CENTRAL OFFICE
OF MEASURES

THE 2022 INFORMATION BOOKLET

Central
Office
of Measures

METROLOGY
IS THE SCIENCE OF MEASUREMENT AND ITS APPLICATIONS

Ladies and Gentlemen,

I am presenting you with the Information Booklet of the Central Office of Measures, an institution which has been working for over a century to guarantee the measurement capabilities necessary for sustainable development of the economy, to ensure an adequate standard of living and to secure the interests of the country and the needs of its citizens.
GUM operation serves the social and economic development of the country. By ensuring suitable measurement accuracy, it protects the interests of the consumer in all walks of life. It also supports the protection of the natural environment, ensures public security and protects the fiscal interests of the state.
Effective domestic and international cooperation in the field of metrology contributes to the improvement of the quality of measurements performed in the country and facilitates knowledge transfer to the economy.
Details on our domestic and international operations may be found in this booklet.

Jacek Semaniak
President
Central Office of Measures

INFORMATION BOOKLET

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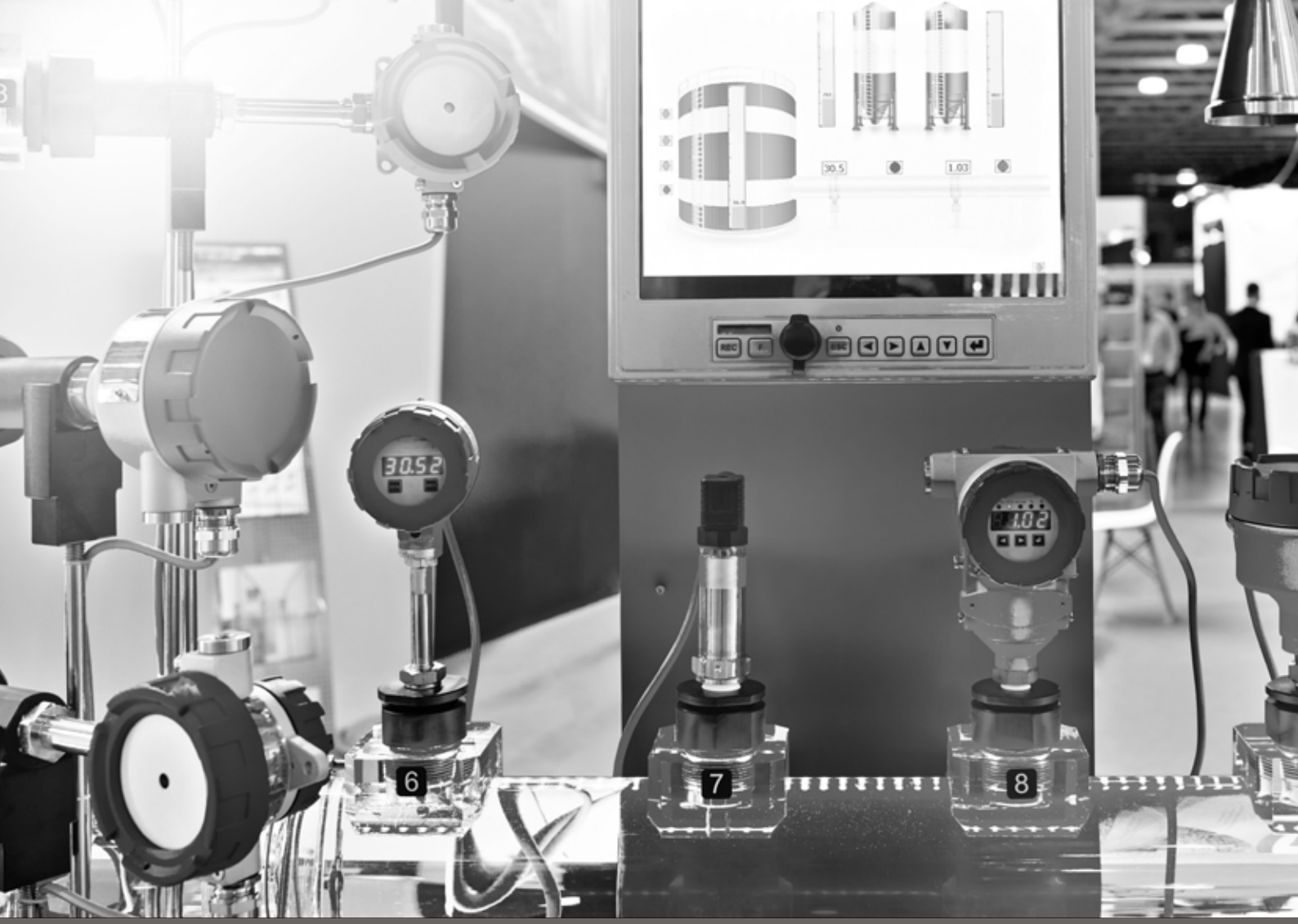


The Central Office of Measures operates in the field of scientific, applied and legal metrology. It ensures uniformity of measures and the required accuracy of quantities measurements in Poland through the realization, maintenance of measurement standards and dissemination of legal units of measurement.

GUM provides calibrations and expertises as well as conformity assessment of measuring instruments, type approvals and verifications.

It actively participates in the work of international metrology organisations. It is involved in research and development in the field of measurement technologies and cooperates with science and industry.

The work carried out at GUM serves the social and economic development of the country. By ensuring adequate measurement accuracy, it serves to protect the interests of the consumer in all walks of life, starting with health. It supports the protection of the natural environment, ensures public security and protects the fiscal interest of the state.

One constantly comes across the outcomes of GUM's operations in everyday life: when refuelling the car, setting the time or doing the shopping.

TASKS

- Developing, maintaining and modernising the national standards of measurement units
- Ensuring the compliance between of the national standards of measuring instruments with international measurement standards or standards in other countries
- Disseminating measurement units from national standards to measuring instruments
- Performing legal metrological control and metrological supervision
  - type approval of measuring instruments
  - issuing certificates of conformity
  - issuing decisions on granting and withdrawing authorisations for initial verification or subsequent verification
  - granting decisions on issuing, refusing to issue and withdrawing permits to repair or instal and check certain types of measuring instruments
- Cooperation with science and industry in the field of measurement technologies
- Cooperation with domestic and international institutions in the field of metrology

Mission

» Playing the role of the National Metrology Institute
» Reliable and modern metrology infrastructure
» Support for science and high-tech industry
» Responsibility for the legally regulated aspects
» Economic and technical security
» High quality of life
» Economic development

Vision

» High research and development potential
» Services for the economy and society
» Supporting the development and implementation of modern technologies
» Building the position of a national metrology institution recognised in Europe and world-wide

Aims

» Strengthening the role of a coordinator of research and development in the field of metrology
» Extending the scope and quality of the services provided
» Establishing partnerships with the scientific, economic and social partners
» Strengthening the position of GUM in the international metrological environment

The Central Office of Measures has its head office in Warsaw, at Elektoralna Street in a historic building with a long and fascinating history.

Its oldest part was designed in the early 19th century by Jan Jakub Gay and Antonio Corazzi, the most prominent classicist architect of Warsaw, designer of the Grand Theatre of Warsaw, amongst many others.

Originally the building at Elektoralna Street housed the administrative section of the Bank of Poland. During World War I, it served as a hospital, and in the interwar period it became the seat of the Ministry of Industry and Trade.

In 1919, the building was extended to form a rectangular complex with two courtyards. In 1922 this expansion made it possible to allocate one of the rooms to the management of the Central Office of Measures as their head office. More space was acquired as the operation of the Office expanded.

During World War II, the operation of the Office was supervised by the invaders, but metrologists supported the Polish underground, for instance by producing parts for the Błyskawica submachine gun. It was only with the outbreak of the Warsaw Uprising that the work of the Office halted altogether.

The oldest part of the building was damaged in the course of bombing raids and fires, and 70 % of the outbuildings were destroyed. Even before the end of the war, reconstruction began.

In less than 10 years, the building was completely restored, adapting the space for the needs of laboratories.

The horse-chestnut tree planted in 1827 in one of the courtyards survived war-time fire without any damage. This beautiful tree stands witness to nearly 200 years of history of the building of the Central Office of Measures in Warsaw.

Currently, the Central Office of Measures is accomplishing the 1st phase of construction of the Świętokrzyski Laboratory Campus of the Central Office of Measures in Kielce at Wrzosowa Street.

One of the objectives of the project is to supplement the GUM laboratory potential, the outcome of which will be to provide conditions for cooperation between GUM professional and innovative laboratory metrology and the economy.

New metrology laboratories will streamline research and development processes to improve technologically advanced measurement methods, taking into account the required measurement accuracy.

The project will also enable a qualitative change in the operation of research units towards dynamic interaction with industry and science.

The work of the laboratory campus and its interaction with science and the economy will contribute to active cooperation with scientific institutions with an exchange of technological ideas in the field of innovative measurement methods and the development of the latest technologies.

Equipping laboratories with modern infrastructure, minimising the environmental impact and disturbances and enhancing technical potential will increase the quality of scientific research, and thus ensure measurement traceability of international standard.

Fundusze Europejskie Program Regionalny

WOJEWÓDZTWO ŚWIĘTOKRZYSKIE

Unia Europejska Europejski Fundusz Rozwoju Regionalnego

Project implemented by the consortium of the Central Office of Measures and the Kielce University of Technology, co-financed by the European Regional Development Fund, under Priority Axis I – Innovation and science, Measure 1.1 Support for R&D infrastructure of the Regional Operational Programme of the Świętokrzyskie Region for 2014–2020.
Project duration: 01/01/2019–31/12/2023

CENTRAL OFFICE OF MEASURES HAS IMPLEMENTED

A MANAGEMENT SYSTEM WHICH IT IS NOW IMPROVING

It reflects the currently implemented tasks pursuant to the Law on Measures, the Act on the Conformity Assessment System and meets the requirements set out in CIPM MRA ("Mutual Recognition Arrangement of national measurement standards and of calibration and measurement certificates issued by national metrology institutes").

CIPM MRA
Mutual Recognition Arrangement

QUALITY COMES FIRST!

The Central Office of Measures

- Operates on an integrated Management System, recorded in the Management System Book, procedures and instructions which include work performed both at the head office and at the premises of measuring instruments users, serving the implementation of the following Quality Declaration agreed by the GUM Management:

  PN-EN ISO / IEC 17025, PN-EN ISO 17034, PN-EN ISO / IEC 17043
  as well as PN-EN ISO / IEC 17065 in the scope of GUM's operation as JN 1440.
- Carries out its tasks, including the tasks of the Notified Body No. 1440, in accordance with the Quality Declaration and the Declaration of Impartiality and Confidentiality signed by the President of the GUM.

The Acts which specify GUM tasks:

- Act of 11 May 2001 - Law on Measures (Journal of Laws of 2021, item 2068 and of 2022, item 1117)
- Act of 1 April 2011 - Hallmarking Law (Journal of Laws of 2020, item 1365 and of 2022, item 974)
- Act of 7 May 2009 on packaged goods (Journal of Laws of 2020, item 1442) and of 2022, item 974)
- Act of 10 December 2003 on legal time in the territory of the Republic of Poland (Journal of Laws of 2004, No. 16, item 144)
- Act of 13 April 2016 on conformity assessment and market surveillance systems (Journal of Laws of 2022, item 5 and 974)
- Act of 5 July 2018 on tachographs (Journal of Laws of 2020, item 900 and of 2022, item 209)
- Act of 11 March 2004 on tax on goods and services (Journal of Laws of 2022, items 931, 974 and 1137)
- Act of 15 March 2019 amending the Act on tax on goods and services and the Act - Law on measures (Journal of Laws, item 675)

Pursuant to Act of 12 May 2022 signed by the President of the Republic of Poland and amending the act – Law on higher education and science and other acts (Journal of Laws of item no. 1117) the chief responsibilities of The President of the Central Office of Measures have been expanded to include independent and continuous scientific research and development.

