

## **LONG TERM FOLLOW UP OF ELECTRICITY METERS TYPE APPROVAL IN SERBIA AND MONTENEGRO**

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The Bureau of Measures and Precious Metals test electricity meters for type evaluation according to the Law of metrology.

The statistics for electricity meter's type test in Serbia and Montenegro in last five years is presented in this paper.

The type approvals and additions of type approvals for electricity meters, for domestic and foreign manufacturers are presented.

Applications of new Europe Union directives in Serbia and Montenegro are given.

### **LEGAL METROLOGY**

Watt-hour meter is instrument intended to measure energy by integrating power with respect to time [1]. They can be constructed as one-phase meter or three-phase meter, static meter, electrodynamic meter or induction meter, one-rate meter or multi-rate meter. They could measure active or reactive or apparent energy. Because of more implemented functions, we could call them multimeter, but their basic function is still to measure electrical energy.

Meters serve to revenue energy and they are in group of measuring instruments of legal metrology. Legal metrology is part of metrology relating to activities, which result from statutory requirements and concern measurement, units of measurement, measuring instruments and methods of measurement and which competent bodies perform. [2, VIML 1.2].

According to article 9. and 12. of the Law of metrology [3] and in keeping with Command about kind of measuring instruments for which type approval testing is necessary [4], meters are measuring

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instruments for which are obligated type approval testing, examination and verification of a measuring instrument.

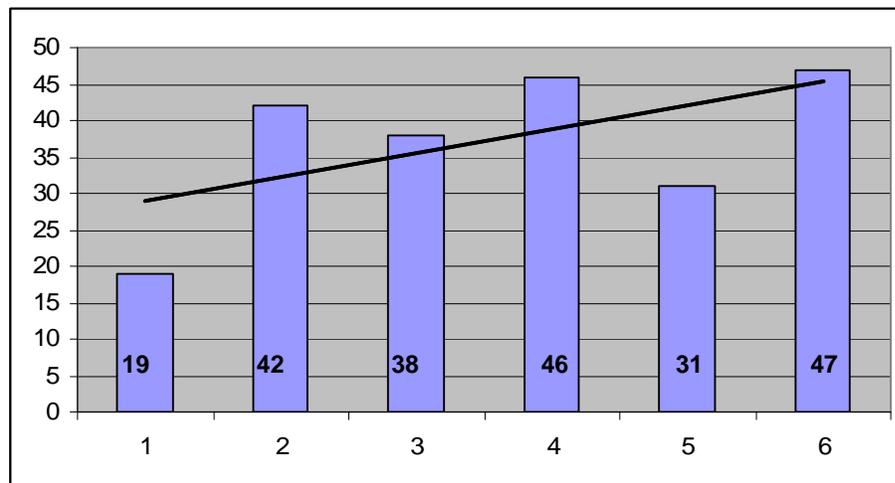
Type evaluation is systematic examination and testing of the performance of one or more specimens of identified type measuring instruments against documented requirements, the results of which are contained in the evaluation report, in order to determine whether the type may be approved. [2, VIML 2.5].

Type approval is decision of legal relevance, based in the evaluation report, that type of measuring instrument complies with the relevant statutory requirements.

#### THE STATISTIC OF SUBMIT REQUIREMENTS FOR ELECTRICITY METER'S TYPE TEST AND SUBTYPE TEST

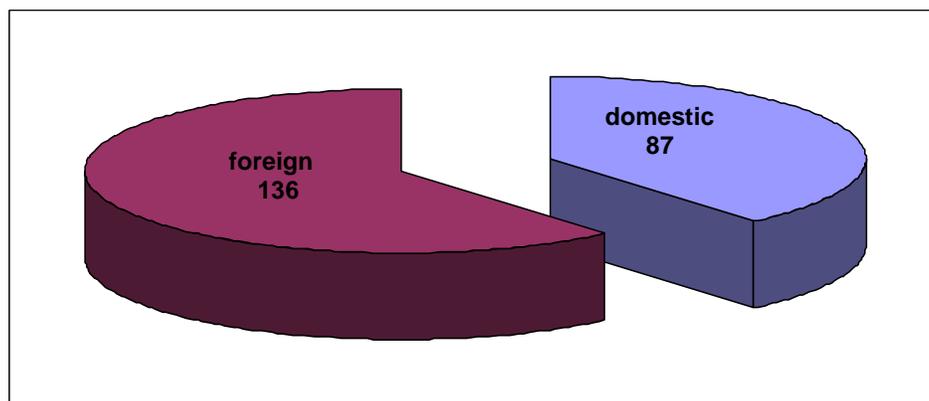
In period from 2001. to 2006. year, Bureau of Measures and Precious Metals answered at 223 requirements for electricity meter's type test and subtype test. Picture 1. presents number of requirements for electricity meter's type test and subtype test, according to year.

