

**VERIFICATION (CALIBRATION) OF MEASURING INSTRUMENTS
AND METROLOGICAL CERTIFICATION OF TEST EQUIPMENT
IN THE AVIATION SYSTEM**

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Annotation

This article provides information on the verification (calibration) of measuring instruments and the metrological certification of test equipment in the aviation system.

Keywords: aviation, measuring instruments, calibration, documentation, recommendations.

The documents for comparison methods and tools can be developed in the form of sections within standards, regulatory documents, recommendations, or operational manuals. Normative documents that define the comparison procedures for measuring instruments, which are either directly related to the comparison or used for developing documents for the comparison of measuring instruments, are prepared in the form of standards, regulatory documents, or recommendations. These documents cover a group of measuring instruments belonging to the same category and specify the comparison procedures for them. The comparison methods and guidelines included in operational manuals should clearly define the methods for comparing specific types of measuring instruments and the tools used for comparison.

The comparison procedures and guidelines included in operational manuals are developed by the manufacturer or organization of the measuring instruments during the process of preparing for the certification tests of the type of measuring instruments according to Uz RST 8.009 or during the preparation for the conformity tests of the measuring instruments to the approved type according to Uz RH 51-022. These documents are reviewed by the manufacturer during the document revision process. Normative documents for comparing measuring instruments presented for metrological certification according to Uz RST 8.011 are developed by the manufacturer, producer, consumer, or the organization conducting the metrological certification. Normative documents for comparing measuring instruments must undergo metrological expertise in the state metrology service offices.

Normative documents for comparing measuring instruments intended for serial production must be coordinated with the Central Metrological Service (CMS) and approved by the Uzbek Standard Agency.

Normative documents for comparing measuring instruments imported from abroad must undergo metrological expertise at the CMS to determine whether they can

be compared with the available metrological resources in the Republic. If necessary, the development of additional normative documents may be allowed to ensure the required accuracy of the metrological characteristics, enabling the use of existing comparison tools in the Republic. Normative documents or amendments for comparing measuring instruments imported from abroad must be approved by the state metrology service agencies.

In accordance with Uzstandart 8.011, the state metrology service agencies approve the normative documents for comparing measuring instruments that must undergo metrological certification.

General Issues of Measuring Instrument Comparison and Calibration Comparison Methods and Tools

The approval and registration of normative documents for comparison methods and tools are carried out by the Uzstandart Agency in accordance with the rules for approving and registering relevant category documents.

Information on the applicable standards, guidelines, and recommendations concerning comparison methods and tools for measuring instruments in the Republic of Uzbekistan is published by the Uzstandart Agency. The validity period of the normative documents is determined based on the specific characteristics of the measuring instruments' group and the validity period of the normative document for the comparison scheme. This period should not exceed 5 years.

After the validity period of the normative document expires, the manufacturer checks its compliance with the current status of the normative documents, international documents, and the state of metrological support tools.

The organizational structure, tasks, and basic provisions for the calibration system of measuring instruments in the Republic of Uzbekistan, as well as the rights and obligations of the entities involved in this system, are specified in Uzstandart 8.018-97. The rules of this standard are implemented for the metrological services of legal entities accredited within the Uzbekistan calibration system, accreditation bodies, and other organizations and agencies involved in the Uzbekistan calibration system.

Calibration System - A set of entities engaged in activities aimed at ensuring the unity of measurements in areas where state metrological inspection and control are not applied, as well as those performing calibration work and organizing and conducting calibration operations based on established requirements.

Calibration Certificate - A document that certifies the calibration of measuring instruments and the validity of its results. This certificate is issued by the organization that carried out the calibration.

Calibration Mark - A stamp applied to the measuring instrument and/or its operational documents to confirm that the calibration results are positive.

Uzbekistan Calibration System - A component of the overall framework for ensuring the unity of measurements in the Republic of Uzbekistan, which ensures the implementation of metrological work in areas outside the scope of state metrological inspection and control. It ensures compliance with the established norms and rules within the national system to ensure the unity of measurements.

The Uzbekistan Calibration System is based on the following principles:

- ✓ Voluntary entry into the system;
- ✓ Mandatory compliance with requirements when performing calibration work;
- ✓ Mandatory provision of measurement units from state standards and primary measuring instruments to the calibrated measuring instruments.

The objects of state metrological inspection and control include:

- ✓ Standards (etalonlar);
- ✓ Measuring instruments.

Testing Instruments;

- ✓ Standard Samples of the Composition and Properties of Substances and Materials;
- ✓ Information-Measurement Systems;
- ✓ Measurement Methodologies;

Metrological Norms and Rules - These are also objects considered in the state metrological inspection and control.

State Metrological Inspection and Control:

- ✓ Health, veterinary care, environmental protection;
- ✓ Accounting of material resources and energy resources;
- ✓ Conducting trade, customs, postal, and tax operations;
- ✓ Provision of telecommunication services;
- ✓ Storage, transportation, and disposal of hazardous, easily flammable, explosive, and radioactive substances;
- ✓ Ensuring national defense;
- ✓ Ensuring labor safety and traffic safety;
- ✓ Certification of product safety and quality determination;
- ✓ Geodetic and hydrometeorological works;
- ✓ State testing, inspection, calibration, repair, and metrological certification of measuring instruments;
- ✓ Mining operations;
- ✓ Recording national and international sports records.

According to the laws of the Republic of Uzbekistan, state metrological inspection and control activities may also be applied to other areas of activity.

State metrological inspection is carried out as follows:

- ✓ Testing and certification of types of measuring instruments;
- ✓ Execution of tests, inspections, and performance of measurements using measuring instruments and testing instruments.

Methodologies for Metrological Certification;

- ✓ Inspection, calibration, and testing of measuring instruments, including standards;
- ✓ Testing and inspection of measuring instruments, testing instruments, and measurement methodologies, as well as their metrological certification;
- ✓ Accreditation of metrology services, centers, and laboratories to hold the rights to calibrate measuring instruments, testing instruments, and other specific types of metrological activities.

State Metrological Control:

- ✓ Preparation, repair, leasing, and sale of measuring instruments, as well as ensuring their condition and application (including units of measurement standards, standard samples of substances and materials, and measurement systems);
 - ✓ Application of measurement methodologies;
- Ensuring compliance with established metrological norms and rules, and overseeing the activities of accredited metrology services, centers, and laboratories. In necessary cases, other types and forms of metrological inspection and control may be established by the decision of the "Uzstandart" agency.

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