ORGANISATIONAL STRUCTURE OF THE MEASURES ADMINISTRATION AND HALLMARKING ADMINISTRATION

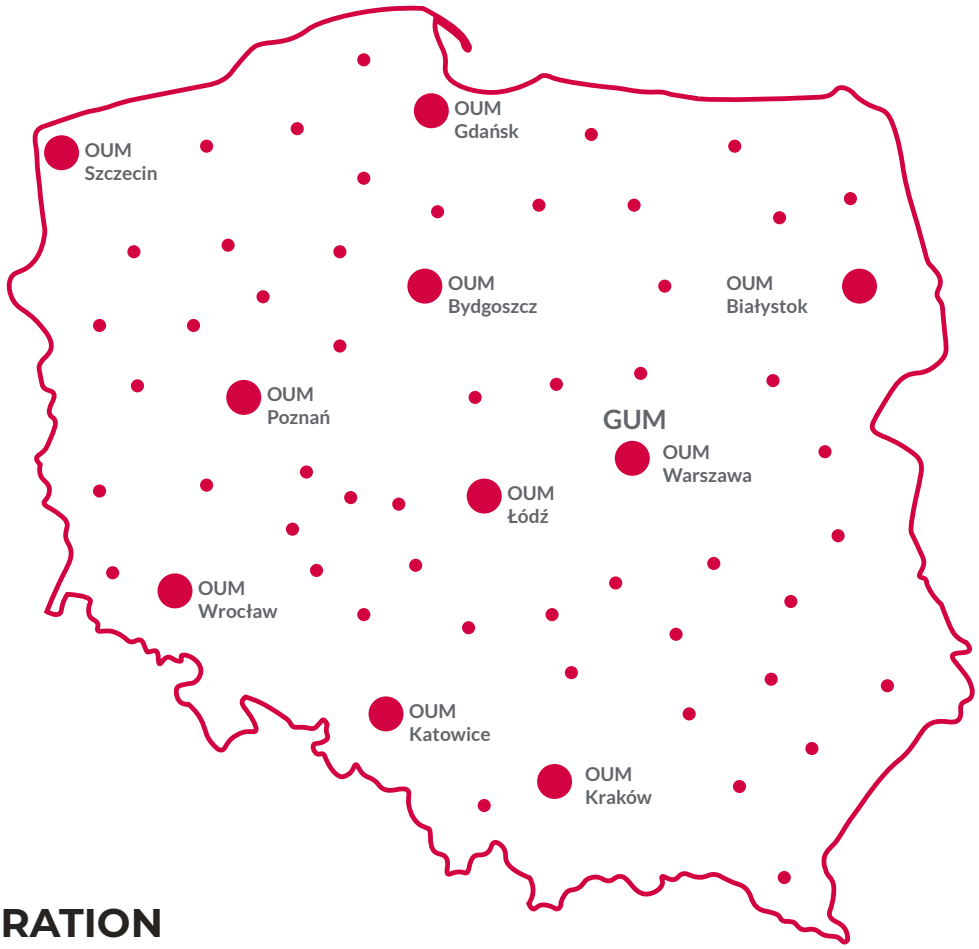
The President of the Central Office of Measures is the central government administration body competent in matters of measures and hallmarking in Poland, performing his responsibilities with the aid of the central office - Central Office of Measures.

1 600 staff

The administration of measures (Central Office of Measures, 10 regional offices of measures and 50 local branches) and hallmarking administration (2 regional assay offices and 8 local branches) employ about 1 600 staff responsible for the security of economic transactions and protection of consumer interests.

MEASURES ADMINISTRATION
STRUCTURE

- Central Office of Measures (GUM),
- 10 regional offices of measures with their head offices in Białystok, Bydgoszcz, Gdańsk, Katowice, Cracow, Łódź, Poznań, Szczecin, Warsaw and Wrocław.
  This structure includes 50 local branches.



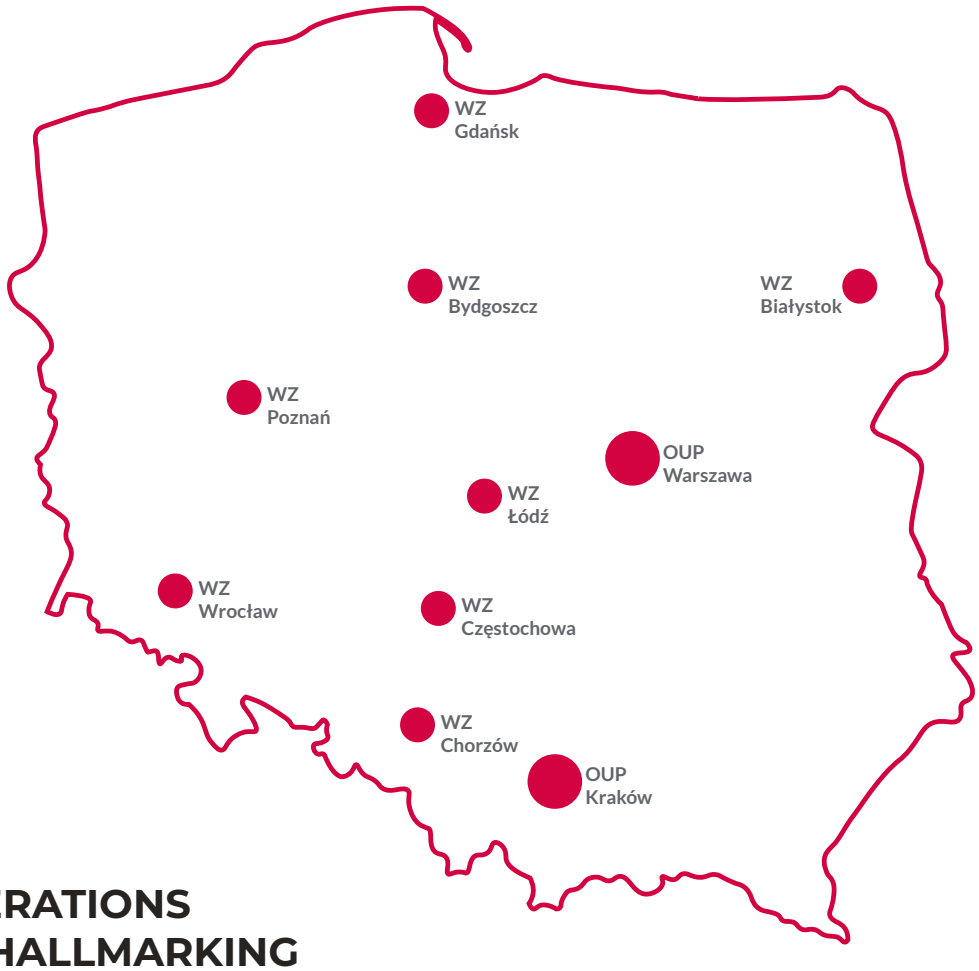
THE OPERATION OF THE REGIONAL OFFICES OF MEASURES INCLUDES:

- performing acivities related to the verification, calibration and expert opinions on measuring instruments and conformity assessment,
- participation in the testing of measuring instruments performed by GUM for the purpose of type approval,
- performing activities related to the supervision of compliance with the provisions of the Act on Measures and the Act on Packaged Goods and cooperation in this area with central and local government administration.

HALLMARKING ADMINISTRATION

STRUCTURE

- 2 regional assay offices with their head offices in Cracow and Warsaw,
- 8 local branches in Białystok, Bydgoszcz, Gdańsk and Łódź (subordinate to the Regional Assay Office in Warsaw), Chorzów, Częstochowa, Poznań and Wrocław (subordinate to The Regional Assay Office in Cracow).



THE OPERATIONS OF THE HALLMARKING ADMINISTRATION INCLUDE:

- testing of precious metal articles and articles containing precious metals and marking them with Polish hallmarks or issuing assay certificates,
- supervision over compliance with the provisions of the Hallmarking Law and cooperation in this respect with central and local government administration.

GUM ORGANISATION STRUCTURE

The President manages GUM with the aid of vice-presidents, general director and heads of organisation units.

GUM IS STRUCTURED WITHIN:

6 metrology departments

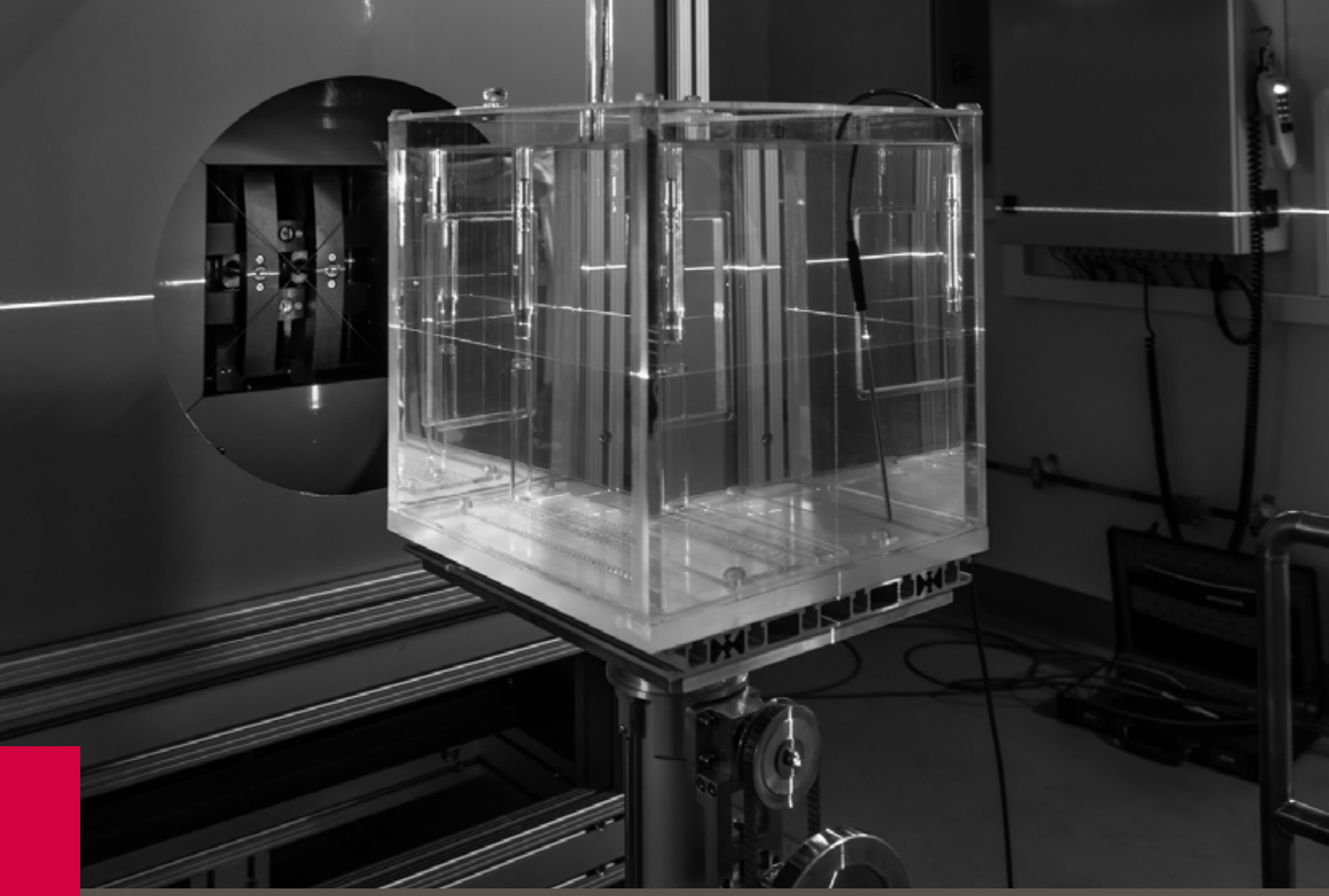
- **Z1** Certification Tests Department
- **Z2** Physical Chemistry and Environment Department
- **Z3** Time and Length Department
- **Z4** Electricity and Radiation Department
- **Z5** Mechanics and Acoustics Department
- **Z6** Digital Technology Department

4 departments and 1 bureau

- **DIR** Innovation and Development Department
- **DWM** International Cooperation and Analyses Department
- **DC** Certification Department
- **DNK** Supervision and Inspection Department

and

- **BDG** Director General's Bureau



SCIENTIFIC METROLOGY

DEALS WITH DEVISING, DEVELOPING AND MAINTAINING MEASUREMENT STANDARDS OF THE HIGHEST ACCURACY.

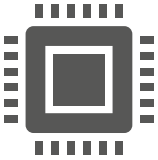
APPLIED METROLOGY

METROLOGY INCLUDES ALL THE METROLOGY OPERATIONS CONNECTED WITH THE PRODUCTION AND RESEARCH PROCESSES AS WELL AS SERVICES.

STANDARDS OF THE HIGHEST ACCURACY ARE THE REFERENCE FOR MEASUREMENTS PERFORMED IN THE COUNTRY.

They ensure that the goods and services one buys meet their requirements, that appropriate doses of medicines are administered and the accuracy of data obtained for various purposes (climate change research, diagnostic tests, etc.).