PICTURE 1. - NUMBER OF REQUIREMENTS FOR TYPE TEST ACCORDING TO THE YEARS



In comparison with period from 1999. to 2001. year, on yarely level, number of requirements is increase from year to year. Picture 2. describes relation between domestic and foreign manufacturers which required electricity meter's type test and subtype test.

PICTURE 2. - RELATION BETWEEN DOMESTIC AND FOREIGN MANUFACTURER WHICH REQUIRED ELECTRICITY METER'S TYPE TEST AND SUBTYPE TEST

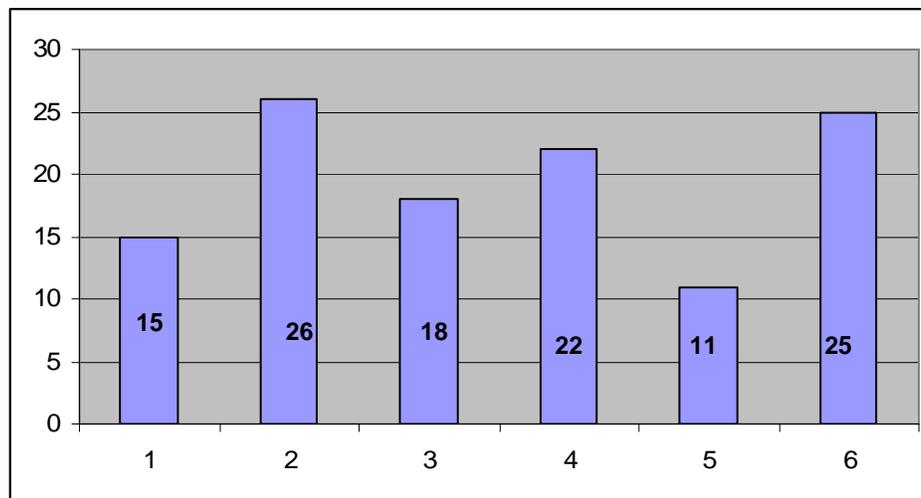


There are 14 domestic manufacturers, but only some of them are still active. Foreign manufacturers are present on our market independent, through their presidency or representative and on the other side, joined with domestic manufacturer to invest in to common product.

#### THE STATISTIC FOR ELECTRICITY METER'S TYPE TEST

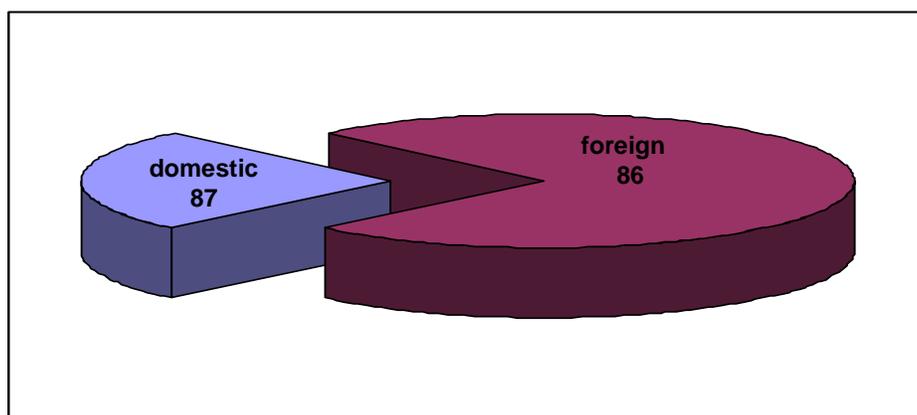
In period from 2001. to 2006. year, Bureau of Measures and Precious Metals answered at 97 requirements for electricity meter's type test. In picture 3. number of requirements for electricity meter's type test, according to year, is presented

PICTURE 3. - NUMBER OF REQUIREMENTS FOR TYPE TEST ACCORDING TO THE YEARS



In comparison with period from 1999. to 2001. year, on yarely level, number of requirements is increased from year to year. In picture 4. relation between domestic and foreign manufacturers which required electricity meter's type test, is presented.

