in accordance with the accuracy class of the Meter (Class)

Flowrate range

Flowrate range	Class	
	1.5	1.0
$Q_{min} \geq$	3	2
$Q < Q_t$	%	%
$Q_t \geq Q \geq$	1.5	1
Q_{max}	%	%

2. When all errors between (Q_t) and (Q_{max}) have the same sign, the error value shall not exceed (1%) for meters with accuracy (1.5), and (0.5)% for meters with accuracy (1.0).

3. The MPE increases by (0.5%) within a range of (30) °C, around the temperature specified by the Manufacturer, which is between (15 - 25) °C, for a Gas Meter that operates with a temperature conversion converter that only indicates the converted volume, and an additional increase of (0.5%) is allowed outside this range in every (10) °C period.

Article (4) Permissible interference effect

1. Electromagnetic immunity

A. Requirements for the effect of electromagnetic interference on the Gas Meter or volume conversion device that shall be considered:

(1) The change in the measurement result shall not be greater than the specified critical change value.

(2) The measurement result shown on the Meter cannot be interpreted as acceptable measurement result, such as an instantaneous change that cannot be interpreted, saved or transmitted as a measurement result.

B. After the electromagnetic interference is removed, the Gas Meter shall achieve the following:

(1) Return to work within the (MPE).

(2) Maintain all measurement functions.

(3) Allow recovery of all measurement results found before the interference.

C. The critical change value is the smaller of the following two values:

(1) The quantity corresponding to half the MPE Value in the upper range of the measured volume.

(2) The quantity corresponding to (MPE) of the quantity produced at the Maximum Flowrate (Q_{max}) for one minute.

2. Effect of upstream-downstream flow interferences

Under the Manufacturer specified installation conditions, the effects of flow in both directions shall not exceed one third of the MPE.

Article (5) Tolerance

Gas Meters shall meet the following criteria after proper inspection and considering the time period estimated by the Manufacturer:

1. Accuracy meters (1.5):

A. The change in the measurement result after performing the tolerance test and when compared to the initial measurement result for Flowrates in the range from (Q_T) to (Q_{max}) shall not exceed the measurement result by more than (2%).

B. The reading error after performing the tolerance test shall not exceed two times the MPE.

2. Accuracy meters (1.0):

A. The change in the measurement result after performing the tolerance test and when compared to the initial measurement result on thirds of MPE.

B. The reading error after performing the tolerance test on the MPE.

Article (6) Appropriateness

1. A Gas Meter operating on (AC) or (DC) electrical power shall be provided with an emergency power supply or other means to ensure that all metering functions are maintained during a fault in the electrical power supply.

2. The power source shall have a relatively long operating life and display an appropriate warning after (90%) of the power source operating life has elapsed.

3. The Meter indicator shall allow the quantity passed during (8,000) hours to be displayed at (Q_{max}), as a minimum, without the indicator value returning to zero again.

4. The Gas Meter shall be capable of being installed so that it will operate in any location declared by the Manufacturer in the installation instructions.

5. The Gas Meter shall be properly prepared for the necessary tests to be carried out so that the test results appear within a suitable time.

6. The Gas Meter shall meet the MPE requirements whether the flow is two-way or one-way in the case of meters with flow direction installed.

7. For Smart Gas Meters and for the purposes of requirements related to security in the exchange of information and communication protocols, reference is made to the legislation in force in the State and the standard specifications issued by the International Electrotechnical Commission (IEC).

Second: Volume conversion devices

Article (7) Operational Conditions

The Manufacturer shall specify the base conditions for converted quantities.

Article (8) Maximum Permissible Errors (MPES).

1.(0.5%) at ambient temperature (3 ± 20)°C and relative humidity (15 ± 60 %), and nominal values of power supply.

2. (0.7%) for heat conversion devices at operating conditions.

3. (1%) for other heat conversion devices at operating conditions.

Note: Gas Meter error is not considered.

Article (9) The Appropriateness

1. The electronic conversion device shall be capable of detecting operation outside the operating range specified by the Manufacturer, for factors affecting the accuracy of measurement, so that the conversion device shall stop combining the quantity converted within the operating range with the quantity converted from outside the operating range. It shall be possible to collect the quantity converted from outside the operating range separately.

2. The electronic conversion device shall be capable of displaying all data related to the measurement without additional equipment.

Article (10) Requirements for the use of Gas Meters and volume conversion devices

1. Gas Meters for domestic purposes of class (1.5) and class (1.5) which have ($Q_{max}/Q_{min} \geq 150$) shall be used.
2. Gas Meters for commercial or light industrial purposes shall be of class (1.5).
3. The Competent Authority shall ensure that the requirements contained in the Operational Conditions Article are observed to by the Supplier or the person legally appointed to install the meter, so as to ensure that the meter used is suitable for making correct measurements of current or expected consumption.

Annex No. (3)

Water Meter Requirements

Article (1) Symbols used in Water Meters

No.	Code	Meaning in English	Meaning in Arabic
1	Q(1)	Minimum Flowrate	Minimum Flowrate is the lowest Flowrate at which the Water Meter gives readings that meet the requirements for MPE. Maximum Permissible Errors (MPES)
2	Q(2)	Transitional Flowrate	Transitional Flowrate is the flow that occurs between the Minimum Flowrate and the Continuous Flowrate, at which the Flowrate range is divided into two ranges, the lower range and the upper range, each of which has a different MPE Value from the other range. (Specific requirements - Gas Meters)
3	Q(3)	Permanent Flowrate	The constant Flowrate is the highest Flowrate at which the Meter will operate satisfactorily under normal conditions of use (intermittent or steady flow conditions).
4	Q(4)	Minimum Flowrate	Overload Flowrate is the highest Flowrate at which the Gas Meter will operate for a short period of time without causing any damage.

Article (2) Operational Conditions

The Manufacturer shall specify the operating conditions of the Meter in particular it shall specify the following operating conditions:

1. Water Flowrate range

A. The water Flowrate range values shall meet the following conditions:

(Dynamic Ratio 400/250) $Q(2)/Q(1) = 1.6$

B. The following percentages may be accepted for a period not exceeding one year after the approval of this resolution:

$Q(3)/Q(4)=1.25$

Note: Regarding the above percentages, the values specified in the international standard are based on them.

1)-OIML R49) in accordance with the latest update of this specification.