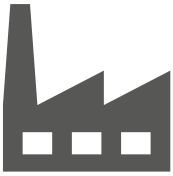
CHALLENGES FACED BY SCIENTIFIC AND APPLIED METROLOGY



NEW TECHNOLOGIES

SMART MEASUREMENTS

ARTIFICIAL INTELLIGENCE



INNOVATIVE INDUSTRY

GREEN DEAL

METROLOGY DEPARTMENTS

INTERDISCIPLINARY RANGE OF FIELDS

Z1

Certification Tests Department

Main Tasks:

- defining directions and conducting research and development in the areas of speed measurements, software security of measuring instruments and cash register devices
- developing and maintaining measuring stands as well as developing research and measurement methods for speed measurements and taximeters, software security testing of measuring instruments and cash register devices,
- disseminating the results of research and development and editing guides and recommendations in the field of speed measuring instruments and taximeters, software security of measuring instruments and cash register devices,
- transfer of metrological knowledge by monitoring, analysing and implementing international results of metrology programmes as well as research and development projects in the field of taximeters and speed measuring instruments, software security of measuring instruments and cash register devices testing methods,
- cooperation with international organisations and representing Poland in matters which lie within the Metrology Department's competencies.

Services:

- expert opinions for the needs of legal metrological control in the field of equipping the taximeters verification points and instruments for measuring vehicle speed in traffic control, as well as for the purposes of admitting new types of instruments for the inspection and checking of tachographs,
- for the purposes of legal metrological control, testing and checking instruments in the field of:
  - record sheets for analog tachographs,
  - instruments for measuring vehicle speed in traffic control,
  - software in measuring instruments,

- for the purposes of conformity assessment of:
  - taximeters,
  - software in measuring instruments,
  - in the field of mechanical and environmental exposures,
- for the purposes of issuing confirmations for cash register devices - testing cash register devices,
- for the purposes of issuing permits to instal, test, check and repair tachographs, providing opinions on records of lists of devices necessary to do it, a description of the procedures for the use of workshop cards and their protection, and the maintenance of safe use of workshop cards, as well as methods of checking, using measuring instruments and meeting the requirements, evaluating measurement uncertainty, storing data downloaded from workshop cards and proceeding with data downloaded from digital tachographs,
- for the purposes of issuing certificates for entities training tachograph workshop technicians - providing opinions on training equipment and lecturers' competences.

CHEMISTRY

Z2
Physical Chemistry and Environment Department

Main Tasks:

- maintaining and developing national measurement standards: pH, electrolytic conductivity, amount of substances (unit - the mole, symbol - mol), density, kinematic viscosity and plane rotation angle of light polarisation
- devising, implementing and developing basic measurement methods and reference materials ensuring metrological traceability with the units of measurement of the International System of Units (SI) for chemical and physicochemical measurements of the highest metrological quality,
- ensuring metrological traceability in the field of chemical and physicochemical metrology by calibration of measuring instruments as well as the production and certification of reference materials,
- participation in domestic and international interlaboratory comparisons,
- research in the field of chemical and physicochemical metrology to support various branches of the Polish economy,
- knowledge and experience transfer and popularisation in the field of chemical and physicochemical metrology.

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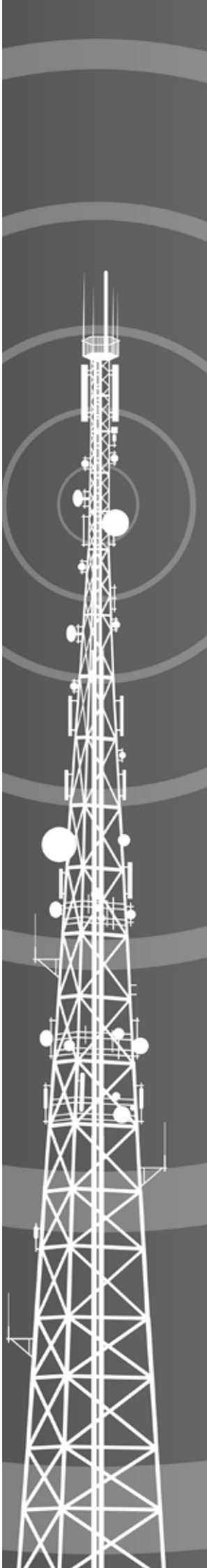
Services:

- calibration of:
  - gas analysers and oxygen meters,
  - gas mixtures,
  - devices for pH measurements (pH meters, pH electrodes),
  - devices for measuring the electrolytic conductivity (conductivity meters, electrolytic conductivity sensors),
  - devices for measuring density: oscillation-type density meters, glass and metal pycnometers, hydrometers, hydrostatic balances, liquid and solids samples,
  - devices for measuring static volume: laboratory glass and plastic ware (volumetric instruments), piston-operated volumetric apparatus,
  - devices for measuring viscosity: glass capillary viscometers, Höppler, Stabinger and rotational viscometers, flow cups,
  - devices for measuring ethanol content in the exhaled air: ethanol standards and breath analysers,
  - photoelectric and visual refractometers, solid and liquid refractive index standards,
  - photoelectric polarimeters, quartz control plates (polarimetric standards),
- production of certified reference materials:
  - primary and secondary pH standards,
  - primary and secondary electrolytic conductivity standards,
  - primary standards of amount of substance (high purity chemicals),
  - mass concentration of elements (AAS),
  - density, `
  - viscosity,
  - surface tension,
  - refractive index,
  - optical rotation factor (the rotation angle of the light wave polarisation plane,
  - ethanol mass concentration (for breath analysers).



THERMOMETRY

Main Tasks:

- maintaining and developing the national measurement standard of temperature and ensuring its compatibility with the standards of other countries through participation in international comparisons,
- maintaining and developing the national dew point temperature and relative humidity reference standards and ensuring their compatibility with the standards of other countries through participation in international comparisons,
- participation in national and international interlaboratory comparisons,
- research, knowledge and experience transfer and popularisation in the field of temperature and humidity,
- ensuring metrological traceability in the field of temperature and relative humidity.

Services:

- calibration of:
  - SPRT and PRT platinum resistance sensors,
  - fixed point cells,
  - type S, R, B thermocouples using the Zn, Al, Ag, Au, Cu fixed point method,
  - liquid glass thermometers,
  - electrical thermometers,
  - thermocouple type B - wire method at the palladium melting point,
  - hygrometers,
  - industrial hygrometers,
  - thermo hygrometers, humidity transducers, electronic psychrometers,
  - electronic thermometers (calibration in a climatic chamber),
  - hygrometers for grains and oilseeds.

TIME AND FREQUENCY

Z3

Time and Length Department

Main Tasks:

- maintaining and developing the national measurement standard of time and frequency,
- ensuring metrological traceability in the time and frequency domain,
- generating the Polish atomic time scale UTC (PL) and determining the legal time of the Republic of Poland,

METROLOGY DEPARTMENTS

- participating in the creation of international atomic time scale TAI and UTC,
- generating and disseminating acoustic time signals to the Polish Radio, maintaining NTP time servers and the TDS system for disseminating legal time,
- developing and improving methods of time dissemination, time transfer and maintenance of atomic time scales and analysing the results of comparisons of atomic time and frequency standards,
- disseminating standard frequency signals to other laboratories of the Office,
- domestic cooperation and comparisons for the development of the independent Polish Atomic Time Scale TA (PL).

Services:

- calibration of:
  - highstability frequency standards,
  - frequency generators and synthesisers,
  - digital frequency meters and time interval counters,
  - chronocomparators (digital, analogue and digital-analogue),
  - secundometers and timers - electrically, optically controlled, with acoustic signalling,
  - clocks,
  - phase calibrators and phase meters,
- expertises of:
  - sources and counters of pulse groups.

LENGTH

Main Tasks:

- maintaining and developing national measurement standards: length, plane angle, refractive index,
- ensuring metrological traceability in the field of length, plane angle, refractometry,
- research and development in the field of frequency measurements of light emitted by stabilised lasers, measurements of length, plane angle, surface geometry parameters, refractive index,

- organising and participation in domestic and international interlaboratory comparisons.

Services:

- calibration of:
  - stabilised lasers and laser interferometers,
  - gauge blocks,
  - laser distance meters,
  - optical flats,
  - ring gauges,
  - plug gauges (internal and external),
  - 1-D and 3D measuring machines,
  - gauge block comparators,
  - optical polygons, angle gauges, rotary and indexing tables, goniometers, angular encoders,
  - photoelectric autocollimators and electronic levels
  - solid refractive index standards,
  - straightness, roundness and roughness standards,
  - form-measuring machines, profilometers,
  - tapes (rigid, semi-rigid),
  - precision line scales, stage micrometers.

ELECTRICITY AND MAGNETISM

Z4 Electricity and Radiation Metrology Department

Main Tasks:

- maintaining and developing national measurement standards of: resistance, DC and AC voltage, capacitance, inductance, ratio of AC voltage and currents and AC electric current power,
- maintaining and developing reference standards and measuring systems for electrical and magnetic quantities,
- disseminating units of measurement of electrical and magnetic quantities while maintaining metrological traceability,
- performing tests to assess the conformity of active electricity meters,
- performing electromagnetic compatibility (EMC) tests to assess compliance and type approval of measuring instruments subject to legal metrological control,

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- conducting and participating in research and development related to electrical metrology,
- developing and introducing innovative methods of measuring particular electrical and magnetic quantities,
- organising and conducting interlaboratory comparisons and participation in international comparisons.

Services:

- calibration of:
  - standard DC voltage sources,
  - fixed and adjustable resistors,
  - thermal bridges,
  - other measuring instruments for measuring DC resistance,
  - calibrators of electrical quantities and reference multimeters and digital meters,
  - thermal voltage and current effective value converters (TVC and TCC ACDC),
  - capacitors, inductors and AC resistors (fixed and decade),
  - instruments for measuring AC resistance, inductance and capacitance, e.g. of bridges and RLC meters,
  - single-phase and three-phase electricity meters,
  - AC power and energy calibrators,
  - single-phase and three-phase AC wattmeters,
  - voltage and current transformers,
  - instrument transformer burdens,
  - bridges for measuring transformer errors,
  - high voltage meters,
  - calibrators of high frequency power meters and high frequency power meters,
  - high-frequency power sensors,
  - high-frequency voltage meters,
  - high-frequency attenuators,

- high-frequency measurement receivers,
- passive components in terms of scattering parameters,
- meters (probes) for the intensity of static and alternating magnetic fields,
- electric field strength meters (probes),
- fixed magnets,

- testing of:
  - AC active electricity meters to assess compliance with MID requirements, conformity assessment is performed by a notified body (JN 1440),
  - electromagnetic compatibility (EMC) for the assessment compliance and type approval in the field of measuring instruments subject to legal metrological control,
- providing opinions on the documentation attached to the applications for the opening of the verification service of electricity meters in terms of technical equipment as well as the assessment of measuring equipment.

PHOTOMETRY AND RADIOMETRY

Main Tasks:

- maintaining and developing national measurement standards of: luminous flux and directional luminous intensity as well as reference standards for photometric and radiometric quantities,
- planning and development of measurement methods ensuring metrological traceability with the units of measurement of the International System of Units (SI) for photometric and radiometric measurements of the highest metrological quality,
- research and development in the field of metrology of photometric and radiometric quantities, supporting various branches of the Polish economy,

Services:

- calibration of:
  - regular spectral absorbance standards,
  - spectrophotometers for spectral absorbance scale,
  - regular spectral transmittance standards,
  - spectrophotometers for spectral transmittance scale,

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- wavelength standards,
- spectrophotometers (for wavelength scale),
- tristimulus values and chromaticity coordinates standards,
- luminous intensity standards (incandescent lamps),
- luminous flux standards (incandescent lamps),
- correlated colour temperature standards (incandescent lamps),
- digital luxmeters,
- luminance meters,
- tristimulus colorimeters for light sources,
- photoluminescent materials (luminance and luminance decay time),
- gloss meters,
- gloss standards,
- luminance standards,
- optical power meters,
- spectral responsivity standards (monochromatic radiation),
- radiant power meters (monochromatic radiation),
- white light and ultraviolet meters used in non-destructive testing (NDT),
- photometric calibrators,
- light chambers,
- reflectance standards (achromatic and colour),
- trichromatic colorimeters and reflection spectrophotometers,
- materials for safety signs (evacuation and fire protection) – colorimetric measurements.

IONIZING RADIATION

Main Tasks:

- maintaining and developing the primary standards for air kerma of x-ray and gamma radiation,
- disseminating air kerma to ensure traceability,
- maintaining and developing the primary standard for absorbed dose to water of gamma radiation,
- disseminating absorbed dose to water to ensure traceability,
- research and development in the field of ionizing radiation,
- participation and organization of national and international interlaboratory comparisons.