PICTURE 4. - RELATION BETWEEN DOMESTIC AND FOREIGN MANUFACTURERS, WHICH REQUIRED ELECTRICITY METER'S TYPE TESTS

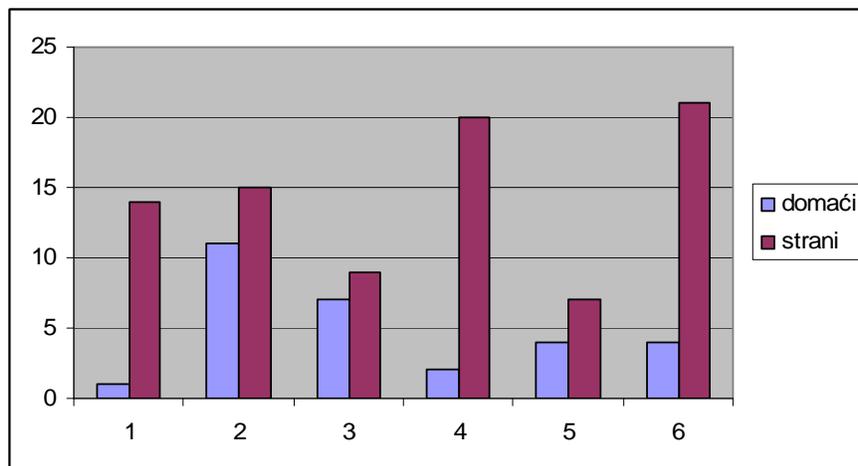


In table 1. number of domestic and foreign manufacturers of electricity meters which required for electricity meter's type test are given. In picture 5. the same information is presented graphically.

TABLE 1. - REQUIREMENTS FOR TYPE TEST ACCORDING TO THE YEARS

Year	Domestic manufacturer	Foreign manufacturer
2001	1	14
2002	11	15
2003	7	9
2004	2	20
2005	4	7
2006	4	21

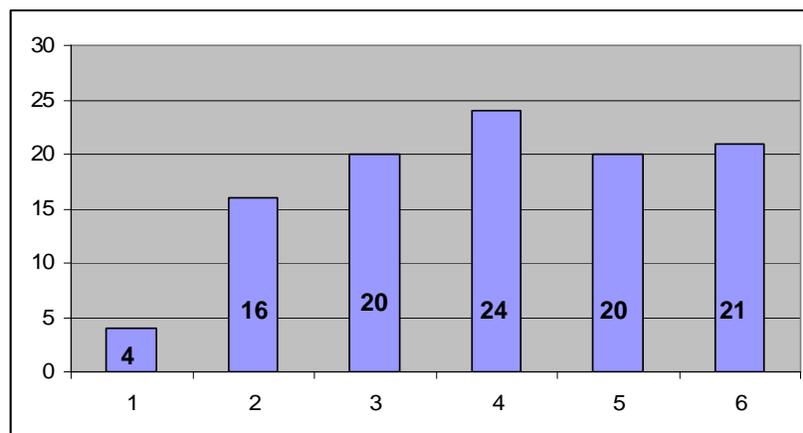
PICTURE 5. - GRAPHIC PRESENTATION OF INFORMATION FROM TABLE 1.



#### THE STATISTIC FOR ELECTRICITY METER'S SUBTYPE TEST

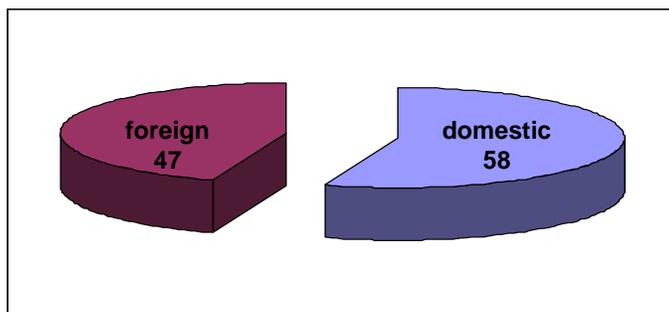
In period from 2001. to 2006. year, Bureau of Measures and Precious Metals answered at 105 requirements for electricity meter's subtype test. In picture 6. number of requirements for electricity meter's subtype test, according to year, is presented.

