SLOVENSKI STANDARD
oSIST prEN ISO 8655-8:2020

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Volumetrične naprave, delujoče na bat - 8. del: Postopek fotometričnega referenčnega merjenja za določanje prostornine (ISO/DIS 8655-8:2020)

Piston-operated volumetric apparatus - Part 8: Photometric reference measurement procedure for the determination of volume (ISO/DIS 8655-8:2020)

Volumenmessgeräte mit Hubkolben - Teil 8: Photometrisches Referenzprüfverfahren zur Bestimmung des Volumens (ISO/DIS 8655-8:2020)

Appareils volumétriques à piston - Partie 8: Titre manque

Ta slovenski standard je istoveten z: **prEN ISO 8655-8**

ICS:

17.060	Merjenje prostornine, mase, gostote, viskoznosti	Measurement of volume, mass, density, viscosity
71.040.20	Laboratorijska posoda in aparati	Laboratory ware and related apparatus

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Piston-operated volumetric apparatus —

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

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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 on 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 the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 48, *Laboratory Equipment*, Working Group WG 4, *Piston- operated instruments*.

A list of all parts in the ISO 8655 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

ISO 8655 addresses the needs of:

— manufacturers, as a basis for quality control including, where appropriate, the issuance of manufacturer's declarations;

— calibration laboratories, test houses, users of the equipment and other bodies as a basis for independent calibration, certification, and routine checking.

The tests specified in the ISO 8655 series are intended to be carried out by trained personnel.

Piston-operated volumetric apparatus —

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

1 Scope

This part of ISO 8655 specifies the photometric reference measurement procedure for the determination of volume of piston-operated volumetric apparatus (POVA). The procedure is applicable to complete systems comprising the basic apparatus with a maximum nominal volume of 5 ml and all parts selected for use with the apparatus, disposable or reusable, involved in the measurement by delivery (Ex).

NOTE General requirements and definitions of terms for piston-operated volumetric apparatus are given in ISO 8655-1. For the metrological requirements, maximum permissible errors, requirements for marking and information to be provided for users of piston-operated volumetric apparatus, see ISO 8655-2 for pipettes, see ISO 8655-3 for burettes, see ISO 8655-4 for dilutors, see ISO 8655-5 for dispensers, and see ISO 8655-9 for manually operated precision laboratory syringes. The gravimetric reference procedure for the determination of volume of piston-operated volumetric apparatus is given in ISO 8655-6. Alternative measurement procedures for the determination of volume are given in ISO 8655-7.

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 3696, *Water for analytical laboratory use — Specification and test methods*

ISO/DIS 8655-1:2020, *Piston-operated volumetric apparatus — Part 1: Terminology, general requirements and user recommendations*

ISO/DIS 8655-2:2020, *Piston-operated volumetric apparatus — Part 2: Pipettes*

ISO/DIS 8655-3:2020, *Piston-operated volumetric apparatus — Part 3: Burettes*

ISO/DIS 8655-5:2020, *Piston-operated volumetric apparatus — Part 5: Dispensers*

ISO/DIS 8655-9:2020, *Piston-operated volumetric apparatus — Part 9: Manually operated precision laboratory syringes*

ISO/TR 16153, *Piston-operated volumetric instruments — Determination of uncertainty for volume measurements made using the photometric method*

ISO/IEC Guide 2, *Standardization and related activities — General vocabulary*

ISO/IEC Guide 98-3, *Uncertainty of measurement — Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)*

ISO/IEC Guide 98-4, *Uncertainty of measurement — Part 4: Role of measurement uncertainty in conformity assessment*

ISO/IEC Guide 99, *International vocabulary of metrology — Basic and general concepts and associated terms (VIM)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in in ISO/DIS 8655-1:2020, ISO/IEC Guide 2, and ISO/IEC Guide 99 apply.

Note 1 to entry Further definitions and explanations of chemical terms can be found in the IUPAC Compendium of Chemical Terminology.[1]

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 General requirements

When performing calibrations according to the reference measurement procedure described in this standard, all provisions and requirements of this standard shall be followed. If one or more of those requirements is not followed, conformity to ISO 8655-8 shall not be claimed.

5 Test equipment

5.1 General

Measurement equipment for spectrophotometry, weighing, temperature, density, pH, humidity, and barometric pressure shall be traceable to the international system of units (SI) and shall meet the uncertainty requirements of this standard.