Services:

- calibration of:
  - dosimeters with ionisation chambers used for radiation protection and radiotherapy.

ACOUSTICS, ULTRASOUND AND VIBRATIONS

Z5 Mechanics and Acoustics Metrology Department

Main Tasks:

- maintaining and developing of national standards of sound pressure and vibration quantities and ensuring their compatibility with standards of other countries through participation in key comparisons,
- ensuring metrological traceability in the country in the field of acoustics and mechanical vibrations and mechanical shocks,
- research and development in the field of acoustics and mechanical vibrations and cooperation in this field with domestic and international institutions,
- participating in domestic and international standardisation works, in the development of standards for instruments for acoustic and mechanical vibrations measurements,

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- development of metrological infrastructure and staff competences in the field of medical ultrasound,
- development of metrological infrastructure and staff competences in the field of underwater acoustics.

Services:

- calibration of:
  - measuring microphones by primary and secondary methods,
  - vibration transducers by primary and secondary methods,
  - ear simulators and mechanical couplers for measurements with bone vibrators,
- calibration, testing and expert opinions on measuring instruments used for acoustic, vibration and mechanical shock measurements,
- pattern evaluation tests of sound level meters,
- organising domestic interlaboratory comparisons.

MASS AND RELATED QUANTITIES

Main Tasks:

- maintaining and developing the national measurement standard of mass and reference standards of related quantities, as well as ensuring their compliance with international standards and standards of other countries through calibrations and participation in international comparisons,
- ensuring metrological traceability in the field of mass and related quantities: strength, hardness, pressure,
- testing and checking measuring instruments subject to legal metrological control and conformity assessment,
- providing expert opinions on measuring instruments in the field of mass and related quantities,
- organising and participating in domestic and international interlaboratory comparisons,
- research and development in the field of mass and related quantities,
- developing new measurement methods and improving the existing ones.

Services:

- calibration and testing of instruments for measuring mass, including mass standards, reference standards of force, torque and pressure, non-automatic and automatic scales and grain densimeters,
- calibration of instruments for measuring force and torque, including dynamometers, force transducers, torque meters, torque transducers and reference torque wrenches, force measuring systems of strength testing machines for static tests,
- calibration of hardness measuring instruments, including hardness standards and hardness testers according to the Brinell, Rockwell and Vickers hardness scales,
- calibration of pressure measuring instruments, including deadweight testers and piston-cylinder pressure gauges, electronic pressure gauges, hydrostatic pressure gauges,
- tests for conformity assessment and type approval,
- coordination of testing and controlling of measurement devices which undergo compatibility assessments or legal metrology control such as
    - weight meters,
    - non-automatic scales,
    - truck scales for weighing vehicles in motion,
    - automatic scales (for single loads, batching, weighing and conveyor, railway carriages),
    - measuring vehicles in road traffic - development of a new type of HS-WIM measuring instruments / systems,
    - reference grain density meters 20 L,
    - tire pressure gauges for motor vehicles,
    - weights of E1, E2, F1, F2, M1 accuracy class.

FLOWS

Main Tasks:

- maintaining the reference standard of the water volume of flow and volumetric flow rate,
- ensuring the compatibility of the above-mentioned standard with the standards of other countries and with international standards by participating in international comparisons,
- ensuring metrological traceability and dissemination of the unit of measurement for the liquid volume of flow and volumetric flow rate,

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- maintaining reference standards for gas volume of flow and volumetric flow rate.

Services:

- calibration of:
  - instruments for measuring gas volume of flow and volumetric flow rate (gas meters and gas flow meters),
  - control bell tanks,
  - instruments for measuring the water volume of flow and volumetric flow rate (water meters and water flow meters),
  - measuring installations for liquids other than water and control meters for liquefied propane-butane (LPG) gas,
- expert opinions on:
  - measuring stands for testing: gas meters, conversion factors for gas meters,
  - measuring stands for testing: water meters, heat meters for water in terms of converters with pairs of temperature sensors and subassemblies of heat meters: flow transducers, converters and pairs of temperature sensors, propane-butane (LPG) liquid gas meters, dispensers for liquid fuels other than liquid gases, components of measuring systems for liquids other than water or complete systems,
  - measuring stands for measuring tank calibration with liquid stored in these tanks,
- conducting tests to assess the conformity of water meters, measuring systems for liquids other than water and their components, heat meters for water and their components (flow transducers, steam converters, temperature sensors).

DEVELOPMENT OF DIGITAL TECHNOLOGIES

Z6
Digital Technologies
Metrology
Department

METROLOGICAL IT

Main Tasks:

- designing, preparing, maintaining and developing metrological software,
- maintaining and developing metrological infrastructure,
- automating laboratory stands, developing methods of analysis and processing of measurement data and support for decision-making processes using proprietary IT solutions,
- research and development, design and implementation in the area of the use of IT technologies in metrology,
- designing and producing mechanical and construction of elements in 3D printing technology,
- coordination of the use and selection of metrology software,
- cooperation with domestic and international institutions in the field of introducing modern technologies in metrology.

ARTIFICIAL INTELLIGENCE

Main Tasks:

- designing, programming, implementing and maintaining software using artificial intelligence technology,
- research and development, design and implementation in the area of applying artificial intelligence technology in metrology,
- developing methodology and tools used in artificial intelligence technology
- participation in development in the field of artificial intelligence, in particular regarding the improvement of regulations, standards and supporting innovation,
- issuing opinions on draft legal acts, standards, recommendations and other documents in the field of artificial intelligence,
- cooperation with domestic and international institutions in the field of artificial intelligence.

NATIONAL

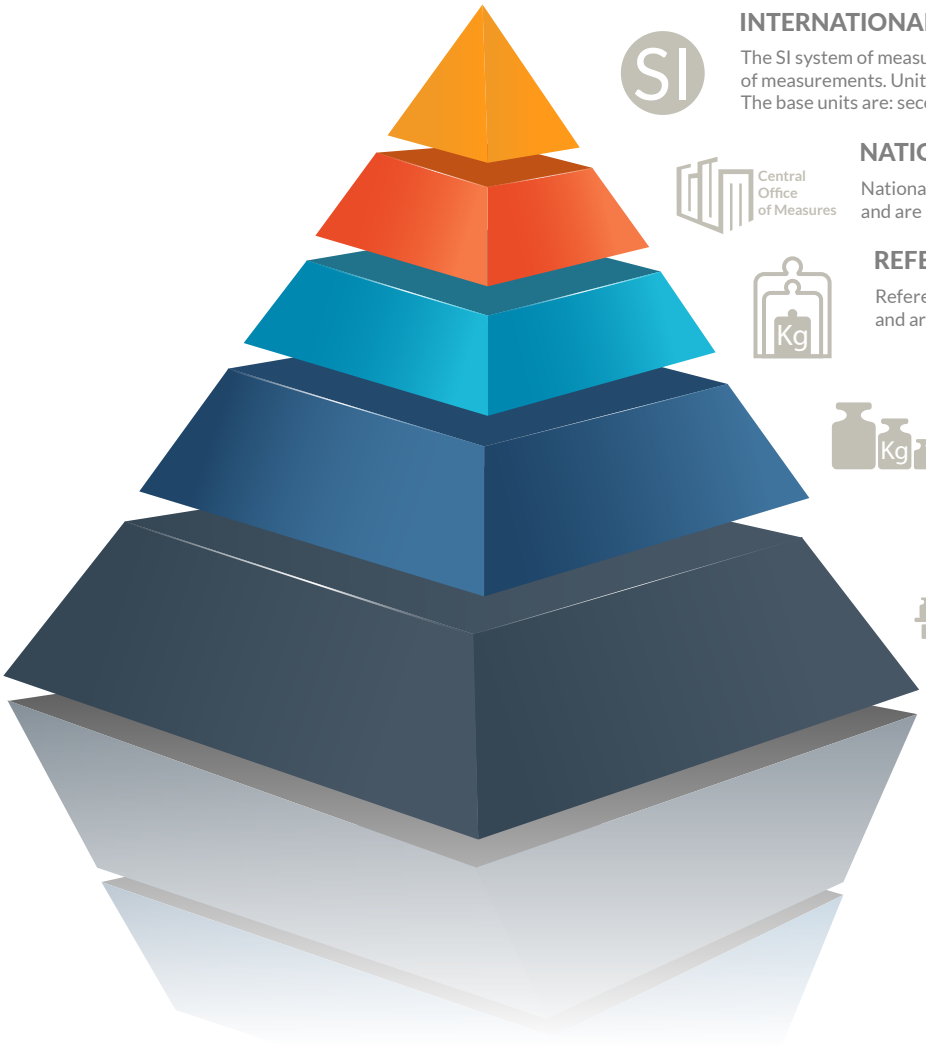
MEASUREMENT STANDARDS

IN THE CENTRAL OFFICE OF MEASURES 24 NATIONAL MEASUREMENT STANDARDS ARE MAINTAINED:

1. length,
2. plane angle,
3. temperature,
4. mass,
5. resistance,
6. capacitance,
7. density,
8. pH,
9. refractive index,
10. optical rotation,
11. luminous flux,
12. luminous intensity,
13. time and frequency,
14. inductance,
15. DC voltage,
16. AC voltage ratio with at frequency of 50 Hz,
17. AC current ratio with at frequency of 50 Hz,
18. AC voltage,
19. specific electrical conductivity of electrolytic conductivity,
20. acoustic pressure,
21. values of mechanical vibrations,
22. amount of substance,
23. AC power,
24. kinematic viscosity.

NATIONAL MEASUREMENT STANDARD

is a standard of a measurement unit officially recognised in the Republic of Poland as the basis for assigning values to other standards of measurement unit of a given physical quantity.



INTERNATIONAL SYSTEM OF UNITS (SI)

The SI system of measurement units is based on a metric system of measurements. Units in the SI system are divided into base and derived units. The base units are: second, metre, kilogram, ampere, kelvin, mole and candela.

NATIONAL STANDARDS

National standards are the practical realization of SI units and are maintained at National Metrology Institutes (NMI).

REFERENCE STANDARDS

Reference standards derive traceability from national standards and are maintained in accredited calibration laboratories.

WORKING STANDARDS

Working standards are calibrated by accredited laboratories and then used for the calibration of measuring instruments.

MEASURING INSTRUMENTS

Measuring instruments are used in all areas of the national economy.

FIRST OF ALL GUM STANDS FOR LABORATORIES AND THE METROLOGISTS WORKING IN THEM

The key tasks of ensuring the accuracy and compliance of measurements in the country, as well as the measurement possibilities guaranteeing the development of the economy, are carried out by the laboratories of the Central Office of Measures.

The laboratories maintain and constantly modernise measurement standards with the highest accuracy in Poland. Their compatibility with the international measurement system and the relevant standards of other countries is achieved through the participation of GUM laboratories in international comparisons. Units of measurement of individual quantities are disseminated in a hierarchical manner, from GUM standards, through lower-order standards to measuring instruments commonly used in the industry, trade, environmental protection, health and in the area of public security.

REFERENCE STANDARDS FOR THE FOLLOWING QUANTITIES ARE MAINTAINED AT GUM

1. density of grain in a solid state,
2. force,
3. torque,
4. pressure,
5. static volume,
6. kinematic viscosity,
7. Rockwell hardness,
8. Vickers hardness,
9. Brinell hardness,
10. alternating current (AC),
11. high-frequency power,
12. high-frequency dissipation parameters,
13. magnetic field induction,
14. AC electrical energy,
15. flatness,
16. roundness,
17. roughness,
18. temperature dew point,
19. relative humidity,
20. air kerma for x-ray radiation,
21. air kerma for gamma radiation,
22. absorbed dose to water for gamma radiation,
23. spectral responsivity,
24. colour temperature,
25. high gloss,
26. spectral reflectance,
27. spectral luminance factor in measurement geometry 0 ° / 45 ° a and d: 8 °,
28. colorimetric parameters,
29. spectral transmittance,
30. gas volume of flow and volumetric flow rate,
31. water volume of flow and volumetric flow rate,
32. component content in gas mixture,
33. component content in mass concentration of elements,
34. ethanol concentration in air.

Some of them are primary standards which form part of international key comparisons, others are calibrated in the International Bureau of Weights and Measures (BIPM) and abroad at national metrological institutes. This ensures compatibility between the national measurement system and the international system.