PICTURE 6. - NUMBER OF REQUIREMENTS FOR SUBTYPE TEST ACCORDING TO THE YEARS



In comparison with period from 1999. to 2001. year, on yarely level, number of requirements increased from year to year. In picture 7. relation between domestic and foreign manufacturers which required electricity meter's subtype test, is presented.

PICTURE 7. - RELATION BETWEEN DOMESTIC AND FOREIGN MANUFACTURERS WHICH REQUIRED ELECTRICITY METER'S SUBTYPE TESTS

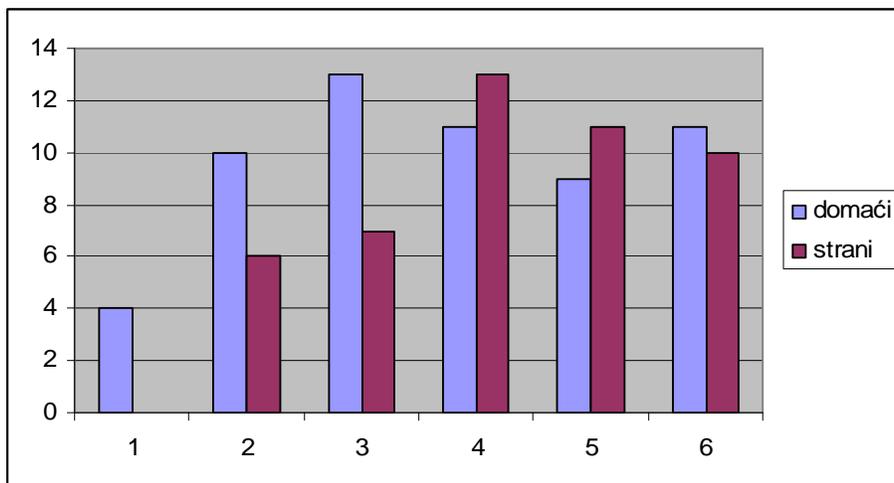


In table 2. number of domestic and foreign manufacturer of electricity meters which required electricity meter's subtype test is given. In picture 8. the same information are describe graphics.

TABLE 2. - REQUIREMENTS FOR SUBTYPE TEST ACCORDING TO THE YEARS

Year	Domestic manufacturer	Foreign manufacturer
2001	4	0
2002	10	6
2003	13	7
2004	11	13
2005	9	11
2006	11	10

PICTURE 8. - GRAPHIC PRESENTATION OF INFORMATION FROM TABLE 2.



Requirements for additional type test come from world's trends and demand of market and they are higher ranges for electric current, the way of montage, accuracy class, electric energy measurement, new case and so on.

#### THE NEW DIRECTIVE

Free exchange of goods is the most important for unique market. The intention is to prevent trade barriers and enable mutual recognition of results of measurements and technical harmonization. The candidate states, for the period of negotiations implement the same principle gradually. Mark CE on electricity meters are put according MID [5]. Before putting instrument on the market, it must pass

conformity assessment procedure. On the other side, accreditation (and quality system) demand the Manual of quality system according standard ISO/IEC 17025 and ISO/IEC 17020. EU directive are implemented on territory of EU.

New Law of metrology, Law of standardization, Law of accreditation and Law of technical demand for products and conformity assessment, were adopted in October 2005.

In the MRS ZMDM, Laboratories in the Group for electrical quantities are working according standard ISO/IEC 17025. There are procedure according documented ZMDM quality system. CMC [6] for electric voltage, current, resistance and electric power are approved in the EUROMET and RMO, and it can be find in Appendix C of the KCDB-The BIPM key comparison database. ZMDM assigned MRA (Mutual Recognition Arrangement), so calibration certificate of ZMDM is recognized in Europe.

## LITERATURE

1. International vocabulary of basic and general terms in metrology, BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML, 1996.
2. International vocabulary of terms in legal metrology, OIML, 2001.
3. Law of metrology, 2005.
4. Command about instruments for which examination is obliget, 2002.
5. Measuring instruments directive, EU, 2004.
6. [www.bipm.org](http://www.bipm.org)