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Strengthening Qatar's National Metrology Capabilities to Directly Support Industry

QGOS has developed a national-level capability in temperature, humidity, mass, electrical, and dimensional metrology, thereby creating new jobs and reducing the need for calibration services abroad

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The Challenge

As Qatar's industrial and regulatory sectors expanded, reliance on foreign calibration laboratories created operational challenges. Many measuring instruments of different local sectors are routinely sent abroad for calibration, resulting in extended turnaround times, high service costs, logistical risks, and limited oversight of metrological traceability chains. Qatar General Organization for Standardization (QGOS) therefore prioritized the development of core laboratory capabilities to support industrial performance, regulatory enforcement, and market confidence, thereby contributing directly to industrial and infrastructure development. At the same time, the development of national metrological capabilities has always faced limitations in terms of qualified personnel and the budget required to establish a national metrology institute (NMI). These factors required a phased and strategic approach to strengthening the national metrology system.

The Solution

QGOS has developed a plan to enhance the metrological capabilities of the Legal and Industrial Calibration Department, enabling it to eventually serve as a national metrology institute. This plan focuses on the gradual development of national human resources and metrological technical capabilities. As a first stage, QGOS strengthened four priority activities: 1) temperature and humidity, 2) electrical quantities, 3) mass and weighing instruments, and 4) dimensional measurements. All selected activities achieved ISO/IEC 17025 accreditation from the ANSI National Accreditation Board (ANAB), which, in turn, has international recognition from ILAC (now Global Accreditation Cooperation (GAC)).

The calibration laboratory of QGOS serves as the foundational pillar for industrial measurement accuracy, national quality compliance, and international trade in Qatar (see **Figure 1**). By maintaining national measurement standards traceable to the International System of Units (SI), this laboratory supports local industries by preventing costly operational errors, certifying third-party laboratories, and ensuring consumer safety across critical domains.



Figure 1. An illustration and overview of the Qatar General Organization for Standardization (QGOS) calibration services that support Qatar’s industries.

The following are a few specific industrial applications where QCOS calibration activities empower Qatar’s core industries, including (and as illustrated in **Figure 2**):

- **Mass:** Heavy industrial sectors and logistic hubs rely heavily on mass precision. The QGOS labs calibrate platform scales and precision laboratory balances, ensuring fair trade and preventing overloading hazards.
- **Temperature:** The QGOS laboratories support local manufacturing and processing industries by calibrating thermal sensors such as RTDs, thermocouples, industrial ovens, and infrared thermometers. For instance, it verifies the accuracy of heat-treatment furnaces used in the steel and metal fabrication industries, ensuring structural safety and product integrity.
- **Humidity:** Due to Qatar’s harsh ambient climate, environmental monitoring is crucial for food storage warehouses, HVAC installations, and cleanrooms. The QGOS labs validate the precision of thermo-hygrometers, weather meters, and ambient data loggers in the local pharmaceutical manufacturing and food cold-chain industries.

- **Electrical Quantities:** Power generation plants (Kahramaa utility networks), desalination complexes, and manufacturing networks rely on the stable delivery of electricity. The QGOS lab calibrates high-precision instrumentation, including digital multimeters, clamp meters, and process calibrators.
- **Dimensional:** Construction, civil engineering, steel factories, and mechanical workshops require micrometric precision to guarantee that parts fit together accurately. The QGOS labs calibrate master measuring tools such as vernier calipers, micrometers, dial indicators, gauge blocks, and industrial measuring ruler tapes. For example, in a Qatar steel factory, dimensional calibration ensures that measuring instruments retain their precision. It is critical for maintaining structural integrity, preventing costly material waste, and guaranteeing that rolled steel, plates, and prefabricated components adhere to strict industry tolerances and specifications.

The adopted strategy also ensured SI traceability by calibrating primary reference standards externally at recognized NMIs, such as the National Institute of Standards and Technology (NIST, US), the National Physical Laboratory (NPL, UK), and the Physikalisch-Technische Bundesanstalt (PTB, Germany), or through accredited calibration laboratories that operate under ISO/IEC 17025. QGOS then provides internal calibration services using these primary standards. Calibration services were extended to support other laboratories and institutions, reducing the need to send instruments abroad for mass, temperature, and dimensional calibration.

Following successful participation in GULFMET regional comparisons, technical competence and measurement comparability were strengthened in several areas. This includes (but is not limited to) improvements in laboratory environmental controls and operating conditions, and an increase in the number of qualified staff, especially among younger metrologists. QGOS is also currently preparing submission of CMCs in the field of electrical quantities for consideration in the KCDB-BIPM, and a plan has been developed to update national measurement standards at the laboratory. Furthermore, during the year 2026, the Legal and Industrial Metrology Department will apply to publish its calibration measurement capabilities (CMC) under the CIPM MRA through the regional organization GULFMET, to demonstrate international equivalence of national measurement standards, ensuring global recognition of calibration services.



Figure 2. Illustrations of QCOS metrology staff performing laboratory calibration services for temperature, dimensional, and mass (upper left-to-right panels), and electrical (bottom) metrology areas.

A Quantifiable Impact

In 2025, approximately 70 calibration certificates were issued, with a projected increase to 150 in 2026 as the accreditation scope expands. This represents a more than 2-fold year-on-year increase in service capacity. By providing internal calibration services within the country, a cost reduction of an estimated QAR 100 000 (over 6 months since the lab accreditation) was observed compared with typical international service costs. Further, the turnaround times dropped from an average of 2 months to 7 days, improving industrial productivity and reducing downtime in critical sectors such as construction and testing labs.

Qatar has also demonstrated that it can reduce international shipments by providing its own instrument calibrations, thereby reducing costs for about 175 of its measuring instruments. This initiative has a demonstrable reduction in associated carbon emissions of approximately 7.9 tons of CO₂ annually, directly supporting responsible consumption and production in industry.

QGOS created training programs for the four new specialized metrology job areas in 2025 and plans to expand to 5 jobs by 2027, thereby continuing to strengthen national metrology expertise. QGOS has successfully participated in regional GULFMET comparisons, which have improved Qatar's technical credibility, with 90 % satisfactory results in interlaboratory comparisons. The upcoming publication of calibration measurement capabilities within the KCDB will provide global recognition of the nation's metrology capabilities and position Qatar among internationally recognized metrology systems, enhancing trust in national products and services.

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