

ISO 8655:2022. EVERYTHING YOU NEED TO KNOW

In April 2022, the ISO 8655 guidelines that apply to manual liquid handling were revised. A number of changes were made to the calibration and testing requirements of Pipettes, Burettes, Dilutors, Dispensers, and Syringes. These changes have important implications for those who work in compliance with these standards, from Manufacturers and Calibration Laboratories to everyday users.



What Is ISO 8655?

ISO 8655 is an International Standard for the calibration and testing of piston-operated volumetric apparatus (POVA), including Pipettes, Burettes, Dilutors, Dispensers, and Manually Operated Precision Laboratory Syringes. ISO 8655 defines the specific testing criteria and specifies the maximum permissible error limits, the number of measurements and volumes required, testing procedures, and reporting requirements.

In doing so, the standard addresses the needs of manufacturers as a basis for quality control, provides instructions for calibration and testing laboratories, and offers guidance for end users on how to properly maintain and verify the accuracy of pipettes and other equipment.

ISO 8655:2022, introduces both major and minor changes to the different parts.

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What Changes Have Been Made?

The ISO 8655:2022 for pipette calibration has nine parts, this being two more than the previous version. Below is a list of all parts.

Part 1: Terminology, general requirements, and user recommendations

Part 2: Pipettes

Part 3: Burettes

Part 4: Dilutors

Part 5: Dispensers

Part 6: Gravimetric reference measurement procedure for the determination of volume

Part 7: Alternative measurement procedures for the determination of volume

Part 8: Photometric reference measurement procedure for the determination of volume

Part 9: Manually operated precision laboratory syringes

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Key Updates

Part 2:

In Part 2, the standard defines and specifies maximum permissible errors for Pipettes, the requirements for markings, and the information manufacturers must provide.

“Part 2 includes air-displacement and positive displacement pipettes, multi-channel and single-channel variants,” notes Joni. “Importantly, the new ISO always combines the tip and the instrument as one system.”

Pipette tips:

Pipette tip manufacturers must prove that the system (pipette + tip) fulfills all requirements and maximum permissible errors.

To account for variation in manufacturing, the tip must be changed at least once per volume tested during calibration.

Tips are single use, so you can only mount the tips once.

Multi-channel pipette tips have new maximum tolerances for how bent the tips can be, especially tips less than 100 μ L in volume.

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Maximum permissible errors:

There are additional maximum permissible error limits for 100% (the nominal volume), 50%, and 10%.

User information:

Both pipette and tip manufacturers must disclose which pipette and tip combinations fulfill the ISO 8655 standards.

Testing and calibration: Part 6, Part 7, and Part 8:

Calibration ensures repeatable and reliable Pipetting results. Prior to the update, Gravimetric measurement was the Gold Standard for calibration and testing. However the new ISO 8655:2022, states that it is acceptable to use either a Gravimetric procedure (Part 6), or a Photometric procedure (Part 8).

Part 7 addresses the environmental requirements for testing and calibration. Alternative measurement procedures described in Part 7 allow deviations from these requirements within defined limits, and alternative Gravimetric measurements can also be performed according to Part 7 A.2."

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The new ISO has requirements on the readability, the repeatability and the so called "expanded uncertainty in use" for Balances that are used for pipette calibration and testing.

Applying the new ISO 8655 standards, some labs may need to upgrade their balances as a Six-Place Balance is now required for Pipettes with nominal volumes smaller than 20 μL , and Precision Balances are needed for volumes between 20 μL and 199 μL .

In addition to this, a Multi-Channel Analytical Balance can now be used for calibrating a multi-channel pipette of 20 μL . The new standard also stipulates that Multi-Channel Balances may only be used to measure the test volume delivered from all channels in parallel, with the results of each channel analysed individually at the same time.

"This means the new ISO requires a balance with several weighing cells that enables parallel measurement. Measuring multi-channel pipettes sequentially no longer meets the requirements.