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Specification and method for the determination of performance of automated liquid handling systems

Spécification et méthode pour la détermination de performance des systèmes automatisés de manipulation de liquides

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Foreword

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The committee responsible for this document is ISO/TMBG, *Technical Management Board Groups*.

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Specification and method for the determination of performance of automated liquid handling systems

1 Scope

This International Workshop Agreement (IWA) specifies methods for testing the volumetric performance of air-displacement, system-liquid filled and positive displacement automated liquid handling systems (ALHS), including an estimation of measurement uncertainties and established traceability to reference standards (preferably, traceability to SI Units). The testing methods specified in this document may also be used to measure the volumetric performance of automated liquid delivery systems which do not aspirate the test liquid.

This IWA also specifies statistical methods for the determination of random and systematic errors (including intra-plate and inter-plate comparisons), analysis of measured results when using multichannel dispensing heads, and analysis depending on dispense patterns. It further defines terms and formulae to be used for summarizing test results.

This IWA also specifies the information to be provided to users of ALHS, including the display of summary results and performance claims.

This IWA is applicable to all ALHS with complete, installed liquid handling devices, including tips and other essential parts needed for delivering a specified volume, which perform liquid handling tasks without human intervention into microplates. Manipulation of the microplates on the deck of the automated liquid handling system may be achieved automatically, semi-automatically, or manually.

This IWA addresses the needs of:

— suppliers of ALHS, as a basis for quality control including, where appropriate, the issuance of supplier's declarations;

— test houses and other bodies, as a basis for independent certification and calibration;

— users of the equipment, to enable calibration, verification, validation, and routine testing of trueness and precision.

The tests established in this IWA should be carried out by trained personnel.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

3 Terms and definitions

For purposes of this document, the following terms and definitions apply.

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3.1 Definitions

3.1.1
accuracy
<automated liquid handling system> closeness of agreement between a delivered volume and the target volume

Note 1 to entry: The concept 'accuracy' is not a quantity and is not given a numerical quantity value. A liquid delivery is said to be more accurate when it is accomplished with a smaller liquid handling error.

[SOURCE: ISO/IEC Guide 99:2007, 2.13, modified]

3.1.2
air displacement
liquid handling principle in which a body of air is contained between the piston and the test liquid

Note 1 to entry: It is possible to have a large air gap (piston systems), or smaller air gap between the test liquid and the system liquid (liquid filled systems).

3.1.3
ALHS uncertainty
non-negative parameter characterizing the dispersion of the measured volumes relative to the target volume

Note 1 to entry: Uncertainty is inversely related to accuracy, and is a quantity value. This value should be expressed in accordance with ISO/IEC Guide 98-3.

[SOURCE: ISO/IEC Guide 99:2007, 2.26, modified]

3.1.4
aliquot
<automated liquid handling system> single delivery during a multi-dispense

3.1.5
automated liquid handling system
ALHS
system with a complete, installed liquid handling device, including tips and other essential parts needed for delivering a specified volume without human intervention into microplates

Note 1 to entry: Examples of automated liquid handling systems include automated pipetting systems (APS), and automated dispensing systems (ADS).

3.1.6
calibration
<automated liquid handling system> operation that, under specified conditions, establishes a relation between the target volume of the ALHS and the delivered volume

Note 1 to entry: A calibration may be expressed by a statement, a calibration curve or a calibration table. It may include a correction, but correction or adjustment is not a required element of a calibration.

[SOURCE: ISO/IEC Guide 99:2007, 2.39, modified]

3.1.7
dead air volume
captive air volume
air gap
<piston-operated automated liquid handling systems> air volume between the lower part of the piston and the surface of the aspirated liquid

Note 1 to entry: It is possible to have a large air gap (piston systems), or smaller air gap for liquid filled systems. Sometimes called captive air volume.

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