REFERENCE MEASUREMENT STANDARD

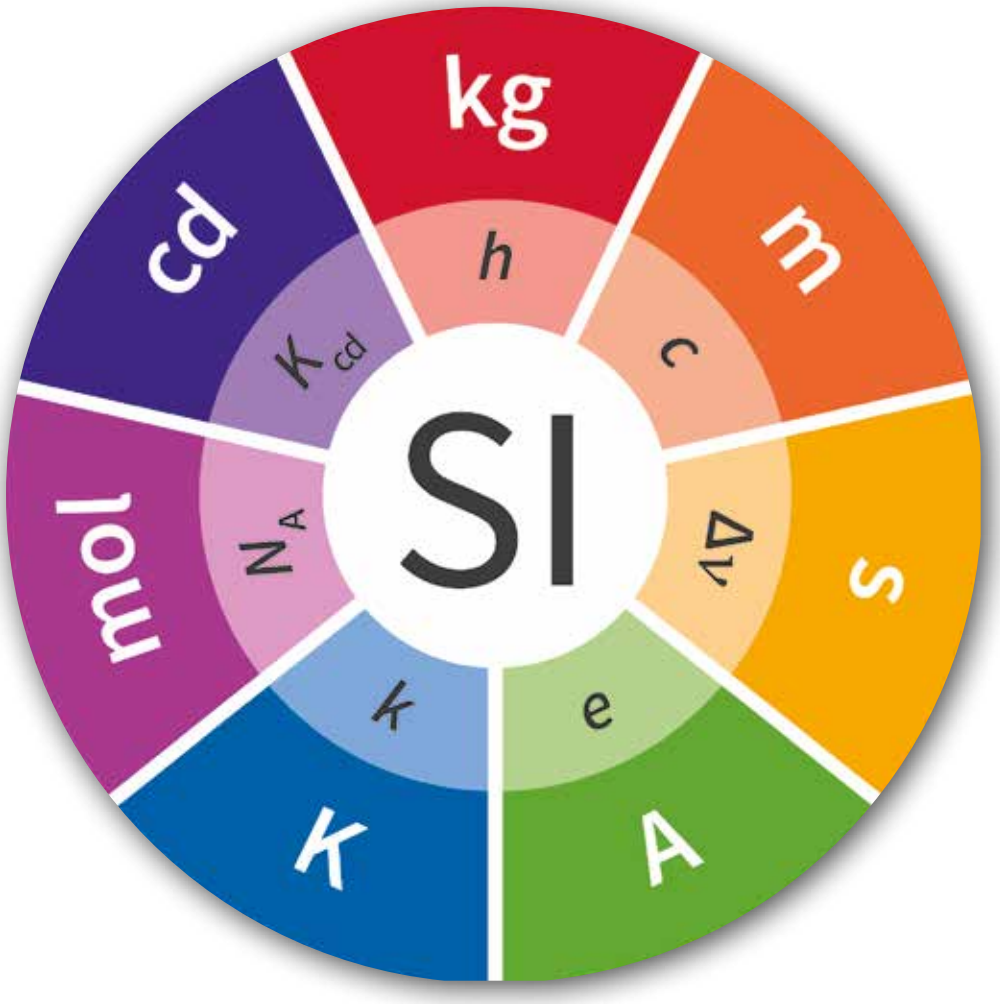
A measurement standard designated for the calibration of other measurement standards for quantities of a given kind in a given organization or at a given location

Research and development is done at GUM laboratories with the aim of devising and modernising measurement standards, production of certified reference materials, as well as development and validation of new measurement methods for the industry.

GUM staff closely cooperate with domestic research centres dealing with metrology, taking active part in research projects at the domesticl level. They are also involved in the implementation of international projects under the European Metrology Programme for Innovation and Research (EMPIR) co-financed by the European Union.

This cooperation provides Polish metrology with access to the latest knowledge in this area, which is necessary in the age of dynamic development of civilisation which constantly poses new challenges. It allows to carry out increasingly difficult and complex metrological tasks to meet the needs of industrial environments and the world of science.

INTERNATIONAL SYSTEM OF UNITS (SI)



International System of Units (SI) is a system which has been accepted and recommended by The General Conference on Weights and Measures.

It is based on 7 basic units: metre, kilogram, second, ampere, kelvin, mole and candela.

EU PROJECTS

ŚWIĘTOKRZYSKI LABORATORY CAMPUS OF THE CENTRAL OFFICE OF MEASURES

The ŚKLGUM project includes the construction, in cooperation with the Kielce University of Technology, of a laboratory research and implementation base, which will allow for effective and professional research and development aimed at strengthening cooperation between research and science on the one hand and business on the other.

The strategic objective is to use metrology to increase the competitiveness of Polish companies on the European and global market and to create a Polish metrology centre, a place where research, scientific and industry-related communities can meet. The basis for the implementation of such a defined objective is the adaptation of the national metrological institution to today's conditions and requirements of the Polish economy.

Fundusze Europejskie Program Regionalny | Województwo Świętokrzyskie | Unia Europejska Europejski Fundusz Rozwoju Regionalnego

TRANS-TACHO

The full name of the project is "IT system for creating a digital environment for the implementation of public services and GUM tasks in the field of tachographs - TRANS-TACHO".

Its aim is to create, implement and launch an e-service for remote service of GUM clients, which will facilitate the conduct of tachograph workshops, the profession of a technician, and the introduction of tachographs on the EU market.

Fundusze Europejskie Polska Cyfrowa | Unia Europejska Europejski Fundusz Rozwoju Regionalnego

"ŚWITEŹ" – AN IT SUPPORT SYSTEM FOR THE SERVICES OF THE REGIONAL MEASURES ADMINISTRATION

The aim of the project is to implement and launch a modern platform of electronic public services targeted at clients of the measures offices. The electronic nature of the services will limit personal contact with the office, which in turn will contribute to saving time and reducing the costs of doing business.

Platform site: switez.gum.gov.pl

Fundusze Europejskie Polska Cyfrowa

Unia Europejska Europejski Fundusz Rozwoju Regionalnego

e-CzasPL

The aim of the project is to provide the service of reliable and credible distribution of legal time signals, applicable in the territory of the Republic of Poland and signals of the Polish realization of Coordinated Universal Time UTC(PL) and the synchronisation monitoring service.

Fundusze Europejskie Polska Cyfrowa

Unia Europejska Europejski Fundusz Rozwoju Regionalnego

THE KIELCE CAMPUS OF THE CENTRAL OFFICE OF MEASURES

The Central Office of Measures, in consortium with the Kielce University of Technology, is implementing the first phase of construction of the Świętokrzyskie Laboratory Campus, which will soon become the centre of national metrology. The project has a unique character. This modern research and development centre will provide conditions for cooperation between professional and innovative laboratory metrology and the economy. The interdisciplinary nature of the GUM Campus will result in support for all sectors of the economy by providing access to a world-class measurement system.

The most modern measurement infrastructure will ensure metrological traceability at the highest required level - work on measurement systems supports the development of new technologies, competitiveness and is in line with National Smart Specialisations.

The campus of the Central Office of Measures will have all the necessary technical and research support instruments. Communication will be ensured by a modern IT network and fibre optic connections with external centres. The location at the foot of Mount Hałas in the southern part of Kielce will minimise the impact of environmental conditions and disturbances on the results of research and tests, which in turn will translate into increased technical possibilities and higher quality of research. Companies that decide to cooperate with the Campus will improve their potential of adapting optical technologies, nanotechnology, acoustics or material technologies, all of them being part of advanced mechatronic technologies and modern material technologies. This is a huge step into the future for Industry 4.0.

The campus will be a meeting venue for research communities not only with representatives of industry and enterprises, but also with schools, universities, state institutions and the military, which will translate into higher competitiveness of the Polish research sector.

The laboratories set up at the Campus will have a unique character on a national scale. The equipment and apparatus of the highest international standard which they will provide meet the needs signalled by the domestic industry. This opens an opportunity for the implementation of research projects and sharing their results, conducting training and apprenticeships, as well as performing research and tests commissioned by companies. This is a completely new quality in the Polish economy, which will give domestic entrepreneurs from many different industries a chance to develop in previously unattainable fields.

Professional teaching base will help to inhibit the effect of the so-called brain drain and will contribute to the accumulation of human capital in the market, which will also be invaluable for economic development. Cooperation with the Central Office of Measures will be of prestigious nature for enterprises both on the domestic and international market.

CONSTRUCTION WORKS
IN MAY 2022

EUROPEAN PARTNERSHIP ON METROLOGY

In view of an excellent assessment of the efficiency of EMRP and EMPIR programmes, EURAMET decided to continue scientific cooperation with EU funding and by Decision of the European Parliament and Council (EU) 2021/2084 of 24 November 2021 the European Partnership on Metrology was established.

THE AIMS OF THE PARTNERSHIP AS DESCRIBED IN THE DECISION TO ESTABLISH THE PROGRAMME:

- developing a balanced, perfect and coordinated metrology system of a European standard, bridging the investment gap between Europe and its global competitors,
- ensuring cutting-edge metrology capabilities and enabling their wide use by innovators in their ecosystems and beyond,
- increasing the impact of metrology on social challenges in connection with the implementation of policies, standards and regulations, including in the digital, economic, industrial and environmental fields, so that they are fit for their intended purpose.

REASEARCH PROJECTS

GUM participated, together with domestic and international partners, in 30 projects of the ending EMPIR programme.

Three new projects are under preparation and will be implemented under the Partnership (as of 1 June 2022).

These operations contribute to the development of many branches of the economy. Thanks to them, economic cooperation is becoming more effective and economical.

CENTRAL OFFICE OF MEASURES

DOMESTIC COOPERATION

GUM COOPERATES WITH DOMESTIC INSTITUTIONS AND ORGANISATIONS, INCLUDING:

- Polish Centre for Accreditation,
- Polish Committee for Standardisation,
- scientific institutes and universities.

In addition, the Office implements agreements concluded with domestic universities, institutes and institutions regarding:

- joint research projects, including the development and submitting of joint research topics, financed from domestic or European framework funds (EMRP or EMPIR),
- mutual assistance in the implementation of diploma and doctoral theses, internships and apprenticeships by staff, students and doctoral students at the Central Office of Measures,
- undertaking joint research and development projects regarding the construction, maintenance and modernisation of state measurement standards,
- conducting specialised metrology training courses and lectures at postgraduate studies,
- reciprocal sharing of measurement infrastructure for research and development,
- undertaking joint initiatives to popularise selected metrological issues,
- conformity assessment.

POLISH METROLOGICAL UNION

The Polish Metrological Union was established on 30 August 2021 and serves to integrate Polish metrology institutions.

The Cracow University of Technology, Lublin University of Technology, Łódź University of Technology, Opole University of Technology, Poznań University of Technology, Silesian University of Technology, Świętokrzyskie University of Technology, Warsaw University of Technology and the Łukasiewicz Research Network - Institute of Ferrous Metallurgy joined the Polish Metrological Union together with the Central Office of Measures.

Operations of the Polish Metrological Union focus on cooperation with the industry and business environment highly demanded by entrepreneurs, especially those who do not have adequate facilities and metrological infrastructure.