2. Temperature range of the water

Values of Temperature range of the water shall meet the following condition in accordance with the specification ((1-OIML (R49):

+5°C to +55°C

3. Relative water pressure range at Q(3)

The field shall achieve the following:

0.3 bar to at least 10 bars

4. Power supply:

Statement of the nominal value of the AC power supply voltage and/or the limits of the DC power supply.

Article (3) Maximum Permissible Errors (MPES).

1. The Meters have accuracy degree of (1).

A. The MPE for the supplied volumes at the upper Flowrate ($Q2 \leq Q \leq Q4$) is ($\pm 1\%$) within the temperature range from $(0.1)^\circ \text{C}$ to $(30)^\circ \text{C}$ and by ($\pm 2\%$) for temperatures above $(30)^\circ \text{C}$.

B. MPE for volumes supplied at Minimum Flowrate ($Q1 \leq Q \leq Q2$) of ($\pm 3\%$)

2. The Meters have accuracy degree of (2)

A. The MPE for the supplied volumes at the upper Flowrate ($Q2 \leq Q \leq Q4$) is ($\pm 2\%$) within the temperature range from $(0.1)^\circ \text{C}$ to $(30)^\circ \text{C}$ and by ($\pm 3\%$) for temperatures above $(30)^\circ \text{C}$.

B. The MPE for the supplied volumes at Flowrates ($Q1 \leq Q < Q2$) is (5%) for all temperatures.

Note: Regarding the classification of the mentioned flow values and the classification of the Meters, the latest update of the standard specification (OIML R49-1) is based on

Article (4) Permissible interference effect

(Electromagnetic immunity)

1. If the Meter is exposed to electromagnetic interference, it shall:
 - A. The change in the measurement results shall not be greater than the critical change value.
 - B. The measurement result is not stored, converted, or presented in a manner that could be interpreted as acceptable measurement result.
2. After the electromagnetic interference on the Meter is removed, the Meter shall:
 - A. Return to work within the (MPE).
 - B. Maintain all measurement functions.
 - C. Allow recovery of all measurement data found before the interference.
3. The critical change value is the smaller of the following two values:
 - A. The volume corresponding to half the value of (MPE) in the upper region of the measured volume.
 - B. The volume corresponding to (MPE) of the volume produced at a Flowrate of $Q(3)$ for one minute.

Article (5) Tolerance

The following criteria shall be achieved after carrying out the appropriate test and considering the time period estimated by the Manufacturer: 1. The difference in the measurement result after carrying out the tolerance test and when compared to the initial measurement result shall not exceed:

- A. (3%) of the measured volume when $Q(2) \geq Q \geq Q(1)$
 - B. (1.5%) of the measured volume when $Q(4) \geq Q \geq Q(1)$
2. The reading error of the measured volume after carrying out the tolerance test shall not exceed:
- A. (6%) of the measured volume when $Q(2) \geq Q \geq Q(1)$

B. (2.5%) of the measured volume, in the temperature range greater than $(0.1)^{\circ}\text{C}$ to $(30)^{\circ}\text{C}$, when $Q(4) \geq Q \geq Q(2)$

C. (3.5%) of the measured volume in the temperature range greater than $(30)^{\circ}\text{C}$ to $(90)^{\circ}\text{C}$, when $Q(4) \geq Q \geq Q(2)$

Article (6) Appropriateness

1. The Meter shall be suitably mountable so that it will operate in any location unless otherwise clearly specified by the Manufacturer on the Meter non-removable.
2. The Manufacturer shall specify if the Meter is designed to measure reverse flow, in which case the reverse flow volume shall be subtracted from the cumulative volume, or recorded separately. The same MPE shall be applied for reverse and forward flow.
3. Water Meters shall prevent backflow if they are not designed to measure it and withstand any sudden backflow without causing any damage or change in the metrological properties of the Meter.

Article (7) Requirements for the Status of Use

1. The Competent Authority shall ensure that the requirements contained in Article (2) relating to the operational conditions of Annex No. (3) are observed by the Supplier or the person legally appointed to install the Meter so as to ensure that the Meter used is suitable for making correct measurements of current or expected consumption.
2. For Smart Water Meters and for the purposes of requirements related to security in the exchange of information and communication protocols, reference is made to the legislation in force in the State and the standard specifications issued by the International Electrotechnical Commission (IEC).

Annex No. (4)

Heat Meter requirements

Article (1) Symbols used in electric energy meters

No.	Code	Meaning in English	Meaning in Arabic
1	The temperature of the heat carrier fluid	The temperature of the heat carrier fluid
2	Value of ...at the entrance of heat exchange circuit	Value... At the entrance to the heat exchange circuit
3	Value of... at the outlet of heat exchange circuit	Value ...at the outlet of the heat exchange circuit
4	Temperature difference	Temperature difference... Whereas....
5	The upper limit of .. so that the Heat Meter operates properly within the MPE	Maximum of... So that the Heat Meter operates correctly within the MPE range.
6	The lower limit of... so that the Heat Meter operates properly within the MPE	Minimum So that the Heat Meter operates correctly within the MPE range.
7	The upper limit of ...O so that the Heat Meter operates properly within the MPE	Maximum of... So that the Heat Meter operates correctly within the MPE range.
8	The lower limit of... so that the Heat Meter operates properly within the MPE	Minimum So that the Heat Meter operates correctly within the MPE range.
9	Average of Flowrate of the thermal energy carrier	Average of Flowrate of the thermal energy carrier

10	The highest value of q that is allowed for short periods of time for the Heat Meter to function properly	The highest value of q is always allowed for the Heat Meter to function properly
11	The highest value of q is always allowed for the Heat Meter to function properly	The highest value of q allowed for short periods of time for the Heat Meter for proper operation.
12	The minimum value of q is allowed for the Heat Meter to function properly	The minimum value of q is allowed for the Heat Meter to function properly
13	p	Thermal power for heat exchange	Heat exchange capacity
14	PS	The upper limit of P is always allowed for the Heat Meter to function properly	The upper limit of (P) is always allowed for the Heat Meter to function properly

Article (2) Accuracy

The accuracy ratings for Heat Meters are: (1), (2) and (3).

Article (3) Operational Conditions

The Manufacturer shall specify the following operating conditions for the Heat Meter:

1. Liquid temperature....

A. Temperature difference.... Where it shall be:

....

min = 3 K or 5 K or 10 K....

