


Legal framework of metrological service requirements

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Abstract: This article explores the legal and regulatory frameworks that govern metrology services, emphasizing the role of accurate and reliable measurement systems in various industries. It examines the national and international legal instruments that establish the standards for metrological services, highlighting the importance of conformity to legal metrology in ensuring fair trade, consumer protection, and public safety.

Keywords: Normative document, legal metrology, measurement standards, measurement instruments, measurement systems.

Introduction: Metrology, the science of measurement, plays a fundamental role in various sectors including trade, health, safety, science, and technology. The legal framework surrounding metrological services ensures that measurements and measuring instruments are accurate, reliable, and consistent across borders. This legal structure governs the standards, practices, and procedures that ensure metrological services operate in a way that protects consumers, supports fair trade, and promotes public welfare. This article explores the key components of the legal framework governing metrological service requirements, focusing on international standards, national regulations, accreditation, and enforcement mechanisms.

International Standards and Harmonization

At the core of metrology is the International System of Units (SI), which standardizes measurements worldwide. The SI units—such as the meter, kilogram, second, and ampere—ensure consistency and facilitate global trade, science, and communication. These units are maintained by the International Bureau of Weights and Measures (BIPM), a global authority that ensures measurement consistency across countries.

The International Organization of Legal Metrology (OIML) is another key body that facilitates the harmonization of measurement standards internationally. OIML provides recommendations and

guidelines to ensure that metrological systems are aligned across member countries. These guidelines cover areas such as the calibration of measuring instruments, the maintenance of national measurement standards, and the testing of instruments used in trade and commerce.

The World Trade Organization (WTO) also plays a role in ensuring that international trade is not impeded by measurement discrepancies. Under the Agreement on Technical Barriers to Trade (TBT), countries are encouraged to adopt international standards and best practices in metrology to eliminate barriers in trade. This agreement promotes the use of common measurement standards and reduces the risk of disputes arising from differing measurement systems.

National Metrological Legislation

While international standards provide the foundation, individual countries implement metrological laws and regulations to ensure that measurement systems within their borders are accurate, reliable, and conform to global standards. These laws are crucial for safeguarding public health, ensuring fair trade, and protecting consumers from deceptive practices.

Metrology, the science of measurement, plays a critical role in ensuring accuracy, reliability, and standardization across various industries. In Uzbekistan, the national legal framework for

metrological services is designed to promote uniformity, enhance trade competitiveness, and protect the rights of consumers and producers. This article provides an overview of the key components of the metrological legal framework in Uzbekistan, highlighting its objectives, governing bodies, and legislative structure.

Key Objectives of the Metrological Legal Framework:

1) Ensuring measurement accuracy: the framework sets strict

standards to guarantee the precision of measurements across sectors, including industry, health, trade, and environmental monitoring.

2) Protecting consumer rights: by regulating measurements in

commerce, the framework safeguards consumers against fraudulent practices and ensures fair transactions.

3) Facilitating trade: compliance with international metrological

standards enhances the country's global trade relations, ensuring that Uzbekistan's products and services meet global benchmarks.

4) Promoting scientific and technological development: the

framework supports innovation and technological advancements in measurement techniques and instrumentation.

Legislative structure

The legal framework governing metrology in Uzbekistan is rooted in several key laws and regulations, including:

1) The Law of the Republic of Uzbekistan on Metrology: This

foundational legislation outlines the principles of metrological regulation, specifying the rights and responsibilities of entities involved in measurement activities. Referring to the law on metrology of course this law is a law that regulates Metrological actions in the production process. The date of entry into force is 09.10.2020, which was approved by the Senate on February 28, 2020, passed by the legislature on November 12, 2019. Metrology legislation consists of this law and other legislative acts. If the International Treaty of the Republic of Uzbekistan establishes rules different from those provided for by the metrology law of the Republic of Uzbekistan, the provisions of the international treaty apply. Section 3 of this Act cites the basic concepts. Metrology activities are activities related to ensuring that measurements are in a single unit, measurement techniques and tools, as well as

methods to achieve the required accuracy. Metrological observability is the property of a measurement result that can be attributed to a benchmark through a sequence of documented continuous calibrations. Metrological examination-a set of organizational and legal works on the assessment and analysis of the correctness and completeness of the application of Metrological requirements, rules and norms related to the uniform unity of measurements. A test vehicle is a technical device, substance, and (or) material with normalized technical descriptions, intended for testing. A standard sample is a measuring instrument in the form of a sample of the same substance (material), in which one or more values are determined that characterize the property or composition of the substance (material) as a result of Metrological attestation. A étalon is a measuring instrument designed to be re-generated and stored for the purpose of transferring the size of a particular unit of magnitude to other measuring instruments. An indicator of measurement accuracy is a defined description of the accuracy of measurement results obtained when observing the applicable norms and rules of measurement methodology. The methodology for performing measurements is a set of operations and rules that ensure the execution of measurements and their results are obtained with established accuracy indicators. A meter is a technique used for measurements and has normalized Metrological properties. Calibration of measuring instruments is a set of operations performed under given conditions with the aim of determining Metrological descriptions of the measuring instrument by determining the ratio between the magnitude value obtained using the measuring instrument and the corresponding magnitude value to be reconstructed with the benchmark. Comparison of measuring instruments is a set of operations performed in order to determine and confirm the compliance of measuring instruments with the specified Metrological requirements. The uniform unit of measurements is the state in which the results of the measurements are expressed in legitimized units and the accuracy indicators of the measurements are located within the limits set by a certain probability. Article 8 of the law provides that the state management of the main area of activity related to Metrology is carried out by the National Authority for metrology — the Uzbek agency for Standardization, Metrology and certification.