NOTE An example of the calculation of the expanded uncertainty of the photometric reference procedure is given in ISO/TR 16153.

5.2 Spectrophotometer

The visible range spectrophotometer shall meet the performance requirements according to Table 1 at 520 nm and 730 nm.

Table 1 — Performance requirements of the spectrophotometric system

Parameter	Requirement
Photometric repeatability at A = 0,0 AU [a]	0,000 05 AU
Photometric repeatability at A = 0,5 AU [a]	0,000 05 AU
Photometric repeatability at A = 1,0 AU [a]	0,000 10 AU
Photometric repeatability at A = 1,5 AU [a]	0,000 15 AU
Center wavelength reproducibility[b]	0,025 nm
Bandwidth reproducibility [b]	0,050 nm
Reproducibility of cuvette attenuance [c]	0,000 10 AU

[a] Repeatability to be measured as standard deviation using the same reading procedures, settings and conditions as are used during the photometric volume determination. Adjusting integration time (sample averaging time), bandpass (slit width), and the number of replicate readings are acceptable means of improving the spectrophotometer's repeatability.

[b] Wavelength and bandwidth repeatability applies to instruments where wavelength and bandwidth are adjustable. It does not apply to fixed-wavelength interference filter instruments.

[c] Cuvette attenuance reproducibility applies to the spectrophotometer and cuvette tested together. An example is given in ISO/TR 16153.

[d] Applicable when use of ND glass standard is specified by the manufacturer.

Table 1 *(continued)*

Parameter	Requirement
ND glass calibration standards [d]	0,001 5
Uncertainty at A = 0,5 AU	0,002 5
Uncertainty at A = 1,0 AU	0,003 0
Uncertainty at A = 1,5 AU	

[a] Repeatability to be measured as standard deviation using the same reading procedures, settings and conditions as are used during the photometric volume determination. Adjusting integration time (sample averaging time), bandpass (slit width), and the number of replicate readings are acceptable means of improving the spectrophotometer's repeatability.

[b] Wavelength and bandwidth repeatability applies to instruments where wavelength and bandwidth are adjustable. It does not apply to fixed-wavelength interference filter instruments.

[c] Cuvette attenuance reproducibility applies to the spectrophotometer and cuvette tested together. An example is given in ISO/TR 16153.

[d] Applicable when use of ND glass standard is specified by the manufacturer.

5.3 Cuvette and mixer

The cuvette shall be made of a material with at least 99 % internal optical transmittance at 520 nm and 730 nm. The cuvette shall have an optical path length of 20 mm ± 2 mm. If multiple cuvettes are used, each cuvette shall have a path length within ± 0,2 mm of the chosen nominal.

A mixing mechanism shall be fitted to the cuvette holder of the spectrophotometer, such that the cuvette's contents can be mixed while the cuvette remains seated in the spectrophotometer. Mixing shall ensure that the liquid contents are mixed to within 0,010 % of complete mixing. Mixing speed shall be sufficient to wash down dye solution deposited on the cuvette side wall.

Mixing mechanisms, such as orbital mixing, a glass-covered magnetic stir bar or a PTFE-covered magnetic stir bar may be used and shall be verified to meet this requirement.

NOTE Complete mixing is achieved when re-mixing and re-measuring the absorbance produces a systematic change no larger than the required value.

5.4 Thermometers, hygrometer, and barometer

The minimum requirements for each relevant measuring device are listed in Table 2.

Table 2 — Minimum requirements for measuring devices

Device	Readability	Expanded uncertainty of measurement (k = 2)
Thermometer for liquids [a]	0,02 °C	0,2 °C
Thermometer for room air	0,1 °C	0,2 °C
Hygrometer	1 % rel. humidity	5 % rel. humidity
Barometer	0,1 kPa	1 kPa
Timing device	1 s	n/a

[a] Thermometer for liquids shall have a repeatability of 0,05 °C or better.

NOTE Acceptable means of measuring the temperature of a solution in a cuvette include a thermistor bead probe immersed in the solution within the cuvette; a suitable contact thermometer on the outside of the cuvette; or a suitable infrared thermometer.

5.5 Volumetric glassware

Solutions shall be prepared by volumetric or gravimetric means. For volumetric preparations, class A flasks shall be used to bring solutions to the final volume.