2. Fluid pressure: The maximum positive internal pressure at which a Heat Meter can be permanently maintained at the upper temperature limit.

3. The fluid Flowrates (q_s), (q_p), and (q_i) where the values of (q_p) and (q_i) are subject to the following condition:

$$Q_p/q_i \geq 10$$

4. Heat capacity (P_s).

Article (4) Maximum Permissible Errors (MPES).

The maximum permissible relative errors of integrated Heat Meter expressed as a percentage of the correct value for each degree of accuracy are:

$$E=EF+ET+EC$$

Where (EF), (Et) and (EC) are as in Article (8) of this Annex.

Article (5) Permissible effects of electromagnetic interference

1. The device shall not be affected by static magnetic fields and electromagnetic fields at the main frequency.
2. The effect of electromagnetic interference shall be such that the change in the measurement result is not greater than the critical change value specified in Clause (3) of the same Article or the indication of the measurement result cannot be interpreted as a correct result.
3. The critical variation value of integrated Heat Meter is equal to the absolute MPE Value applied to that meter as stated in the MPES section of this Appendix.

Article (6) Tolerance

The following criteria shall be fulfilled after proper inspection considering the time period estimated by the Manufacturer:

1. Flow Sensors:

The difference in the measurement result after performing the tolerance test and when compared with the initial measurement result shall not exceed the critical change value.

2. Temperature Sensors:

The change in the measurement result after performing the tolerance test and when compared to the initial measurement (absolute 0.15)°.

Article (7) Label Card for Heat Meters

The Label Card for Heat Meters shall bear the following data:

1. Accuracy.
2. Flowrate limits.
3. Temperature limits.
4. Temperature difference.

5. Flow Sensor installation location with or against flow.

6. Flow direction indication.

Article (8) Sub-Parts

The requirements of the Sub-Parts may apply to Sub-Parts manufactured by the same or different Manufacturers, and since the Heat Meter consists of Sub-Parts, the necessary requirements of the Heat Meter apply to the Sub-Parts as a reference, in addition to the following requirements:

1. The MPE of the Flow Sensor of the main and sub-meters expressed as a percentage of accuracy degrees is as follows:

but not more than 5%	Class 1: $EF=1+0.01qp/q$
but not more than 5%	Class2: $EF=2+0.02qp/q$
but not more than 5%	Class3: $EF=3+0.05qp/q$

The error (EF) relates the value shown on the Meter to the correct value of the relationship between the signal coming out of the Flow Sensor and the mass or volume.

2. The maximum relative error allowed for the Temperature Sensor expressed as a percentage:

$$Et=0.5+3\times\dots$$

The error (Et) relates the value shown on the Meter to the correct value of the dual Temperature Sensor reading.

Temperature difference.

3. The maximum relative error allowed for the Temperature Sensor expressed as a percentage:

$$Ec=0.5+3\times\dots$$

Whereas the error (Ec) links the value shown on the Meter to the correct value which indicates the correct value of thermal energy.

4. The critical variation value for the sub-assemblies of the Heat Meter is equal to the absolute value of the corresponding MPE applicable to the sub-assemblies of items (1, 2 and 3) of this article.

Article (9) Label Card for Sub-Parts

The following basic information is recorded on the Sub-Parts of the Meter:

1. Flow Sensor:

A. Accuracy

B. Flowrate limits.

C. Temperature limits.

D. The nominal value of the Meter coefficient (e.g. litres/pulse) or of the resulting signal.

E. Flow indication.

2. Dual Temperature Sensor:

A. Type definition (example: pt100)

B. Temperature limits.

C. Temperature difference.

3. Calculator:

A. Temperature Sensor type.

B. Temperature limits.

C. Temperature difference.

D. The required nominal value of the Meter coefficient (e.g. litres/pulse) or of the corresponding input signal coming from the Flow Sensor.

E. Flow Sensor installation location with or against flow.

Article (10) Requirements for the Status of Use

1. If it is mandatory to measure the thermal energy consumed for domestic purposes, it may be permitted to carry out these measurements using meters of class (3).

2. If it is mandatory to measure the thermal energy consumed for commercial purposes or light industries, it may be permitted to carry out these measurements using meters of class (2).

3. It must be ensured that the special requirements set out in Article (3) relating to operating conditions in this Annex are observed by the Supplier or the person legally appointed to install the Meter so as to ensure that the Meter used is suitable for making correct measurements of current or expected consumption.

4. For Smart Heat Meters, and for the purposes of requirements related to security in the exchange of information and communication protocols, reference is made to the legislation in force in the State and the standard specifications issued by the International Electrotechnical Commission (IEC).

Annex No. (5)

Sampling Table

First: Sampling Tables for Electricity, Water and Gas Meters:

1. For the purpose of confirming Electricity, Water and Gas Meters, Samples are taken in accordance with Table (A-1) issued based on the International Organisation for Legal Metrology Guide No. (e17-G020) and the international specification ISO2859-2.
2. If the first sample does not pass the periodic confirmation requirements, another sample of twice the size of the first sample may be tested.

Table (1-A)

NO	Lot size	Sample size	Number of nonconforming meters		Spare utility meters
			Criteria for acceptance of lot (c)	Criteria for rejection of lot (d)	
1.1	Up to 1200	50	1	2	10
1.2	1201-3200	80	3	4	16
1.3	3201-10000	125	5	6	25
1.4	10001-35000	200	10	11	40

Second: Sampling Tables for Heat Meters:

For the purpose of confirming Electricity, Water and Gas Meters, samples are taken in accordance with Table (A-2) issued based on the International Organisation for Legal Metrology Guide No. (e17-G020) and the international specification ISO2859-2.

Table (A-2)

NO	Lot size		Number of nonconforming meters	
----	----------	--	--------------------------------	--

		Sample size	Criteria for acceptance of lot (c)	Criteria for rejection of lot (d)	Spare meters
2.1	Up to 90	24	0	1	5
2.2	91-150	26	0	1	8
2.3	151-280	28	0	1	10
2.4	281-500	32	0	1	10
2.5	501-1200	50	1	2	10
2.6	1201-3200	80	3	4	16
2.7	3201-10000	125	5	6	25
2.8	10001-35000	200	10	11	40

Annex No. (6)
Compliance Models
Compliance Model (B)
Type Examination

1. It is part of the conformity assessment procedure through which the Concerned Authority tests the technical design of an device and verifies and certifies that the technical design of this device meets the requirements of this resolution to which it applies.

