



Republika e Kosovës
Republika Kosova -Republic of Kosovo
Qeveria-Vlada-Government

Ministria e Tregtisë dhe Industrisë - Ministarstvo Trgovine i Industrije - Ministry of Trade and Industry

Pursuant to Article 93 paragraph 4 of the Constitution of the Republic of Kosovo, article 4, paragraph 4, subparagraph 4.1 and article 46 of Law No.03/L-203 On Metrology, and article 8 paragraph 1 subparagraph 1.4. and Annex 8 of the Regulation No.02/2011 On Areas of Administrative Responsibility of the Office of the Prime Minister and Ministries, the Minister of Trade and Industry issues the following:

ADMINISTRATIVE INSTRUCTION No. 06/2011
ON TESTING OF ACTIVE ENERGY ELECTRONIC METERS
OF THE ACCURACY CLASS 1 AND 2

Article 1
Purpose

1. This Administrative Instruction sets out the method of testing during the process of verification of single-phase and three-phase active energy electronic meters of accuracy class 1 and 2 (hereinafter “meters”) to verify whether the metrological and technical requirements under the Administrative Instruction. 2006/22 on technical - metrological requirements for static active energy meters of accuracy class 1 and 2 are met.
2. This instruction sets out the test procedures of the first - initial verification, regular verification pursuant to the time intervals described, and of the extraordinary verification of meters.

Article 2
Definition of Terms

1. Terms and expressions used in this directive have the following meanings:
 - 1.1. **Electronic meters** - means metering devices that measure electricity electronically;
 - 1.2. **DMK** - means the Department of Metrology of Kosovo.

Article 3
Conditions to be fulfilled by the Service

1. The Service must meet the following requirements regarding:

- 1.1. Personnel;
 - 1.2. Space for meter testing;
 - 1.3. Equipment for meter testing;
 - 1.4. Relevant documentation provided by the Administrative Instruction No.2006/23 On metrological-technical requirements for authorization of services to prepare electricity meters for verification.
2. The Service shall enable testing of meters by the method of work measurement – comparison with etalon meter (etalon meter method).

Article 4

Preparation of Meters for Verification

1. Types of meter verification:

- 1.1. First verification of the meters is conducted at the manufacturer's service for new meters which were produced;
- 1.2. Regular - periodic verification of meters on specified time intervals is conducted for the meters that have been in use, but were withdrawn from the distribution network to be verified;
- 1.3. Extraordinary verification of meters is conducted for meters that were not in use due to defects or other technical shortcomings, or because they were not verified on specified time intervals.

2. Control of prepared meters:

- 2.1. Meters prepared for verification shall meet the criteria defined on the metering device type approval issued by the Department of Metrology of Kosovo, hereinafter - DMK;
- 2.2. In the verification shall not be accepted meters that do not meet the criteria defined on the metering device type approval, the meters for which there are no adequate equipment for testing and accuracy class for this type of meters, and meters which before the preparation are found with mechanical damages, damages from corrosion, electrical damages, cracked or broken glass of the windows, pressed meter casing, connection terminals damaged or similar;
- 2.3. Meters are prepared for regular verification if they are clean - washed, serviced and adequate even though on them have been conducted all actions required for safe and uninterrupted work and with meter covers closed with lead or plastic seals;
- 2.4. Meters prepared for verification individually – single method, shall be placed in the frame in vertical position, connected on current and voltage circuit;
- 2.5. Meters on which the verification is conducted with statistical methods shall be located in adequate shelves. Before verification the testing samples are selected, which afterwards are placed in the frame;
- 2.6. Prepared test reports are controlled;
- 2.7. Data on the meter inscription table are controlled, where should be confirmed whether the following data are written on the inscription plate:

- 2.7.1. name and designation or trademark of the manufacturer and place of production;
- 2.7.2. mark of the factory for the meter type;
- 2.7.3. type of meter;
- 2.7.4. serial number and production year;
- 2.7.5. reference voltage in "V" or "kV";
- 2.7.6. data on nominal and maximum current in "A";
- 2.7.7. reference frequency in "Hz" (ex. 50 Hz);
- 2.7.8. constant of the meter in imp. / kWh (ex. 1000imp. / kWh);
- 2.7.9. accuracy class (ex.C1.2);
- 2.7.10. official mark of the meter type;
- 2.7.11. measuring unit;
- 2.7.12. the sign "square in square" meters with insulation casing of protection class II;
- 2.7.13. connection scheme or number of the connection scheme;
- 2.7.14. inscription for " prevention of reverse registration", or appropriate sign for meters with a mechanism for prevention of reverse registration;
- 2.7.15. all clamps are written in the connection box according to the connection standard scheme;
- 2.7.16. inscription "transformer meter", respectively relevant sign for meters connected through measurement transformer.