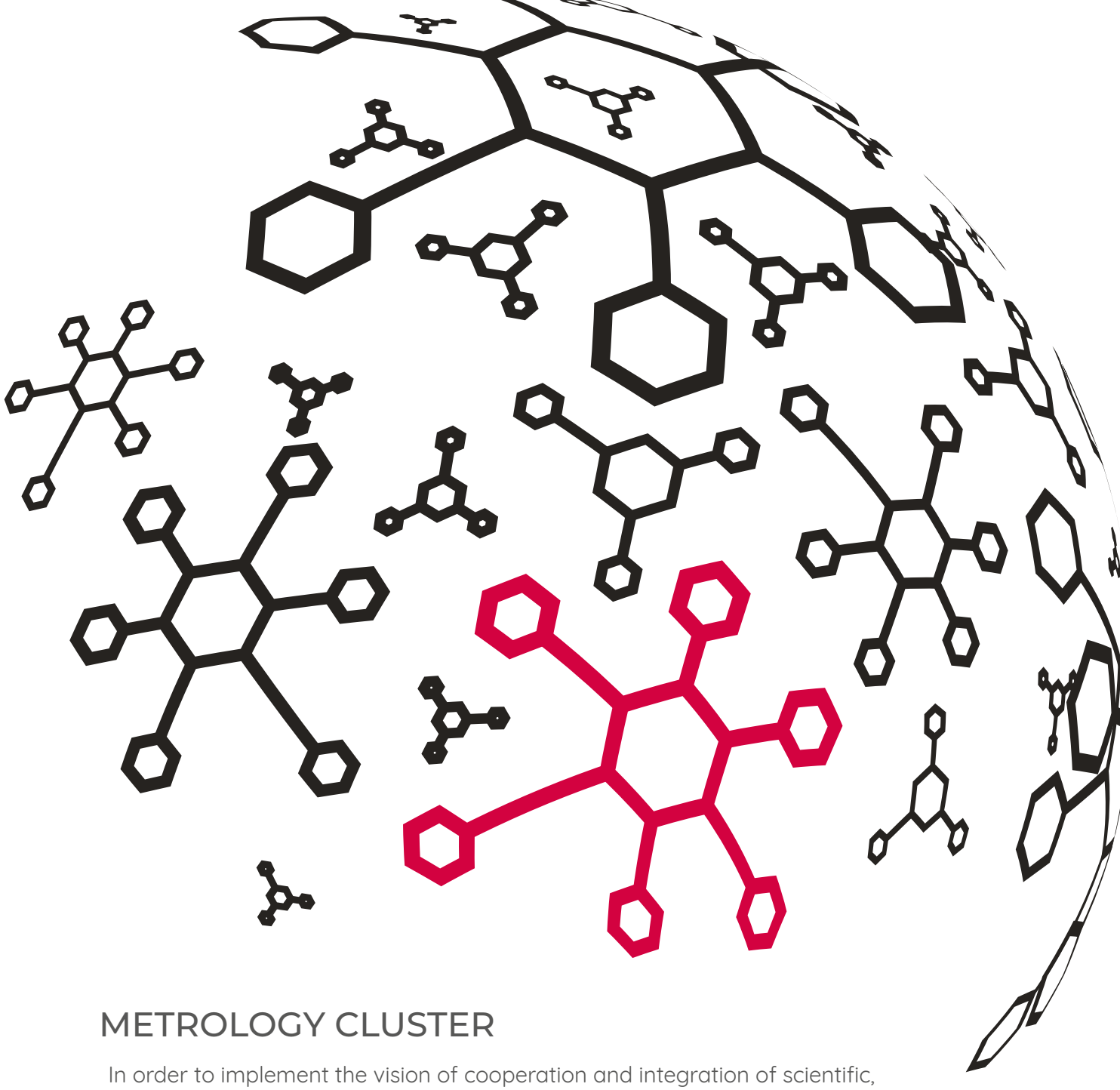
The main task of the Union is to inventory the equipment of Polish metrology under the slogan "Universal metrological inventory". This will allow the creation of an infrastructure base, enabling quick and effective implementation of research in specific institutions and laboratories. In addition, scientists will develop and start implementing a staff support system. It will include internships for young scientists, including students, assistance with industrial PhD programmes, participation in research, courses and training in the field of metrology.

POLISH METROLOGICAL UNION'S tasks also include:

- increasing the absorption of national and international grants,
- promoting the latest solutions and innovations in the field of metrology,
- exchanging scientific ideas by organising seminars, symposia, conferences and congresses,
- setting new directions for the development of metrology.

We must develop our potential in a collaborative environment so that we can launch initiatives which frequently go beyond the capabilities of a single entity. Our cooperation will make us unrivalled in the national dimension and competitive in the international arena.

President of GUM, prof. Jacek Semaniak



METROLOGY CLUSTER

In order to implement the vision of cooperation and integration of scientific, economic and social communities in the field of metrology, on 6 April 2022, during a Congress named Metrology - an opportunity and challenge of the future, the "Declaration of cooperation to create a Metrology Cluster" was signed. The aim of the Cluster is to act for the benefit of broadly understood innovation and to create modern solutions in the metrology sector for the Polish industry.

The establishment of the Cluster is an opportunity to take up challenges in the field of metrology that go beyond the capabilities of one environment.

We welcome cooperation with everyone interested in developing the potential of Polish metrology.

Join us to create the future of the Polish economy!

The main thematic areas related to the operations of the Cluster:

- advanced measurement techniques,
- health and food safety,
- energy and environmental protection,
- digital technologies.

The most important tasks of the Metrology Cluster:

- acting for broadly understood innovation and creating modern solutions in the metrology sector for the Polish industry,
- transfer of knowledge, technology and competences between the Cluster stakeholders,
- development of an optimal model of cooperation between the scientific community and the business world in the field of research and development and education of human resources for the economy,
- establishing a "fast track" of substantive consultations on development projects with representatives of scientific institutions for entrepreneurs,
- finding and indicating scientific and business partners in the implementation of research, development and implementation projects by companies,
- supporting the process of commercialisation of results of research and scientific work carried out by the Cluster participants,
- building a competitive advantage of companies associated in the Cluster through access to research infrastructure resources and intellectual competences of research centres which are Cluster participants,
- informing about the possibilities of obtaining external funds and financial support in conducting research and implementation of projects related to launching a new product / service on the market,
- provision of services in the field of internationalisation of enterprises and expansion to foreign markets,
- participation in meetings at government, inter-ministerial and local government levels, determining the shape of the entrepreneurship development policy in Poland and determining the areas and sectors of the Polish economy that qualify for state subsidies from the domestic and European institutions.

POLISH METROLOGY

The programme of the Minister of Education and Science called "Polish Metrology" supports, in cooperation with the President of the Central Office of Measures, institutions of the higher education and science system in their research and development in the areas related to metrology.

The programme will support the implementation of projects aimed at:

- increasing the level of competences of metrological institutions,
- strengthening intellectual capital,
- increasing the competitiveness of the economy,
- developing modern technologies,
- stimulating the development of metrology, in particular in the areas of: health, environment and energy, advanced measurement techniques and development of digital technologies.

INTERNATIONAL COOPERATION

THE CENTRAL OFFICE OF MEASURES ACTIVELY OPERATES ON THE INTERNATIONAL ARENA. THE OBJECTIVES OF THIS COOPERATION ARE FOCUSED ON ENSURING A HIGH LEVEL OF MEASUREMENTS AND METROLOGICAL TRACEABILITY WITHIN THE WORLD-WIDE MEASUREMENT SYSTEM. AN ESSENTIAL ELEMENT OF COOPERATION IS HARMONISATION OF INTERNATIONAL REGULATIONS CONCERNING LEGAL METROLOGY AND PARTICIPATION IN THE CREATION OF NEW REGULATIONS (INCLUDING, AMONG OTHERS OIML RECOMMENDATIONS).

Operations on an international scale also allow for increasing the competences of the Office through ongoing exchange of information in the field of metrology and hallmarking, participation in international comparisons or expert assessments carried out by metrologists from national metrology institutes

GUM actively participates in works carried out by international organisations such as BIPM, OIML, EURAMET e.V., WELMEC e.V., NoBoMet and in works carried out within the framework of the European Commission.

Cooperation with all the above-mentioned organisations includes scientific and technical cooperation as well as activities related to legal metrology, often of strategic and global importance.

In the area of research, GUM participates in projects under EURAMET research programmes.

METROLOGY CONVENTIONS AND ORGANISATIONS

Metric Convention

A treaty of 1875, signed by Poland in 1925. The Convention established, amongst others, The International Bureau of Weights and Measures (BIPM) and the International Committee of Weights and Measures (CIPM). The President of GUM represents Poland at the meetings of the General Conference on Weights and Measures – the highest body of the Metric Convention, adopting resolutions on basic metrological problems. Poland actively participates in the work of the BIPM management group.

Representatives of GUM participate, as part of CIPM, in the work of Consultative Committees for Mass and Related Qualities, Acoustics, Ultrasound and Vibration, Time and Frequency, and as observers in Consultative Committees for Length, Amount of Substance - Metrology in Chemistry and Biology, Ionising Radiation.

International Organisation of Legal Metrology (OIML)

Set up under the Convention establishing the OIML in 1955. Poland, as a co-founder of OIML, participates in the work of all Technical Committees of the organisation, as well as a vast majority of Subcommittees and their Project Groups. Moreover, GUM (since 1961) is responsible for the secretariat of the Technical Committee OIML TC1 Terminology, which develops relevant international metrological

publications, and the representative of GUM is the convener of project groups for the update and revision of the International Vocabulary of Terms in Legal Metrology VIML (OIML V1). A representative of GUM is also convener of the project group for the revision of the OIML R22 recommendation – International Alkoholometric Tables.

The European Association of National Metrology Institutes (EURAMET e.V.)

GUM appointed representatives to all Technical Committees of the organisation. A representative of GUM participates in the work of the Working Group for Capacity Building and Partnership Committee. GUM staff participate in peer review expert visits.

The European Cooperation in Legal Metrology (WELMEC e.V.)

GUM participates in the works of all WELMEC e.V. working groups. The areas of WELMEC's operations include measuring instruments covered by the regulations of the MID and NAWID directives. A representative of GUM chairs the WG10 working group - Measuring Equipment for Liquids Other Than Water.

GUM also cooperates with other international organisations:

- the European Platform of Notified Bodies working in Legal Metrology (NoBoMet);
- Committee on Reference Materials (REMCO) of the International Organisation for Standardisation (ISO)
- International Database for Certified Reference Materials (COMAR)

GUM participates in key and supplementary international comparisons carried out under the CIPM MRA by BIPM, CIPM Consultative Committees and regional metrology organisations.

LEGAL METROLOGY

LEGAL METROLOGY IS AN AREA THAT MAY BE UNPERCEIVED BUT IS WITH US EVERY DAY. EVERY DAY, WHEN USING WATER OR OTHER UTILITIES, WE DO NOT THINK HOW THEIR CONSUMPTION IS DETERMINED, AND TO WHAT PROCEDURES THE WATER METER HAD BEEN SUBJECTED, BEFORE IT WAS INSTALLED IN OUR HOME.

PROTECTION OF THE INTERESTS OF THE STATE AND CITIZENS OF THE REPUBLIC OF POLAND

The tasks of the President of the Central Office of Measures include legal metrological control of measuring instruments in specific areas in order to protect the interests of the State and the citizens of the Republic of Poland..

This protection consists of checking whether the measuring instruments meet the technical requirements specified in legal regulations, both before placing them on the market and during their use. The relevant legal acts define the scope and type of instruments subject to legal metrological control.

AREAS DEFINED BY LAW

Legal metrological control is an activity aimed at proving that a measuring instrument meets the requirements specified in legal regulations.

LEGAL METROLOGICAL CONTROL

The aim of legal metrological control is to protect the interests defined in act of 11 May 2001 – Law on Measures.

Legal metrological control of measuring instruments is performed by:

- type approval of a measuring instrument on the basis of a type test - prior to placing on the market a type of a measuring instrument

or

- initial verification or unit verification - prior to placing on the market or use a given measuring instrument,

and

- subsequent verification - for measuring instruments placed on the market or put into service.

Scope of legal metrological control

The scope of legal metrological control depends on the type of a measuring instrument. It may cover all these forms of legal metrological control, two of them or only one (e.g. type approval or subsequent verification).

A detailed list of measuring instruments subject to legal metrological control is available on the GUM website in the For business / Services / Certification tab.

Verification points

Legal metrological control also makes use of verification points, which are places where the administration of measures performs operations related to the verification of a large number of specific types of measuring instruments at the manufacturer's, importer's or at the repair or installation's premises.

Apart from the measures administration authorities, specific activities in the field of legal metrological control are performed by entities to which the President of the Central Office of Measures granted authorisation to perform initial verification or subsequent verification of specific types of measuring instruments.

LEGAL METROLOGICAL CONTROL OF MEASURING INSTRUMENTS IS PERFORMED BY MEASURES ADMINISTRATION BODIES

CONFORMITY ASSESSMENT

Conformity assessment is one of the ways of putting measuring instruments into service. It is a universal system - it applies not only to measuring instruments, but also to many different types of products. As a rule, it covers the countries of the European Union.

The conformity assessment system covers the following measuring instruments:

- non-automatic weighing instruments,
- water meters,
- gas meters and volume conversion devices,
- active electrical energy meters,
- thermal energy meters,
- measuring systems for the continuous and dynamic measurement of quantities of liquids other than water (e.g. liquid fuel dispensers at gas stations),
- automatic weighing instruments (e.g. for packing products),
- taximeters,
- material measures:
  - material measures of length (e.g. tapes),
  - capacity serving measures (e.g. tankards, beer mugs),
- instruments for measuring multiple dimesions*:
  - instruments for measuring length,
  - instruments for measuring the surface area (e.g. leathers),
  - instruments for measuring multiple dimensions (e.g. package dimension),
- automotive exhaust gas analysers*.