2. The gender test can be done in one of the following ways:

A. Examination of a representative sample of the expected output of the complete Measuring Device, called a production type check.

B. Assessing the adequacy of the technical design of the device by examining the technical documents and supporting evidence referred to in Clause (3) of this form, without examining a sample, is called a design type examination.

C. Assessing the adequacy of the technical design of the device by examining the technical documents and supporting evidence referred to in Clause (3) of this form, in addition to examining samples representative of the expected production, whether the examination is conducted on the main part of the device or its sub-part. This type combines production type examinations and design type examinations.

D. The Concerned Authority shall define the appropriate method it wishes to follow and the samples required for the examinations referred to in the items contained in this clause.

3. The Manufacturer shall submit a request for type testing to one Concerned Authority of his choice, and the request shall contain the following:

A. Name and address of the Manufacturer. If the application is submitted by the Supplier, the Concerned Authority shall also be provided with his name and address.

B. A written undertaking that this application has not been submitted with any other Concerned Authority.

C. The technical documents contained in Annex No. (8) of this resolution shall be sufficient to enable the conformity assessment to be conducted, and include risk analysis and data on the design and operation of the measurement department.

D. Representative samples of the expected production, and the Concerned Authority may request additional samples when necessary to implement the testing programme.

E. Supporting evidence of the adequacy of the technical design solutions. This supporting evidence shall mention any documents that were used, especially with regard to the specifications contained in Annex (7) of this Resolution that were not fully implemented. The supporting evidence shall also contain, when necessary, the results of tests carried out based on other relevant technical specifications by a laboratory appropriate to the Manufacturer, or by another testing laboratory that carried out the tests on behalf of the Manufacturer and under its responsibility.

4. The Concerned Authority shall:

A. Regarding the device:

Examine technical documentation and supporting evidence to assess the adequacy of the technical design of the device.

B. Regarding the sample/samples:

(1) Confirm that the sample/samples have been manufactured in accordance with the technical documents and identifying the elements that have been designed in accordance with the provisions applicable to them from the specifications contained in Appendix (7) of this resolution, in addition to the elements that have been designed based on other related technical specifications.

(2) Conduct appropriate examinations and tests, or supervising their conduct, to ensure that the Manufacturer, if it selects to apply the solutions contained in the specifications contained in Appendix (7) of this resolution, has applied them correctly.

(3) Conduct appropriate examinations and tests, or supervising their conduct, to ensure that the Manufacturer meets the basic requirements contained in this resolution, in the event that the Manufacturer selects not to apply solutions not included in the specifications set forth in Appendix (7) of this resolution, and selects to apply the solutions contained in other related technical specifications.

(4) Agree with the Manufacturer on the place where the examinations and tests will be carried out for the other parts of the Measuring Device.

(5) Examine technical documentation and supporting evidence to assess the adequacy of the technical design of the other parts of the device.

5. The Concerned Authority shall prepare assessment report recording all the procedures undertaken pursuant to Clause (4) of this form and their results, without prejudice to its obligations towards the Ministry or the Competent Authorities. The Concerned Authority shall also declare the contents of this report in full or in part, after obtaining the approval of the Manufacturer.

6. If the type meets the requirements of this resolution, the Concerned Authority shall issue a Type Test Certificate to the Manufacturer, which shall contain the name and address of the Manufacturer, the results of the tests, the conditions (if necessary) of its powers and the data necessary to identify the approved type. The Type Test Certificate may also contain one or more Annexes. The Type Test Certificate and its Annexes shall also include all the following information, which makes it possible to assess the conformity of the Measuring Device manufactured in accordance with the type being tested, especially with regard to metrological properties when it is properly adjusted using appropriate methods:

A. Metrological properties of the device type.

B. Procedures required to ensure the integrity of the device (seal, unique number of the software used, etc.).

C. Information about other elements necessary to identify the device and ensure its theoretical external conformity to the type.

D. Any other information necessary to confirm the characteristics of the manufactured device, if appropriate.

E. Regarding the device accessories, all information to ensure compatibility with other accessories or with the Measuring Device itself.

7. The validity of the Type Test Certificate is for a period of (10) years from the date of issue. It may be renewed for subsequent periods of (10) years each. If the type does not meet the requirements related to it in this resolution, the Concerned Authority

shall refuse to issue the Type Test Certificate, and shall inform the party submitting the application of this, stating the reason for the refusal in detail.

8. The Concerned Authority shall be kept fully informed of any change in the Measuring Device which consequently renders it non-compliant with this resolution, and shall define whether the change in the Measuring Device requires further investigation, and shall inform the Manufacturer accordingly.

9. The Manufacturer shall inform the Concerned Authority holding the technical documentation for the Type Test Certificate of all changes to the approved type which may affect the conformity of the device with the essential requirements of this resolution or special circumstances of the validity of the certificate, which require additional checks to be carried out in addition to those contained in the original Type Test Certificate.

10. Each Concerned Authority shall provide the Ministry or the Competent Authorities (Notifying Authority) with the Type Test Certificates it has issued, amended, specified the scope of, suspended or cancelled, on a periodic basis or upon request.

11. The Ministry or other designated bodies shall have the right to obtain a copy of such certificates, technical documents or results of examinations conducted by the Concerned Authority.

12. The Concerned Authority shall retain a copy of the Type Test Certificate, its Annexes and amendments, the technical documentation file, and the documents submitted by the Manufacturer, until the expiry of the certificate validity.

13. The Manufacturer shall keep a copy of the Type Test Certificate, its attachments and amendments, and the technical documentation file to be immediately available upon request from the Competent Authorities for a period of (10) years from the date of placing the device on the market. 14. The Supplier may submit the application in accordance with Clause (3) of this form and meet the requirements set out in Clauses (10.8) of this form, provided that they are supported by the Supplier obligations.

Compliance Model (F)

Conformity to type based on product confirmation

Conformity to type based on product confirmation

1. It is a conformity assessment procedure during which the Manufacturer meets the requirements stated in clauses (2), (5/A) and (6) of this form and guarantees and declares its full responsibility that the Measuring Device manufactured by it, which has been subject to the provisions of clause (3) of this form, conforms to the approved type as indicated in the Type Test Certificate in addition to the requirements stated in this resolution.