Article 5

Methods of Meter Verification

1. Initial - first verification of active energy electronic meters of accuracy class 1 and 2 (newly produced meters) can be conducted through testing individually or with the statistical method by selecting samples according to the selection of samples provided under paragraph 7 of this law.
2. Regular and extraordinary verification of active energy electronic meters of accuracy class 1 and 2 can be conducted through testing, individually or with the statistical method by selecting samples according to the plan provided under paragraph 8 of this law.
3. With the individual testing method are tested active energy electronic meters of accuracy class 1 and 2 for connection through measurement transformers. .
4. By the statistical testing method are tested active energy electronic meters of accuracy class 1 and 2 for direct connection with the same reference voltage, with the same value of nominal current and a similar value of maximum current (the difference of the value of maximum current can be highest 20 A).
5. Meters for verification, pursuant to the submitted request, make a group of meters which group must contain the testing report.
6. If in the request it is not stressed out the method of testing of samples with statistical method, then the testing is conducted by taking samples individually.

7. Initial first verification of meters pursuant to the paragraph 1 of this article can be conducted by the statistical testing method, by individually taking samples (taking one sample) or taking double sample, for which is selected the next number of samples given in the tables 1 and 2.

Table 1 Testing of new meters with the method of taking individual samples

No.	Quantity of group	Quantity of samples	Number of inaccurate meters	
			Criteria for acceptance of the group	Criteria for refusal of the group
1.	from 50 to 100	15	0	≥ 1
2.	from 101 to 500	30	0	≥ 1
3.	from 501 to 1000	40	0	≥ 1

Table 2 Testing of new meters with the method of taking double samples

Nr.	Quantity of group	Samples	Quantity of samples	Total quantity of samples	Number of inaccurate meters		
					Criteria for acceptance of the group	Criteria for refusal of the group	Criteria for taking 2 samples
1.	from 101 to 500	First	30	30	0	≥ 2	1
		Second	30	60	1	≥ 2	
2.	from 501 to 1000	First	40	40	0	≥ 2	1
		Second	40	80	1	≥ 2	

8. Regular and extraordinary testing pursuant to paragraph 4 of this article can be conducted with the statistical method, with the individual method or double sample method, for whom is selected the next number of sample provided in tables 3 and 4.

Table 3 Testing with the method of taking individual sample

No.	Quantity of group	Quantity of samples	Number of inaccurate meters	
			Criteria for acceptance of the group	Criteria for refusal of the group
1.	from 16 to 25	5	0	≥ 1
2.	from 26 to 50	8	0	≥ 1
3.	from 51 to 90	13	1	≥ 2
4.	from 91 to 150	20	1	≥ 2
5.	from 151 to 280	32	2	≥ 3
6.	from 281 to 500	50	3	≥ 4
7.	from 501 to 1200	80	5	≥ 6

Table 4 Testing with the method of taking double sample

No.	Quantity of group	Sample	Quantity of samples	Total quantity of samples	Number of inaccurate meters		
					Criteria for acceptance of the group	Criteria for refusal of the group	Criteria for taking 2 samples
1.	from 16 to 25	First	3	3	0	≥ 2	1
		Second	3	6	1	≥ 2	
2.	from 26 to 50	First	5	5	0	≥ 2	1
		Second	5	10	1	≥ 2	
3.	from 51 to 90	First	8	8	0	≥ 2	1
		Second	8	16	1	≥ 2	
4.	from 91 to 150	First	13	13	0	≥ 2	1
		Second	13	26	1	≥ 2	
5.	from 151 to 280	First	20	20	0	≥ 3	1 or 2
		Second	20	40	3	≥ 4	
6.	from 281 to 500	First	32	32	1	≥ 4	2 or 3
		Second	32	64	4	≥ 5	
7.	from 501 to 1200	First	50	50	2	≥ 5	3 or 4
		Second	50	100	6	≥ 7	