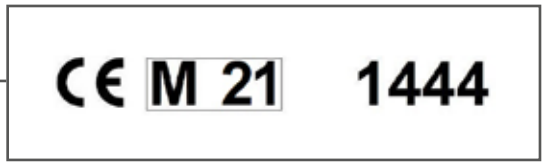
*) – Outside the scope of notification GUM NB 1440

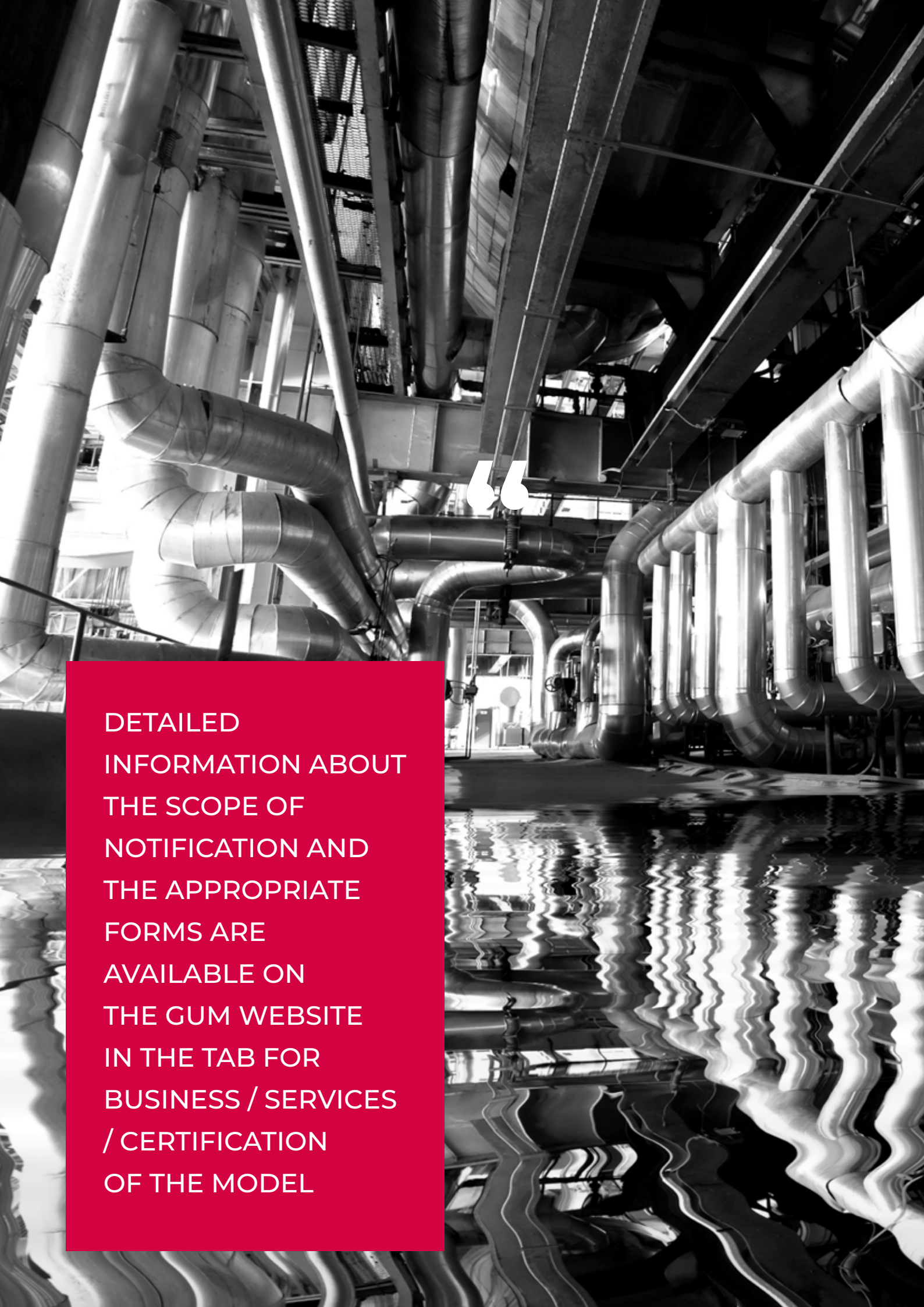
The most important feature of the conformity assessment system, which distinguishes it from the "classic" legal metrological control, is the shifting of the burden of responsibility from the state authorities to the manufacturer.

CONFIRMATION OF CONFORMITY

The confirmation that a measuring instrument has been assessed for compliance with the requirements of the MID / NAWID directives is the conformity marking placed on the instrument and the declaration of conformity.

An example of conformity marking of a measuring instrument





DETAILED INFORMATION ABOUT THE SCOPE OF NOTIFICATION AND THE APPROPRIATE FORMS ARE AVAILABLE ON THE GUM WEBSITE IN THE TAB FOR BUSINESS / SERVICES / CERTIFICATION OF THE MODEL

Forms of legal metrological control of measuring devices

	Classic Legal Metrological Control			Legal Metrological Control according to the model of Old Approach Directives			Legal Metrological Control according to the model of New Approach Directives	
Measuring Instrument *	type approval	Initial verification	Subsequent verification	EEC type approval	EEC initial verification	Subsequent verification	Conformity assessment	Subsequent verification
I. Instruments for measuring electrical quantities								
Active electrical energy meters	✓	✓	✓	✓	✓	✓	✓	✓
II. Instruments for measuring the volume and flow of liquids and for measuring heat								
Gas meters	✓	✓	✓	✓	✓	✓	✓	✓
Gas volume conversion devices	✓	✓					✓	✓
Water meters	✓	✓	✓	✓	✓	✓	✓	✓
Measuring systems for the continuous and dynamic measurement of quantities of liquids other than water	✓	✓	✓	✓	✓	✓	✓	✓
Fixed tanks starage	✓	✓	✓					
Road tankers	✓	✓	✓					
Metal barrels	✓	✓						
Water heat meters	✓	✓	✓				✓	✓
Conversions for water heat meters	✓	✓	✓				✓	✓
Steam temperature sensors for water heat meters	✓	✓	✓				✓	✓
Flow transducers for water heat meters	✓	✓	✓				✓	✓
III. Instruments for measuring length and related quantities								
Instruments for measuring the length of fabrics, wire, cable, tape, dressing and paper materials	✓	✓	✓				✓	✓
Material length measures	✓	✓	✓	✓	✓	✓	✓	
Machines for measuring the surface area of leathers	✓	✓	✓				✓	✓
Electronic taximeters	✓	✓	✓	✓	✓	✓	✓	✓
Vehicle speed measuring instruments in road traffic control	✓	✓	✓					
IV. Mass measuring instruments								
Weights		✓	✓		✓	✓		
Non-automatic weighing instruments	✓	✓	✓				✓	✓

	Classic Legal Metrological Control			Legal Metrological Control according to the model of Old Approach Directives			Legal Metrological Control according to the model of New Approach Directives	
Measuring Instrument *	type approval	Initial verification	Subsequent verification	EEC type approval	EEC initial verification	Subsequent verification	Conformity assessment	Subsequent verification
Automatic weighing instruments:								
portioning	✓	✓	✓				✓	✓
continuous totalisers	✓	✓	✓	✓	✓	✓	✓	✓
weighing	✓	✓	✓				✓	✓
automatic Catchweighers	✓	✓	✓				✓	✓
weighing in motion of chained train carriages	✓	✓	✓					
automatic rail weighbridges							✓	✓
V. Instruments for measuring density								
Glass hydrometers, alcoholometers and alcohol hydrometers	✓	✓		✓	✓			
Glass hydrometers, hydrometers for liquids other than alcohol	✓	✓						
Standard grain density meters 20 L	✓							
Oscillating densimeters for measuring density of liquids (from 450 kg / m^3 to 2000 kg / m^3)	✓							
VI. Instruments for measuring pressure								
Tire pressure gauges for motor vehicle	✓	✓	✓	✓	✓	✓		
VII. Chemical and physicochemical quantity measuring instruments								
Automotive exhaust gas analysers	✓	✓	✓				✓	✓
VIII. Measuring instruments for sound								
Sound level meters	✓							

Legend	
✓	- means that this type of measuring instrument is subject to relevant form of legal metrological control
	- means that this form of legal metrological control for a given type of measuring instrument is no longer performed

* A detailed list of measuring instruments including their parameters, application and classification may be found in a decree of the Minister of Development and Finance of April 13, 2017 on the types of measuring instruments subject to legal metrological control and the scope of this control, Journal Of Laws, item 885.

METROLOGICAL AND HALLMARKING SUPERVISION

The President of the GUM is responsible for the implementation of statutory tasks in the field of:

- supervising the observance of the provisions of the Acts: Law on Measures, Hallmarking Law, the Act on Tachographs and implementing acts for these acts,

as well as

- supervision and inspection over regional representatives of measures and hallmarking administration,

as well as

- is responsible for the implementation of tasks pursuant to the provisions of the Act on Packaged Goods and the Act on Conformity Assessment Systems and Market Surveillance. Inspections carried out by the administration of measures in the field of packaging products are to ensure that the purchased packaged goods conforms to the manufacturer's quantitative declaration.

Metrological supervision is carried out, amongst others, by:

- inspection of measuring instruments in use under legal metrological control,
- inspection of entities and entrepreneurs operating on the basis of permits or authorisations granted by the President of the GUM in the scope of meeting the necessary conditions to perform the granted authorisations or permits,
- reporting in the area of supervision and inspections and conducting analyses based on them in order to identify positive and / or negative phenomena and trends, thus setting directions of supervisions and inspections,
- keeping a register of identification marks of bottle producers and supervision in the field of compliance with the provisions of the Act on Packaged Goods – in accordance with the area of their competence,
- collecting and monitoring information including on the implementation of post-inspection conclusions and recommendations and other recommendations that may be used to prepare inspections and conduct explanatory proceedings.

Information on the results of the inspections carried out is available on the BIP GUM website.

PACKAGED GOODS

The Act on Packaged Goods specifies, amongst other things, the regulations for the packaging of products intended for marketing in packaging and for labelling packaged goods with the "e" mark.

GUM participates in the system of supervision over the packaging of products in Poland, incl. by coordinating work on packaged goods, which ensures uniformity of decisions issued as part of planned and ad hoc inspections. As part of this supervision, the tasks of the directors of regional offices of measures include:

- registration of notifications of packers,
- and performing ad hoc and scheduled inspections.

Within the scope of supervision over the Act on Packaged Goods, GUM cooperates with other public administration units, in particular with the Trade Inspection, the Main Inspectorate of Commercial Quality of Agricultural and Food Products and the Main Pharmaceutical Inspectorate. The packer, importer, or the party who commissions packaging are responsible for ensuring that the packaged goods meet the requirements specified in the Act.
In particular, they are responsible for ensuring that the actual quantity matches the minimum value quoted on the unit packaging.

Inspections carried out by the administration of measures in the scope of packaging goods are to ensure that the purchased packaged goods comply with the manufacturer's quantitative declaration.

As defined in Art. 2 point 1 of the Act of 7 May 2009 on Packaged Goods (Journal of Laws of 2020, item 1442), packaged goods include any product in a unit package of any type, the nominal quantity of which is the same for the entire batch , measured without the presence of the buyer, not exceeding 50 kg or 50 l, which cannot be changed without damaging the packaging.

SOFTWARE TESTING: CASH REGISTR DEVICES, MEASURING INSTRUMENTS

In order to meet the challenges which result from the use of modern IT technologies in metrology, GUM provides a laboratory dealing with software security and metrological data. Its tasks include, amongst others, testing the software of measuring instruments, carried out as part of the conformity assessment and type approval processes, in accordance with the relevant regulations.

The laboratory also conducts software security tests based on embedded and mobile technologies, operating in various operating systems, including distributed ones, using the Internet to transmit control signals. As part of the testing of measuring instruments, the security of data storage, processing and transmission with the use of the latest IT technologies are also assessed.

In addition to testing measuring instruments, the Central Office of Measures also performs tasks related to testing the trueness of registration and the security of data processing and storage in modern cash register devices.

The tasks of the President of the Central Office of Measures include issuing confirmations that the functions, criteria and technical conditions specified in the regulations are met by cash register devices. The development of a research methodology which is innovative in this industry, based on risk analysis and software testing methods used in the IT industry, allows to ensure high quality and innovation of these devices and improve the security of VAT registration.

TACHOGRAPHS

The President of GUM performs tasks resulting from the Act of 5 July 2018 on Tachographs (Journal of Laws of 2020, item 900 and 2022, item 209).

The measures administration operations under of the tachograph system includes, among others:

- supervision of compliance with the provisions of the act in accordance with its competences,
- conducting proceedings for type approval of tachographs or tachograph components,
- issuing and withdrawing permits to install, check, inspect and repair tachographs,
- issuing and withdrawing certificates confirming the authorisation to install, check, inspect and repair tachographs.