2. Manufacturing:

The Manufacturer shall take all necessary measures so that all manufacturing and control operations ensure that the manufactured devices conform to the approved type as indicated in the Type Test Certificate in addition to the requirements contained in this resolution.

3. Confirmation:

The Concerned Authority selected by the Manufacturer shall carry out, or request the appropriate examinations and tests to be carried out, to confirm that the device conforms to the approved type as indicated in the Type Test Certificate in addition to the requirements contained in this resolution.

The Manufacturer shall select one of the following two methods to confirm the devices:

A. Confirm conformity by testing and inspecting each device, as indicated in Clause (4) of this form.

B. Confirm conformity by statistical methods each device, as indicated in Clause (5) of this form.

4. Confirm conformity by testing and checking each device:

A. All Measuring Devices shall be individually tested (device by device) and the appropriate tests and examinations stipulated in the specifications set forth in Annex (7) of this Resolution, and/or equivalent examinations stipulated in the relevant technical specifications, shall be carried out in order to confirm the conformity of the

manufactured devices to the approved type as indicated in the Type Test Certificate in addition to the requirements contained in this Resolution.

B. In the event that the specifications set out in Appendix (7) of this resolution are not available, the Concerned Authority shall define the appropriate tests that shall be conducted.

C. The Concerned Authority shall issue Conformity Certificate for the tests and examinations carried out, and shall affix its identification number, or permit its affixation by the Manufacturer and under the responsibility of the Concerned Authority.

D. The Manufacturer shall keep the Conformity Certificate available for inspection by the Competent Authorities for a period of (10) years from the date of placing the device on the market.

5. confirmation of conformity by statistical methods:

A. The Manufacturer shall take all necessary measures so that the manufacturing process and its control ensure the homogeneity of the manufactured batch, and shall provide Measuring Devices for confirmation in the form of homogeneous Inspection Batches.

B. Random samples shall be taken in accordance with Paragraph (c) of this Clause, in order to conduct appropriate tests and examinations on all of them individually, in accordance with the specifications set forth in Annex (7) of this resolution, and/or equivalent examinations stipulated in the relevant technical specifications, in order to confirm the conformity of the manufactured devices to the approved type as indicated in the Type Test Certificate in addition to the requirements contained in this resolution. In the event that specifications are not available in Annex (7) of this resolution, the Concerned Authority shall determine the appropriate examinations that must be conducted.

C. The statistical procedure shall meet the following requirements:

1) A level of quality corresponding to a probability of acceptance of (95%) with a non-conformity of less than (1%).

2) A level of quality corresponding to a probability of acceptance of (5%) with a non-conformity of less than (7%).

D. If Inspection Batch is accepted, the entire batch shall be considered approved except for samples that fail during inspection.

(1) The Concerned Authority shall issue Conformity Certificate for the tests and examinations carried out, and shall affix its identification number, or permit its affixation by the Manufacturer and under the responsibility of the Concerned Authority.

(2) The Manufacturer shall keep the Conformity Certificate available for inspection by the Competent Authorities for a period of (10) years from the date of placing the device on the market.

(3) The same tests shall be applied to meters that operate on a battery system, provided that the expected life of the Meters is (10) ten years at most.

E. In the event that Inspection Batch is rejected, the Concerned Authority shall take the necessary measures to prevent non-compliant Inspection Batches from being placed on the market. In the event that Inspection Batches are repeatedly rejected, the Concerned Authority may suspend confirmation of conformity in accordance with the statistical procedure and take appropriate measures.

6. Conformity Mark and Declaration of Conformity:

A. The Manufacturer, under the responsibility of the Concerned Authority referred to in Clause (3) of this form, shall affix the conformity mark and the metrological mark (type declaration mark) specified in this resolution, in addition to the identification number of the Concerned Authority, on every device conforming to the approved type indicated in the Conformity Certificate declaration that meets the relevant requirements contained in this resolution.

B. The Manufacturer shall issue a written declaration of conformity for each model of Measuring Device, in a clear and specific manner, and keep it available upon request from the Competent Authorities for a period of (10) years from the date of placing the device on the market.

(1) Each device placed on the market shall be provided with a copy of the Declaration of Conformity, and one copy may be provided for one Inspection Batch of Measuring Devices used for one purpose.

(2) If the Appointing Authority referred to in Clause (3) of this form agrees, and under its responsibility, the Manufacturer may affix the identification number of the Appointing Authority to the Measuring Device.

7. If the Appointing Authority referred to in Clause (3) of this form agrees, and under its responsibility, the Manufacturer may affix the identification number of the Appointing Authority to the Measuring Device during the Manufacture Process.

8. Supplier:

A. The Manufacturer obligations may be fulfilled by the Supplier, on behalf of the Manufacturer and under their responsibility, provided that they are limited to the Supplier obligations.

B. The Supplier may not, on behalf of the Manufacturer, fulfil the requirements specified in clauses (2) and (5/A) of this form.

Compliance Model (D)

Conformity to type based on quality assurance of the production process

Conformity to type based on quality assurance of the production process

1. It is a conformity assessment procedure during which the Manufacturer meets the requirements stated in items (2) and (5) of this form, and guarantees and declares its full responsibility that the Measuring Device manufactured by it conforms to the approved type.

As stated in the Type Test Certificate in addition to the requirements contained in this resolution.

2. Manufacturing:

The Manufacturer shall:

- A. To operate in accordance with approved quality system.
- B. The final product shall be inspected and examined in accordance with Clause (3) of this form.
- C. To be subject to continuous monitoring operations in accordance with Clause (4) of this form. C.

3. Quality System:

A. The Manufacturer shall submit application to the Concerned Authority of his selection to assess the quality system used in the manufacture of Measuring Devices, which shall include:

- (1) The name and address of the Manufacturer, and if provided by the Supplier, the name and address of the Supplier shall also be specified.
- (2) A written undertaking that the application has not been submitted to any other Concerned Authority.
- (3) All relevant information for the device to be manufactured.
- (4) Documents related to the quality system.
- (5) The technical documents referred to in Paragraph (b) of Clause (3) of this form.