Article 6

Meter Testing

1. Meter testing is conducted pursuant to the following procedures:

- 1.1. Testing of insulation;
- 1.2. Heat of the meter;
- 1.3. Testing of the empty step (no load condition);
- 1.4. Testing the start of the meter;
- 1.5. Testing the accuracy of the meter;
- 1.6. Verification of the meter constant;
- 1.7. Checking of the accuracy of registration of electricity;
- 1.8. Testing of additional parts of the meter.

2. Insulation testing is done for safety reasons by manufacturers or services before the meters undergo the verification with sinusoidal voltage with effective value 2 kV or 4 kV, in a timeline of 1 min, and 50 Hz frequency under the provisions of the Administrative Instruction No. Nr.2006/22 on technical - metrological requirements for static active energy meters of accuracy class 1 and 2.

3. The heat of the meter is conducted so that the voltage and auxiliary circuits are connected on reference voltage for at least 1 hour prior to testing.

4. During the testing of the state without load, the meter may not give outgoing impulses, respectively may not register electricity when the current circuit is open and when the voltage circuits are connected at 115% reference voltage.

Minimum duration of the Δt testing shall be:

$$\Delta t \geq \frac{900 \times 10^6}{k \, m \, U_n \, I_{\max}} \text{ (min) for meters of accuracy class 1}$$

$$\Delta t \geq \frac{480 \times 10^6}{k \, m \, U_n \, I_{\max}} \text{ (min) for meters of accuracy class 2}$$

where:

k - constant of the meter (imp. / kWh)

m - number of measuring elements of the meter

U_n – reference voltage (V)

$I_{\max}$ - maximum current of the meter (A)

During the test the output test device of the meter shall give only one impulse

5. Meters shall begin to give output impulses (starting point) and record electricity uninterruptedly during balanced load and current which may not exceed the values presented in Table 5.

6. If the meter is designed to measure electricity in two directions, the testing of starting point referred to in Article 6, paragraph 5 should be made for each direction.

Table 5

Meters for	Power factor $\cos \varphi$	Current value (A) for meters of accuracy class	
		1	2
Direct connection	1	0,004 I_o	0,005 I_o
Connection through current transformers	1	0,002 I_n	0,003 I_n

7. During the testing of the meter under the conditions specified in this instruction, during the time period to which correspond at least 1000 periods in power measurement, permissible errors are:

7.1. For one-phase and three-phase meters during the uniform load, they are provided in Table 6 of this article;

7.2. For three-phase meters with single-phase load along symmetrical three-phase voltages, they are provided in Table 7 of this article.

Table 6

Current Value (A)				
Meters with direct connection	Meters with connection through measurement transformers	Power factor $\cos \varphi$	Permissible errors in (%) for meters of accuracy class	
			1	2
I _{max}	I _{max}	1	± 1,0	± 2,0
		0,5 ind.	± 1,0	± 2,0
		0,8 kap.	± 1,0	-
I _o	I _n	1	± 1,0	± 2,0
		0,5 ind.	± 1,0	± 2,0
		0,8 kap.	± 1,0	-
		1(SRT)	± 1,0**	± 2,0**
0,5 I _o	0,5 I _n	0,5 ind.	(± 1,0)*	(± 2,0)*
0,2 I _o	0,2 I _n	1	± 1,0	± 2,0
		0,5 ind.	± 1,0	± 2,0
		0,8 kap.	± 1,0	-
0,05 I _o	0,02 I _n	1	± 1,5	± 2,5

Note: * Testing point is not necessary;

** It is required to test meters on which it is not written "ordering of phases RST".

Table 7

Current Value (A)				
Meters with direct connection	Meters with connection through measurement transformers	Power factor $\cos \varphi$	Permissible errors in (%) for meters of accuracy class	
			1	2
I _o (through phases)	I _n (through phases)	1	± 2,0	± 3,0
		0,5 ind.	± 2,0	± 3,0
0,2 I _o (through phases)	0,2 I _n (through phases)	1	± 2,0	± 3,0

8. Difference in percentage of error of three-phase meter loaded with single-phase base electricity, respectively nominal current with power factor $\cos \varphi = 1$, and the percentage of error in balanced load, must not exceed more than these values:

8.1. 1.5% for meters with accuracy class 1;

8.2. 2.5% for meters with accuracy class 2.