Chapter 3 of the law provides insights into the organization of Metrology-related activities. Article 13. The approval and state registration of regulatory documents on ensuring the uniformity of measurements is carried out by a specially authorized

state body, which determines the norms and rules of Metrology and ensures the uniform union of measurements with mandatory force on the territory of the Republic of Uzbekistan. The following types of regulatory documents are used in the Republic of Uzbekistan to ensure that measurements are in a single unit:

methodology for comparing measuring instruments;
measurement instrument calibration methodology;
methodology for performing measurements;
methodology for attesting Test media

The normative acts on ensuring that measurements are in a single unit also include documentation on standardization, which determines the procedure for conducting a metrology examination. Methods of comparing and calibrating measuring instruments, methods of certification of test instruments should be carried out Metrological examination.

2) Government Decrees and Standards: Various decrees and

technical regulations establish specific measurement standards and procedures for different industries. The national standards, denoted as "O'z DSt," provide a comprehensive framework for metrological practices. For metrological service requirements, currently the O'z DSt 3444 standard is in force. O'z DSt 3444 is likely a specific Uzbekistan State Standard (O'z DSt), part of the national standardization system managed by the technical regulation agency. Unfortunately, without specific context or access to the full database of Uzbekistan's state standards, it's challenging to provide precise details about this specific standard. The standard establishes general requirements for the competence, impartiality and stable functioning of metrological services that carry out or apply for activities [10 verification of measuring instruments (hereinafter — laboratories), This standard is applicable to all organizations engaged in activities on the verification of measuring instruments, regardless of the number of personnel, the standard was developed on the basis of the state standard O'z DSt IEC 17025:2019, taking into account the specific requirements for laboratories engaged in the verification of measuring instruments, Laboratory customers, regulatory authorities, organizations and schemes. using a parity assessment, the accreditation bodies, as well as other parties, apply this standard when approving and recognizing the competence of the laboratory.

There are some terms and concepts related to this standart:

Interlaboratory comparison (interlaboratory

comparison): organization; measurement and evaluation of the same or several samples by two or more laboratories in accordance with predetermined conditions.

Intra-laboratory comparison Organization, execution and evaluation of measurements of the same or several similar samples within the same laboratory in accordance with pre-defined conditions.

Qualification testing (proficiency testing) Assessment of the characteristics of the participant's functional skills according to pre-established criteria of the Department of interlaboratory comparisons,

Verification is a critical process in metrology that ensures the accuracy, reliability, and compliance of measuring instruments with established standards and specifications. It is a legal and technical procedure widely implemented in industries, trade, and public services to maintain trust in measurements.

The laboratory must be liable on the basis of obligations of legal importance for the management of all information received from the outside or received in the process of carrying out laboratory activities, the laboratory must inform the client about the information in advance. it is information that it intends to place in free well-being, the eviction of which is made available to the public by the decision of the client or by agreement between the laboratory and the client (for example, complaints are answered with a tag). All other information is considered a trade secret and must be solved; as confidential.

The laboratory must be a legal entity or the division of a legal entity legally responsible for its activities, the rights and obligations of metrological services of public administration bodies and metrological services of legal entities are determined by the rules agreed with the bodies of the state metrological service.

The fact that international standards are currently being adapted to the conditions of Uzbekistan is of course an important event. Also, the urgent research on perfecting these standards and ensuring the quality of metrology services means that the legal pillars of metrology services should definitely be prepared for development and modifications.

CONCLUSION

The legal framework for metrological services establishes a structured system to ensure the reliability, accuracy, and uniformity of measurements across all sectors. It protects consumers, enhances industrial efficiency, and fosters trust in trade and public services. By defining clear regulations, standards, and verification processes, the framework supports economic development, scientific innovation,

and environmental safety.

In Uzbekistan, the alignment of metrological services with national and international standards ensures compatibility with global practices, promoting trade and technological progress. However, continual modernization, capacity-building, and integration into international systems are necessary to address challenges and meet future demands. A robust legal framework in metrology is thus essential for fostering economic competitiveness, consumer confidence, and sustainable growth.

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