B. The quality system shall ensure that the Measuring Device meets the requirements of this resolution. All elements, terms and conditions adopted by the Manufacturer shall be documented in a systematic, organised and clear manner in the form of

written policies, procedures and work instructions. The quality system shall include an adequate and appropriate description of the following:

- (1) Quality objectives, organisational structure, responsibilities and powers of management, in relation to product safety;
- (2) Quality control and quality assurance procedures, processes and methodologies that will be used during manufacturing.
- (3) The tests that will be conducted before, during and after the manufacturing process and the frequency of conducting them.
- (4) Quality records such as inspection reports, test data, calibration data, qualification reports of relevant persons.
- (5) Means of monitoring the achievement of the required product quality and effective management of the quality system.

C. The Concerned Authority shall assess the quality system to define whether it meets the requirements set forth in paragraph (b) of item (3) of this form. The Review Team shall also be qualified and experienced in assessment processes. The Review Team shall also include at least one technical expert who has technical experience in the field of the measurement device and has good knowledge of the requirements of this resolution.

- (1) The Review Process shall include an assessment visit to the Manufacturer site.
- (2) The Review Team shall review the technical documents referred to in Clause (5) of Paragraph (A) of Clause (3) of this form to confirm the Manufacturer ability to define the requirements referred to in this resolution, and the ability to conduct all necessary tests to ensure compliance with it.
- (3) The Review Team shall inform the Manufacturer of the Review results, which shall include the results and resolutions of the Review Process.

D. The Manufacturer shall take all actions stipulated in the approved quality system, and maintain them appropriately and effectively.

E. The Manufacturer shall keep the Concerned Authority that approved the quality system informed of any changes intended to be made to the quality system.

(1) The Concerned Authority shall assess the submitted proposals and decide whether the quality system will continue to meet the requirements set out in paragraph (b) of item (3) of this form or whether there is a need for re-assessment if necessary.

(2) The Concerned Authority shall inform the Manufacturer of its resolution, which shall include a summary of the assessment process and the reasons for its resolution.

4. Follow-up visits under the responsibility of the Concerned Authority:

A. The follow-up visit aims to ensure that the Manufacturer continues to fully meet the obligations stipulated in the quality system.

B. The Manufacturer shall allow the Concerned Authority access to the design, manufacturing, inspection and storage sites, and provide the Concerned Authority with the necessary information for the assessment processes, in particular:

(1) Quality system documents.

(2) Quality records such as inspection reports, test data, calibration data, qualification reports of relevant persons.

C. The Concerned Authority shall conduct a periodic Review of the Manufacturer to ensure that the Manufacturer continues to maintain and apply the quality system, and the Concerned Authority shall provide the Manufacturer with the Review Report.

D. In addition, the Concerned Authority may conduct Unannounced visits to the Manufacturer, during which examinations or tests are conducted, or requested to be conducted, with the aim of ensuring that the quality system is operating properly. In this case, the Concerned Authority shall provide the Manufacturer with a visit report and a report on the examinations and tests that were conducted by the Concerned Authority or upon its request.

5. Conformity Mark and Declaration of Conformity:

A. The Manufacturer, under the responsibility of the Concerned Authority referred to in Paragraph (A) of Clause (3) of this form, shall affix the conformity mark and the metrological mark (type declaration mark) specified in this resolution, in addition to the identification number of the Concerned Authority, on every device conforming to the approved type indicated in the Conformity Certificate declaration that meets the relevant requirements contained in this resolution.

B. The Manufacturer shall issue written declaration of conformity for each model of Measuring Device, in a clear and specific manner, and keep it available upon request from the Competent Authorities for a period of (10) years from the date of placing the device on the market.

C. Each device placed on the market shall be provided with a copy of the Declaration of Conformity, and one copy may be provided for one Inspection Batch of Measuring Devices used for one purpose.

6. The Manufacturer shall provide the following to the Ministry or the Competent Authorities upon request, for a period of (10) years from the date of placing the device on the market:

A. The technical documents referred to in Paragraph (A) of Clause (3) of this form.

B. Information relating to the change referred to in Paragraph (e) of Clause (3) of this form, as approved.

C. Resolutions and reports issued by the Concerned Authority referred to in clauses (3/e), (4/c) and (4) d).

Each Concerned Authority shall inform the Ministry or the Competent Authorities of each established quality system that has been issued or withdrawn, and shall, periodically or upon request, provide a list of quality systems that have been rejected, suspended or identified.

7. Supplier:

The Manufacturer obligations specified in Clauses (3/a), (3/e), (5) and (6) may be fulfilled by the Supplier, on behalf of the manufacturer and under his responsibility, provided that they are limited to the obligations of the supplier.

Compliance Model (H1)

Compliance based on comprehensive quality assurance and design testing

Compliance based on comprehensive quality assurance and design testing

1. It is a conformity assessment procedure during which the Manufacturer meets the requirements stated in items (2) and (6) of this form, and guarantees and declares its

full responsibility that the Measuring Device manufactured by it fulfil all requirements contained in the Resolution.

2. Manufacturing:

The Manufacturer shall:

- A. To operate in accordance with approved quality system.
- B. The final product shall be inspected and examined in accordance with Clause (3) of this form.
- C. To be subject to continuous monitoring operations in accordance with Clause (5) of this form.
- D. A test shall be carried out to suit the technical design of the Measuring Device in accordance with Clause (4) of this form.

3. Quality System:

A. The Manufacturer shall submit application to the Concerned Authority of his selection to assess the quality system used in the manufacture of Measuring Devices, which shall include:

- (1) Name and address of the Manufacturer, and if provided by the Supplier, the name and address of the Supplier shall also be specified.
- (2) All information relevant to the type of device to be manufactured.
- (3) A written undertaking that the application has not been submitted to any other Concerned Authority.
- (4) Documents related to the quality system.

B. Technical requirements related to the quality system

(1) All elements, terms and conditions adopted by the Manufacturer shall be documented in a systematic, organised and clear manner in the form of written policies, procedures and work instructions.

(2) In particular, the quality system shall include an adequate and appropriate description of the following:

A. Quality objectives, organisational structure, responsibilities and powers of management, in relation to product safety;

B. The technical specifications for the design, including the standard specifications that will be applied and whether the specifications stated in Annex (7) of this resolution will not be fully applied, in addition to the means that will be used to ensure that the basic requirements stated in this resolution regarding the Measuring Device will be met using other related technical specifications.

C. Design control and confirmation techniques, processes and methodological procedures that will be used when designing the Measuring Device in question.