SERVICES

GUM PROVIDES, AMONGST OTHERS, CALIBRATION, TESTS, EXPERT OPINIONS AND PRODUCES CERTIFIED REFERENCE MATERIALS

The list of metrological services related to the cal
of measuring ins
the production o
reference materi
performance of e
with a price list is
on the website o

Apart from the administrative activities performed by GUM in the field of legal metrological control, the Office, like the regional administration of measures, provides the following services:

- calibration and expert opinions of measuring instruments, including reference materials,
- production of certified reference materials,
- conformity assessment of measuring instruments,
- testing of measuring instruments and issuing certificates of compliance with OIML recommendations under the OIML system, selection and use of measuring instruments,
- consultations and technical advisory on the selection and use of measuring instruments,
- • specialist training in the field of measures.

HALLMARKING

In the field of hallmarking, the hallmarking administration authorities consisting of the President of GUM and the Directors of Regional Assay Offices participate in the works of:

- Standing Committee of the Convention on the Control and Marking of Articles of Precious Metals, where the Director of Regional Assay Office in Warsaw acts as Deputy-Chairman,
- the Visegrad Group (GV4).

Laboratories of Polish assay offices participate in international proficiency testing programmes, such as "Round Robin" and "Labtest".

HALLMARKING

The President of GUM supervises smooth operation of the Regional Assay Offices in Warsaw and Cracow. The basic tasks of these offices include testing the content of precious metals in the articles and alloys submitted for testing and marking these items with hallmarks or issuing assay certificates. Hallmarking administration authorities supervise compliance with the provisions of the Hallmarking Law Act of 1 April 2011. As part of this supervision, employees of regional assay offices carry out inspections at precious metal article trading, processing or repair venues. Pre-marketed precious metal articles, without hallmarks or without assay certificates, are withdrawn from sale by the inspectors by way of an administrative decision, with an order to deliver them to the appropriate regional assay office for examination and suitable hallmarking. If the authenticity of hallmarks or assay certificates raises doubts, the inspectors secure the articles in the form of a decision, with a simultaneous order to deliver them to the appropriate regional assay office for the purpose of making an expert opinion.

FINENESS IS THE RATIO BETWEEN THE MASS OF PURE PRECIOUS METAL IN AN ALLOY AND THE MASS OF THE ALLOY, EXPRESSED IN THOUSANDTH PARTS.

Thanks to these inspections, on the territory of the Republic of Poland, articles with precious metal content are confirmed with an authentic hallmark or with an assay certificate which guarantees safe purchase and protects the consumer's interests. Regional assay offices keep registers of responsibility marks. The registers provide open access which allows consumers to identify the marks on articles they purchase.

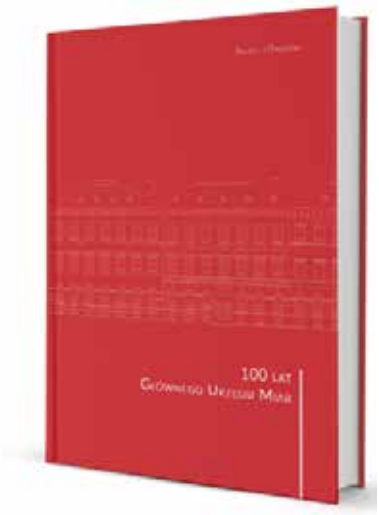
PUBLICATIONS

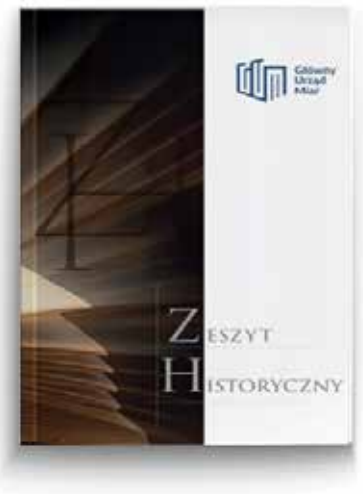
HISTORICAL PUBLICATIONS

The Centenary of the Central Office of Measures and the Biographical Dictionary of employees of the Central Office of Measures are two items published to mark the centenary of the office.

The Centenary of the Central Office of Measures talks about the old times, briefly presenting the history of measures, discussing the variety of measures applicable in Poland before and during the partitions, and the process of standardising measures in free Poland during the Second Polish Republic. A special place in the work is given to the description of the development of the administration of measures in the 20th century and the fates of its most eminent employees. The Biographical Dictionary is a supplement about eminent figures associated with the Central Office of Measures.

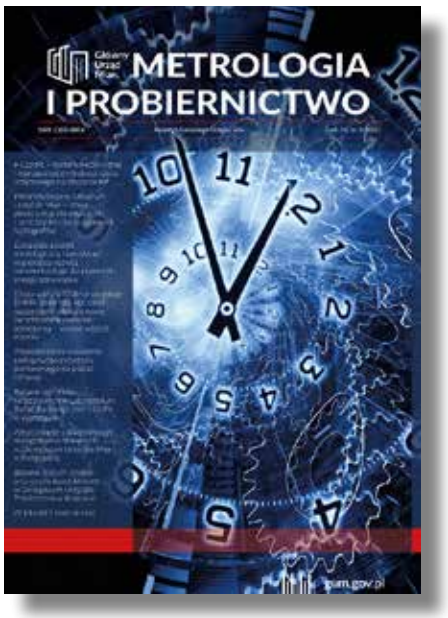
To mark the jubilee, the Historical Notebook was also published, containing a collection of articles about the past of the administration of measures in Poland and presenting the profiles of people related to it.





THE METROLOGY AND HALLMARKING BULLETIN

In the subsequent issues of the Bulletin we present the achievements of GUM laboratories and regional assay offices, issues related to metrology and measurements in everyday life, cooperation in the field of international research programmes (EMRP and EMPIR) and joint initiatives implemented on the basis of agreements between GUM and research centres in Poland. The publication also includes an overview of the most important events in the world of metrology. Additionally, valuable interviews as well as popularising and historical articles are published.



PUBLICATIONS

GUIDES

A series of guides describes the history of the development of a given measurement field, including its importance for the economy and society. Metrological work carried out in GUM laboratories is presented: measuring stands and measurement standards constituting the highest reference level in the country in terms of the consistency of the measurement result with the SI and information on the services provided.

METROLOGICAL VOCABULARIES

A vocabulary of selected terms and definitions used in metrology and hallmarking is the third revised Polish-English and English-Polish dictionary of selected terms and definitions used in metrology and hallmarking.

The main intention of this publication is to be of aid for people working in the administration of measures and hallmarkings, as well as for people using the services of this administration. Its aim is to contribute to the standardisation of terminology used in these fields, to facilitate the exchange of information, translation of documents, studies, of brochures and other publications, and the editing of documents. The dictionary can also be used to aid in contacts with foreign-language-speaking partners and clients.

It also supplements the following publications:

- International Vocabulary of Terms in Legal Metrology – the Polish edition is a translation of "International Vocabulary of Terms in Legal Metrology" OIML V 1 Edition 2013 (E / F).
- International vocabulary of metrology - Basic and general concepts and associates terms (VIM), PKN-ISO / IEC Guide 99.

PUBLICATIONS CONCERNING THE INTERNATIONAL SYSTEM OF UNITS (SI)

On 16 November 2018, the signatory states of the Metric Convention unanimously decided to redefine the basic units of the International System of Units (SI).

They were based on fixed numerical values of a set of seven defining constants from which the definitions of the seven SI base units are derived.

In connection with the entry into force of new definitions of individual SI units, the Central Office of Measures has prepared several publications introducing the redefinition process and containing the most important information about the SI units of measurement:

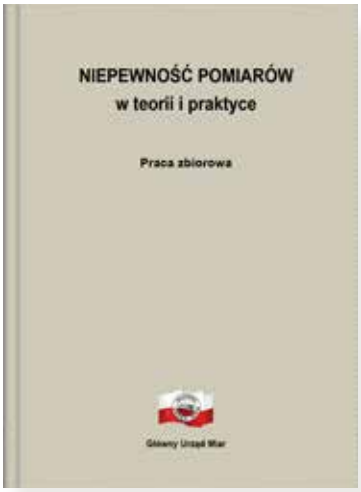
- SI brochure: The International System of Units (SI) - Polish translation of the full BIPM document,
- Summary of information about the International System of Units (SI),
- SI redefinition - guide of the Central Office of Measures,
- From kilogram to candela. A short journey through the basic units of measures – for young readers.

PUBLICATIONS

MEASUREMENT UNCERTAINTY

- Measurement Uncertainty in Theory and in Practice is a kind of monograph divided into four parts. The first one deals with general issues of measurement uncertainty assessment, while the remaining ones with an assessment of uncertainty in biomedical and physicochemical measurements, in measurements of electrical quantities and in measurements of geometric quantities.

  The chapters presented in the work are autonomous and are an expression of professional experience, knowledge and personal interests of their authors in issues related to the preparation of measurement data.



- Evaluation of measurement data - Guide to the expression of uncertainty in measurement is the Polish language version of the JCGM 100:2008 document called Evaluation of Measurement Data

  - Guide to the Expression of Uncertainty in Measurement, available on the website of the International Bureau of Weights and Measures (BIPM).

  The Guide contains updated metrological terminology in line with the International Vocabulary of Metrology VIM-3. The original document was compiled in 1995 as a result of many years of work on the method of determining and expressing measurement uncertainty, and to this day it remains the basic work in the field of developing the measurement result on an international scale.

The publications are available on our website in the Knowledge / Publications tab.

The Phanzeder table scale, maximum capacity of 5 kg - 1916, cast iron, brass, manufacturer: Stanisław Śliwicki, Lviv craftsman

COLLECTION OF HISTORICAL MEASURING INSTRUMENTS OF THE CENTRAL OFFICE OF MEASURES

THE CENTRAL OFFICE OF MEASURES HAS A UNIQUE COLLECTION OF HISTORICAL MEASURING INSTRUMENTS. THE MOST VALUABLE ITEMS ARE PERMANENTLY EXHIBITED IN DISPLAY CASES IN THE CORRIDORS OF THE OFFICE.

The beginnings of the collection date back to the 1920s. It was then that the collection of measuring devices, photographs and documents related to the development of measures in Poland began. Unfortunately, most of them were destroyed during World War II. During the rebuilding of the Office very few historic items which were retrieved the rubble were fit for further display following their restoration. They gave rise to the present collection, which was created basically from scratch in the post-war years on the initiative of prof. Józef Roliński (1889–1962) and prof. Jan Obalski (1898–1968) who were then working at the Central Office of Measures.

The task of recreating the collection was entrusted in 1952 to Andrzej Janiszek (1905–2008), who coordinated the gathering of the collections and served as the curator for the subsequent 40 years. At that time, he was involved in the acquisition, organisation and documentation of unique measuring instruments at GUM. He searched for and acquired historic items, restored their functionality and original appearance, in order to add them to the permanent

A two-cylinder electricity meter 220 V, 50 A - around 1885; wood, ceramics, metal, manufacturer: H. Aron

exhibition. He collected about 3,000 exhibits and he practically wrote himself their detailed technical descriptions.
The exhibits were obtained from various sources, including from the local administration of measures, by way of exchange with other museums or private collectors, as donations from both private persons and institutions. In special cases, decisions were made about their purchase.

Currently, the collection consists of about 3 500 exhibits: historic technical devices, archival documents, chronicles, photographs showing employees of the Polish administration of measures, often at measuring stations used in the past.
To date, 1 600 objects have been inventoried in electronic form.

The most valuable treasures of the collection include:

- the Warsaw semi-bushel from 1764 - a brass container - used to measure volume,
- a Lithuanian weight with the Kościesza coat of arms from 1677,
- measures calibrated in historic units of length (e.g. inches, feet, vershoks (a historic Russian unit of length of approximately 4.4 centimetres) or ells),
- electricity meters, including one of the first Aron meters from the late 19th century,
- wooden variations from the 18th century,
- a pocket sundial from the mid-19th century,
- a Lviv ell (measuring 59.6 cm) from 1866 r.

Two-lever letter scale, maximum capacity of 60 g and 250 g - ca. 1906-1919, cast iron, brass, manufacturer: Columbus

PERMANENT EXHIBITION

We provide all the interested visitors with an opportunity to see our collection.
The collection we have acquired illustrates the history of measurements and the development of measurement techniques and technologies. Please make an appointment for a free tour.

Our young visitors are invited to museum lessons to see historic technological devices.

All information regarding your visit may be obtained by writing to the following address: zbiory@gum.gov.pl or may be found on the website www.gum.gov.pl in the About us / History / Collection of historical measuring instruments tab.

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