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A NEW GENERATION STANDARD – AN INNOVATIVE SOLUTION ENSURING ACCURACY BASED ON INTERNATIONAL STANDARDS.

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Abstract: The article considers the next-generation standard as an innovative solution that ensures a high level of accuracy and reliability of results based on international standards. It is demonstrated that modern standards go beyond traditional regulatory frameworks by integrating digital technologies, interoperability principles, and a risk-based approach. Particular attention is paid to comparing traditional standards with next-generation standards across key parameters, such as measurement accuracy, compliance with international requirements, the level of digitalization, and support for innovation. The results of the analysis confirm that the implementation of next-generation standards contributes to improving the quality of products and services, strengthening trust in measurement results, and ensuring competitiveness in the global market.

Keywords: next-generation standards; international standards; measurement accuracy; innovation; digitalization; interoperability; quality and reliability; metrological compliance.

Ensuring the uniformity of measurements and enhancing metrological reliability are among the key drivers of global economic and industrial development. In this regard, a research group formed in collaboration with the National Institute of Metrology of Uzbekistan (UzNIM) under the Technical Regulation Agency and Tashkent State Technical University has developed and is implementing a next-generation standard for the metrological assurance of contact level gauges in accordance with international requirements.

This reference device was developed in compliance with the SI system of units established by the International Bureau of Weights and Measures (BIPM), as well as the recommendations of the International Organization for Standardization (ISO) and the International Organization of Legal Metrology (OIML). Such an approach ensures international recognition and comparability of measurement results, which is essential for reducing technical barriers within the World Trade Organization (WTO).

The next-generation standard operates within a range of 0 to 4 meters and ensures a liquid level installation accuracy of ±0.2 mm. It is designed for the calibration and verification of guided

wave radar (GWR), capacitive, segmented capacitive, and other contact-type level transmitters. The standard system enables dynamic level control using a standard level transmitter based on a high-precision magnetostrictive system, an intelligent pump control module, and digital valves.

In Figure 1, I have presented a comparative analysis of the performance indicators between the legacy standards and the next-generation standards. The next-generation standards operate at a high and superior level of quality, enabling more accurate measurements.

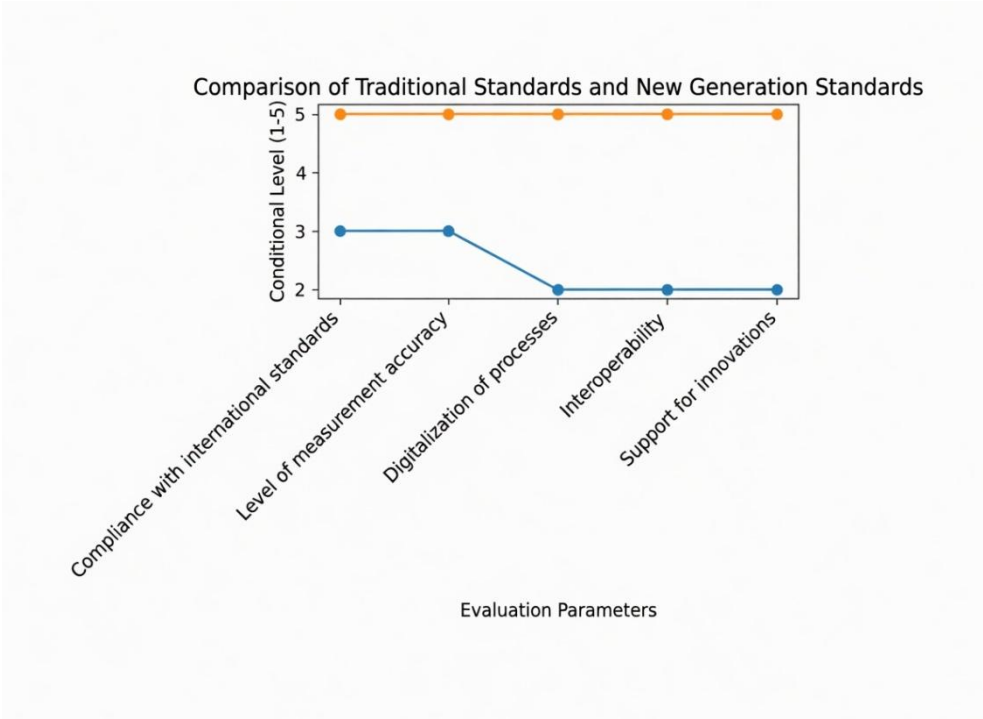


Fig. 1. Comparison of traditional standards and next-generation standards.

The figure illustrates a comparative distribution of conditional assessment levels for traditional and next-generation standards across a number of key parameters: compliance with international standards, level of measurement accuracy, process digitalization, interoperability, and innovation support. An analysis of the graphical data reveals that traditional standards demonstrate average values in terms of compliance with international requirements and measurement accuracy. Concurrently, parameters such as process digitalization, interoperability, and innovation support exhibit low or limited levels. This indicates that traditional standards are predominantly oriented toward regulation and control, without sufficient consideration for modern technological and digital transformations.

In contrast, the new-generation standards are characterized by consistently high values across all analyzed parameters. On the chart, this is reflected as peak evaluation levels, demonstrating a comprehensive approach to ensuring accuracy and quality. Of particular note is the high level of process digitalization and interoperability, which ensures system compatibility, measurement automation, and integration into international quality infrastructures.

Thus, the figure clearly confirms that new-generation standards serve not only as a tool for regulatory control but also as a mechanism for innovative development aimed at increasing measurement reliability, process transparency, and compliance with global international

requirements. The results obtained emphasize the expediency of transitioning to new-generation standards as a key factor in boosting competitiveness and sustainable development in the digital economy.

The key feature of the benchmark test is a fully digitized and automated software package. It is developed in accordance with the "Industry 4.0" concept and includes real-time monitoring, data logging, traceability, and automated reporting. The software is designed in compliance with ISO/IEC standards, allowing benchmark test results to be stored and exported in electronic formats (MS Word, MS Excel).

Safety, quality, and reliability issues have been fully taken into account. The system includes overflow protection, emergency shutdown, high-level alarm, electrical safety, and grounding systems. All design solutions comply with current ISO and GOST standards for occupational health and industrial safety. The launch of this standard installation is aimed at strengthening the national metrological infrastructure and increasing the international competitiveness of calibration services. This will contribute to expanding the export potential of products and services, as well as complying with the requirements of the World Trade Organization Agreement on Technical Barriers to Trade (WTO TBT) in the field of technical regulations and conformity assessment.

The next-generation leveling standard is valued not only for its high accuracy, but also for its innovative approach, compliance with international standards, and as a practical embodiment of the digital metrology concept.

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