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Avtomatizirani sistemi za ravnanje s tekočinami - 1. del: Slovar in splošne zahteve (ISO 23783-1:2022)

Automated liquid handling systems - Part 1: Vocabulary and general requirements (ISO 23783-1:2022)

Automatisierte Flüssigkeitsdosiersysteme - Teil 1: Terminologie und allgemeine Anforderungen (ISO 23783-1:2022)

Systèmes automatisés de manipulation de liquides - Partie 1: Vocabulaire et exigences générales (ISO 23783-1:2022)

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**Automated liquid handling systems —
Part 1:
Vocabulary and general requirements**

*Systèmes automatisés de manipulation de liquides —
Partie 1: Vocabulaire et exigences générales*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 48, *Laboratory equipment*.

This first edition of ISO 23783-1, together with ISO 23783-2 and ISO 23783-3, cancels and replaces IWA 15:2015.

A list of all parts in the ISO 23783 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Globalization of laboratory operations requires standardized practices for operating automated liquid handling systems (ALHS), communicating test protocols, as well as analysing and reporting of performance parameters. IWA 15:2015 was developed to provide standardized terminology, test protocols, and analytical methods for reporting test results. The concepts developed for, and described in, IWA 15 form the foundation of the ISO 23783 series.

Specifically, this document addresses the needs of:

- users of ALHS, as a basis for calibration, verification, validation, optimization, and routine testing of trueness and precision;
- manufacturers of ALHS, as a basis for quality control, communication of acceptance test specifications and conditions, and issuance of manufacturer's declarations (where appropriate);
- test houses and other bodies, as a basis for certification, calibration, and testing.

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

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Automated liquid handling systems —

Part 1: Vocabulary and general requirements

1 Scope

This document defines terms relating to automated liquid handling systems (ALHS). This document also specifies general requirements for the use of ALHS. It describes types of ALHS and specific use requirements, settings, and adjustments for each ALHS type. It also specifies environmental requirements for the use of ALHS.

This document 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 labware.

NOTE Measurement procedures for the determination of volumetric performance are given in ISO 23783-2. The determination, specification, and reporting of volumetric performance of automated liquid handling systems are described in ISO 23783-3.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 23783-2, *Automated liquid handling systems — Part 2: Measurement procedures for the determination of volumetric performance*

ISO 23783-3:2022, *Automated liquid handling systems — Part 3: Determination, specification, and reporting of volumetric performance*

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1

accuracy

accuracy of liquid delivery

<ALHS> closeness of agreement between the delivered volume and the target volume

Note 1 to entry: The concept "accuracy" is not given a numerical value. A liquid delivery is said to be more accurate when it is made with a smaller error.

Note 2 to entry: The term "accuracy" shall not be used for "trueness" and the term "precision" should not be used for 'accuracy,' which, however, is related to both of these concepts.

Note 3 to entry: The relationship between accuracy, systematic error, and random error of an automated liquid handling system is explained further in ISO 23783-3:2022, 5.1.

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[SOURCE: ISO/IEC Guide 99:2007, 2.13, modified — definition and Notes 1 and 2 were modified for the context of automated liquid handling and Note 3 was replaced.]

3.2 air displacement

<piston-operated ALHS> 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 a smaller air gap between the test liquid and the system liquid (liquid filled systems).

3.3 air gap

captive air volume

dead air volume

<piston-operated ALHS> 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 a smaller air gap for liquid filled systems.

3.4 automated liquid handling system ALHS

system with a complete, installed liquid handling device, including tips and other essential components needed for delivering a specified volume without human intervention into labware

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

3.5 calibration

<ALHS> 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 — definition was simplified and modified for the context of automated liquid handling; Note 1 was simplified and Notes 2 and 3 were deleted.]

3.6 correction

mathematical compensation for a systematic effect

Note 1 to entry: The mathematical compensation can take different forms, such as an addend or a factor, or can be deducted from a table.

[SOURCE: ISO/IEC Guide 99:2007, 2.53, modified – added mathematical to the definition and Note 2, deleted estimated from the definition, and Note 1 was deleted.]

3.7 delivered volume

quantity delivered by a liquid handling system

Note 1 to entry: Delivered volume is a conceptual term and cannot be known with complete certainty due to measurement error.

3.8 dispense height

initial distance at which the test liquid is dispensed relative to a stated reference

Note 1 to entry: Dispensing from an initial fixed distance relative to the liquid surface will decrease the dispense height as the liquid level rises.

Note 2 to entry: Dispensing from a fixed distance relative to the well bottom will not change the dispense height over the course of the dispense.

Note 3 to entry: Dispensing and adjusting the distance relative to the liquid surface will not change the dispense height over the course of the dispense. This is an operational mode possible with some ALHS liquid level detection systems.

Note 4 to entry: Dispensing and adjusting the distance relative to the well bottom will increase the dispense height over the course of the dispense. This is an operational mode possible with some ALHS liquid level detection systems.

3.9 dispensing system

device for delivering liquids from a pre-filled liquid reservoir

3.10 disposable tip

component to transfer liquid, which is attached once and after use, as defined by the manufacturer, detached and intended to be discarded

Note 1 to entry: Disposable tips are usually made of plastic.

Note 2 to entry: Disposable tips are in contrast to *fixed tips* (3.13).

3.11 dry contact dispensing

transferring of liquid while the tip is in contact with a dry surface

3.12 factory acceptance testing

internal testing at the site of ALHS production to ensure ALHS performance to manufacturer's specifications

3.13 fixed tip

component to transfer liquid, which remains attached to the dispense head after use and is cleaned prior to its next use

Note 1 to entry: Fixed tips are in contrast to *disposable tips* (3.10).

3.14 forward mode pipetting

direct mode pipetting

process of liquid transfer where the entire aspirated volume is delivered

3.15 immersion depth

depth of the tip orifice below the liquid surface

Note 1 to entry: Immersion depth can be applied to both aspiration and dispensing (wet contact).

3.16 individually controlled channel

<ALHS> liquid handling channel that can be operated independently of other channels

3.17 inkjet type dispenser

dispensing system which uses technologies that deliver liquid volume as individual, free-flying droplets or jets (e.g. inkjet technology)

Note 1 to entry: For example, multiple volume increments as small as a few picolitres can be added up to dispense volumes of several microlitres.