D. Quality control and quality assurance procedures, processes and methodologies that will be used during manufacturing.

E. The tests that will be conducted before, during and after the manufacturing process and the frequency of conducting them.

F. Quality records such as inspection reports, test data, calibration data, qualification reports of relevant persons.

G. Means of monitoring the achievement of the required product quality and effective management of the quality system.

C. Quality System Assessment Requirements

(1) The Review Team shall also be qualified and experienced in assessment processes. The Review Team shall also include at least one technical expert who has technical experience in the field of the measurement device and has good knowledge of the requirements of this resolution.

(2) The Review Process shall include an assessment visit to the Manufacturer site.

(3) The Review Team shall review the technical documents referred to in Clause (2) of Paragraph (A) of Clause (3) of this form to confirm the Manufacturer ability to define the requirements referred to in this resolution, and the ability to conduct all necessary tests to ensure compliance with it.

(4) The Review Team shall inform the Manufacturer of the Review results, which shall include the results and resolutions of the Review Process.

D. The Manufacturer shall take all actions and obligations stipulated in the approved quality system, and maintain them appropriately and effectively.

E. The Manufacturer shall keep the Concerned Authority that approved the quality system informed of any changes intended to be made to the quality system.

F. The Concerned Authority shall assess the submitted proposals and decide whether the quality system will continue to meet the requirements set out in paragraph (b) of item (3) of this form or whether there is a need for re-assessment if necessary.

G. The Concerned Authority shall inform the Manufacturer of its resolution, which shall include a summary of the assessment process and the reasons for its resolution.

H. Each Concerned Authority shall inform the Ministry or the Competent Authorities of each established quality system that has been issued or withdrawn, and shall, periodically or upon request, provide a list of quality systems that have been rejected, suspended or identified.

4. Design tests:

A. The Manufacturer shall submit an application to the Concerned Authority referred to in paragraph (a) of clause (3) of this

The model is for design testing.

B. The application shall be clear enough to enable an understanding of the design, manufacture and operation of the device and an assessment of conformity with the requirements of this resolution, and shall include:

(1) Name and address of the Manufacturer.

(2) A written undertaking that the application has not been submitted to any other Concerned Authority.

(3) The technical documents contained in Annex No. (8) of this resolution shall be sufficient to enable the conduct of

Conformity assessment, including risk analysis, design data and measurement management work.

(4) Evidence and documents supporting the adequacy of the technical design, which shall mention any documents that have been used, and in particular the requirements that have not been met from the specifications set out in Annex (7) of this resolution, and shall also include, whenever necessary, the results of the tests that have been conducted in accordance with the technical specifications, which shall be in

appropriate laboratories affiliated with the Manufacturer or any other laboratories but under its responsibility.

C. The Concerned Authority shall test the application, and if the design complies with the requirements of this resolution, the Concerned Authority shall issue a design test certificate in favour of the Manufacturer, which shall contain the following:

- (1) Name and address of the Manufacturer.
- (2) Test results.
- (3) Conditions of validity of the certificate, if applicable.
- (4) Data necessary to define the headquarters design.

D. The certificate may contain one or more Annexes. The certificate and its annexes shall contain all the information necessary to allow the in-service control of Measuring Devices and to assess their conformity with the tested design, particularly with regard to the reproducibility of metrological properties when they are controlled using appropriate devices, which include:

1. Metrological properties of the design.
2. Measures required to ensure that the device is not tampered with (software seal etc.).
3. Information about other elements necessary to characterize the device and ensure its visual external conformity to the design.
4. Any special information to confirm the Manufacturer device , if necessary.
5. All information necessary to ensure that sub-assembly units are compatible with the Measuring Device or other required units.

I. The Concerned Authority shall prepare an assessment report in this regard and keep it available to the Ministry or the Competent Authorities.

J. Without prejudice to the other provisions, the Concerned Authority shall declare the contents of this report in full or in part, after obtaining the approval of the Manufacturer.

G. The validity of the Type Test Certificate is for a period of (10) years from the date of issue, and it may be renewed for subsequent periods of 10 years each.

L. If the design does not meet the requirements related to it in this resolution, the Concerned Authority shall refuse to issue the (Design examination certificate), and shall inform the party submitting the application of this, stating the reason for the refusal in detail.

M. The Concerned Authority shall be kept fully informed of any change in the Approved Design which consequently renders it non-compliant with this resolution, and shall define whether the change in the Measuring Device requires further investigation, and shall inform the Manufacturer accordingly.

N. The Manufacturer shall inform the Concerned Authority holding the technical documentation for the design test certificate of all changes to the approved type which may affect the conformity of the device with the essential requirements of this resolution or special circumstances of the validity of the certificate, which require additional checks to be carried out in addition to those contained in the original Type Test Certificate.

O. Each Concerned Authority shall provide the Ministry or the Competent Authorities (Notifying Authority) with the Type Test Certificates it has issued, amended, specified the scope of, suspended or cancelled, on a periodic basis or upon request.

I. The Ministry or other designated bodies shall have the right to obtain a copy of such certificates, technical documents or results of tests conducted by the Concerned Authority.

Q. The Concerned Authority shall retain a copy of the Design Test Certificate, its Annexes and amendments, the technical documentation file, and the documents submitted by the Manufacturer, until the expiry of the certificate validity.

G. The Manufacturer shall keep a copy of the Design Test Certificate, its attachments and amendments, and the technical documentation file to be immediately available upon request from the Competent Authorities for a period of (10) years from the date of placing the device on the market.

5. Follow-up visits under the responsibility of the Concerned Authority:

A. The follow-up visit aims to ensure that the Manufacturer continues to fully meet the obligations stipulated in the quality system.

B. The Manufacturer shall allow the Concerned Authority access to the design, manufacturing, inspection and storage sites, and provide the Concerned Authority with all the necessary information for the assessment processes, in particular:

(1) Quality system documents.

(2) Quality records as provided in the design part of the quality system, such as results of analyses, calculations and tests.

(3) Quality records as provided in the manufacturing part of the quality system, such as inspection reports, testing and calibration data, and competency reports of the persons concerned.

C. The Concerned Authority shall conduct a periodic Review of the Manufacturer to ensure that the Manufacturer continues to maintain and apply the quality system, and the Concerned Authority shall provide the Manufacturer with the Review report.