9. During the test of the meter constant it is verified the relation of electricity showed on display - numeric plate and impulses that are given by the impulses provider.

10. During the control of electricity registration, the meters shall be loaded with I_{max} and during this load is measured the error of one meter (reference). Then it should be written the situation in display - numeric plate of all meters connected in series to a current circuit and it is registered the same amount in the display - numeric plate so that the figure of the lower average value makes at least two cycles of full rotation and then again is read the situation in the numeric plate of all meters. The difference of the read situations should contain only the meter's own error. The same registration control should be made for all tariffs of multi-tariff meters.

11. Additional functions of meter shall be tested in particular:

11.1. Accuracy of the work of register-tariff of the multi-tariff meters, is tested with successive connections and disconnections of the controlling voltage $1.15 U_n$ during the loading of the meter with nominal power. It is checked the position of indicator, which shows which tariff is being registered by the meter, whereas the other tariffs should not register;

11.2. The mechanism for prevention of reverse registration is tested in that way where in the meter we change the direction of registration of electricity, and the meter should not register electricity any more (give output impulses);

11.3. The indicator of maximum power is tested in that way where the meter is loaded constantly with power during the time of connection of maximum power indicator (period of measurement = time of connection + time of disconnection). The load of meter is disconnected and the denoted value of maximum power is read. Maximum power indicated is presented when the self error is equal with the meter error during the load;

11.4. Impulse transmitter on distant measurement is tested in that way where during the loading with nominal electricity or maximum electricity, the impulse provided by the impulse transmitter are counted by adjusting number counter of impulses. Then comes the comparison of the electricity values registered in meters and the value of electricity obtained by multiplying the number of impulses with constant of impulses' provider, the provider is accurate if the difference of electricity is not higher than the electricity which corresponds to an impulse given by the provider of impulses.

Article 7

Interpretation of the testing results

1. Meters tested with the individual testing method are in good condition if they satisfy the provisions of the Administrative Nr.2006/22 on technical - metrological requirements for static active energy meters of accuracy class 1 and 2 and the provisions of Article 6 of this instruction.

2. Sample meters during the test with statistical method are accurate if they satisfy the provisions of the Administrative Nr.2006/22 on technical - metrological requirements for static active

energy meters of accuracy class 1 and 2 and the provisions of Article 6 of this instruction.

3. Criteria for acceptance or rejection of the group of meters:

3.1. Criteria for acceptance or rejection of the group of meters are given in Tables 1, 2, 3 or 4;

3.2. The group of meters is accepted if, after testing the samples, the number of inaccurate meters is equal to or smaller than the number of inaccurate meters (criterion for acceptance of the group) presented in Tables 1, 2, 3 or 4;

3.3. The group meter is not accepted if, after testing the samples, the number of inaccurate meters is equal to or greater than the number of inaccurate meters (the criterion for rejection of the group) presented in Tables 1, 2, 3 or 4.

Article 8
Marking with Verification Marks

1. Meters, which during the test it is proved that they satisfy the provisions of the Administrative Nr.2006/22 on technical - metrological requirements for static active energy meters of accuracy class 1 and 2 and the provisions of Article 7 of this Administrative Instruction, are marked with state verification marks (stamps which are printed in seals) as stated in the decision for approval of the type of measuring device.

2. During the first verification of meters, on the left side of the meter casing is set the seal of the meter manufacturer, and on the right side (even higher if applicable) is set the state verification mark.

3. During the regular and extraordinary verification of meters, state verification marks are placed set in all meter seals.

Article 9
Entry into Force

This Administrative Instruction shall enter into force on the day of signing by the Minister of Trade and Industry

Prishtina, 20.04.2011

Mimoza KUSARI-LILA

Minister of MTI