D. In addition, the Concerned Authority may conduct Unannounced visits to the Manufacturer, during which examinations or tests are conducted, or requested to be conducted, with the aim of ensuring that the quality system is operating properly. In this case, the Concerned Authority shall provide the Manufacturer with a visit report and a report on the examinations and tests that were conducted by the Concerned Authority or upon its request.

6. Conformity Mark and Declaration of Conformity:

A. The Manufacturer, under the responsibility of the Concerned Authority referred to in Clause (3) of this form, shall affix the conformity mark and the metrological mark (type declaration mark) specified in this resolution, in addition to the identification number of the Concerned Authority, on every device conforming to the approved type indicated in this resolution.

B. The Manufacturer shall issue a written declaration of conformity for each model of Measuring Device, in a clear and specific manner, and keep it available upon request from the Competent Authorities for a period of (10) years from the date of placing the device on the market.

C. Each device placed on the market shall be provided with a copy of the Declaration of Conformity. One copy may be provided for one Inspection Batch of Measuring Devices used for one purpose.

7. The Manufacturer shall provide the following to the Ministry or the Competent Authorities upon request, for a period of (10) years from the date of placing the device on the market:

A. Documents related to the quality system referred to in paragraph (a) of Clause (3) of this form.

B. Information relating to the change referred to in Paragraph (e) of Clause (3) of this form, as approved.

C. Resolutions and reports issued by the Concerned Authority referred to in Clauses (3/e), (5/c) and (5/d).

8. Supplier:

The Supplier may submit the request referred to in Clauses (4/a) and (4/b). The Manufacturer requirements specified in clauses (3/a), (3/c), (4/d), (4/f), (6) and (7), on behalf of the factory and under its responsibility, provided that they are specified by the Supplier obligations.

Annex (7)

Approved Specifications

This annex shows the list of approved specifications for this resolution, as follows:

1-1 Water Meters:

OIML R49-1
OIML R49-2
OIML R49-3
OIML G020-e17

2-1 Gas Meters and volume conversion devices:

EN 1359 Gas Meters - Diaphragm Gas Meters
EN 1359
EN 12261 Gas Meters - Turbine Gas Meters
EN 12261
EN 12261
EN 12405-1 Gas Meters - Conversion devices - Part 1: Volume conversion
EN 12480 Gas Meters - Rotary displacement Gas Meters
EN 12480
EN 14236 Ultrasonic domestic Gas Meters
OIML G020-e17

1-3 Electricity Meters

EN 50470-1 Electricity Metering equipment (a.c.) -- Part 1: General requirements, tests and test conditions - Metering equipment (class indexes A, B and C)
EN 50470-2 Electricity Metering equipment (a.c.) -- Part 2: Particular requirements - Electromechanical meters for active energy (class indexes A and B)
EN 50470-3 Electricity Metering equipment (a.c.) -- Part 3: Particular requirements - Static meters for active energy (class indexes A, B and C)
(IEC 62052-11)

Electricity Metering equipment- General requirements, tests and test conditions- Part 11: Metering equipment
IEC 62053-11,21,22,23,24 Electricity Metering Equipment...
EN 62058-11 Electricity Metering equipment (a.c.) - Acceptance inspection -- Part 11: General acceptance inspection methods IEC 62058-11:2008 (Modified)
EN 62058-21 Electricity Metering equipment (a.c.) - Acceptance inspection -- Part 21: Particular requirements for electromechanical meters for active energy (classes 0,5, 1 and 2 and class indexes A and B) IEC 62058-21:2008 (Modified)
EN 62058-31 Electricity Metering equipment (a.c.) - Acceptance inspection -- Part 31: Particular requirements for static meters for active energy (classes 0,2 5, 0,5 S, 1 and 2, and class indexes A, B and C) IEC 62058-31:2008 (Modified)
EN 62059-32-1 Electricity Metering equipment - Dependability -- Part 32-1: Durability - Testing of the stability of metrological properties by applying elevated Temperature IEC 62059-32-1:2011
OIML R46-1&2
OIML D 31
OIML G020-e17

4-1 Heat Meter:

EN 1434-1 Heat Meters - Part 1: General requirements

EN 1434-2 Heat Meters - Part 2: Constructional requirements
EN 1434-2
EN 1434-4 Heat Meters - Part 4: Pattern approval tests
EN 1434-4
EN 1434-5 Heat Meters - Part 5: Initial confirmation tests
OIML G020-e17

Article (2)

The recommendations issued by the International Organisation for Legal Metrology are considered equivalent to the specifications adopted in Article (1) of this Annex to the extent that they do not conflict with them.

Annex (8)

Technical Documents

1. Technical Documents shall cover the design, manufacture and operation of the Measuring Device in a manner that clearly enables an assessment of its compliance with the applicable requirements of this resolution.
2. Technical Documents shall be sufficiently detailed to meet the following requirements:
 - A. Definition of metrological properties.
 - B. The repeatability of manufactured Measuring Devices when properly adjusted using appropriate means.
 - C. The safety of the Measuring Device and its resistance to environmental conditions.
3. For the purposes of evaluating and determining the type and/or Measuring Device, the technical documentation shall include the following information:
 - A. General description of the Measuring Device.
 - B. Conceptual design, manufacturing drawings, component and sub-assembly diagrams, circuits, etc.
 - C. Manufacturing procedures to ensure consistent production.
 - D. Description of electronic components and their schematics, logical flow diagrams and a general description of software showing its characteristics and operations, whenever possible.
 - E. Description and explanation necessary to understand the information referred to in paragraphs (a, b, c, d) of this item in addition to how to use the device.
 - F. List of harmonized specifications and/or standard documents fully or partially applied, and the references in which they are published.
 - G. Description of the solutions adopted to meet the essential requirements, in the event that the harmonized specifications and/or applicable standard documents are not applied, including a list of other relevant technical specifications.
 - H. Results of design calculations, tests, etc.
 - I. Results of appropriate tests, where necessary, to demonstrate that the type and/or Measuring Devices meet the following:

(1) The requirements of this resolution are under the headings “Operational Conditions” and “interference.”

(2) Durability characteristics of gas, water and Heat Meters.

J. Type Test Certificates or design test certificates in respect of Measuring Devices containing parts identical to those in the design.

4. The Manufacturer shall specify the locations for placing the required seals and marks in accordance with this resolution.

5. The Manufacturer shall specify the conditions necessary for compatibility with interfaces and sub-assemblies, where appropriate.