INTERNATIONAL STANDARD

ISO 8655-5

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Piston-operated volumetric apparatus —

Part 5: Dispensers

Appareils volumétriques à piston —

Partie 5: Dispenseurs

Reference number
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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.ch
Web www.iso.ch

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Contents

Page

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 8655 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 8655-5 was prepared by Technical Committee ISO/TC 48, *Laboratory glassware and related apparatus*, Subcommittee SC 1, *Volumetric instruments*.

ISO 8655 consists of the following parts, under the general title *Piston-operated volumetric apparatus*:

- *Part 1: Terminology, general requirements and user recommendations*
- *Part 2: Piston pipettes*
- *Part 3: Piston burettes*
- *Part 4: Dilutors*
- *Part 5: Dispensers*
- *Part 6: Gravimetric methods for the determination of measurement error*

The following part is under preparation:

- *Part 7: Non-gravimetric methods for the determination of measurement error*

Introduction

ISO 8655 addresses the needs of:

— suppliers, 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;

— users of the equipment, to enable routine checking of accuracy.

The tests specified should be carried out by trained personnel.

Piston-operated volumetric apparatus —

Part 5:
Dispensers

1 Scope

This part of ISO 8655 specifies

— metrological requirements,

— maximum permissible errors,

— requirements for marking and

— information to be provided for users

for dispensers. It is applicable to dispensers with nominal volumes from 1 µl up to 200 ml, designed to deliver their volume (Ex).

NOTE General requirements and definitions of terms for piston-operated volumetric apparatus are given in ISO 8655-1. Conformity testing (type evaluation) of piston-operated volumetric apparatus is given in ISO 8655-6. Alternative test methods such as photometric and titrimetric methods will be the subject of a future Part 7 to ISO 8655. For all other tests (e.g. quality assurance by the supplier, analytical and measuring equipment quality assurance by the user) see ISO 8655-6 or alternative test methods. For safety requirements of electrically powered dispensers, see IEC 61010-1.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 8655. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 8655 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

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

ISO 8655-1:2002, *Piston-operated volumetric apparatus — Part 1: Terminology, general requirements and user recommendations*

ISO 8655-6:2002, *Piston-operated volumetric apparatus — Part 6: Gravimetric methods for the determination of measurement error*

3 Terms and definitions

For the purposes of this part of ISO 8655, the terms and definitions given in 8655-1 apply.

4 Principle of operation

Dispensers are used for the accurate repetitive delivery (dispensing) of preset liquid volumes. They are of two types:

— single-stroke dispensers providing a single delivery from each filling stroke;

— multiple-delivery dispensers or ratchet-based systems providing multiple deliveries from each filling stroke.

The piston can be operated manually, electrically, pneumatically or hydraulically. Drive mechanism, piston and cylinder can be a single unit or can be separable by simple hand actions, so that different pistons and cylinders (change-over units) can be used with the same drive mechanism.

During operation, the aspiration tube dips into the reservoir containing the fluid to be dispensed. After the system has been primed with fluid, assuring that it is free of any air, the piston aspirates fluid by moving in one direction and delivers the fluid to be measured by moving in the opposite direction.

Dispensers can be constructed with or without valves. The metrological characteristics of dispensers are dependent on, among other things, the material and workmanship of the aspiration and delivery tubing used. The supplier shall therefore deliver the necessary tubing with the dispenser or suggest or state the characteristics the tubing shall have in order to meet the metrological demands placed on the system.

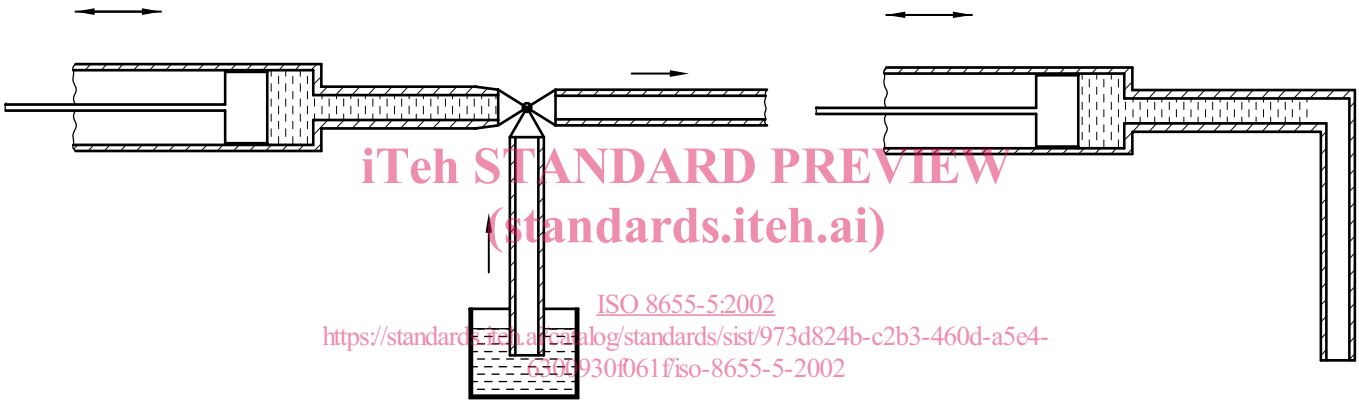

Figure 1 — Schematic drawing of dispensers with and without valves

5 Adjustment

5.1 A dispenser shall be adjusted by its supplier for the delivery (Ex) of its volume and for the standard reference temperature of 20 °C using grade 3 water as specified in ISO 3696.

5.2 If dispensers are designed to have their factory-preset adjustment altered by the user, the design shall prevent unintentional readjustment. If the user readjusts the dispenser, it shall be clearly and unequivocally indicated on the outside of the dispenser that readjustment has been effected, for example by means of a mark, a broken seal, or a label affixed by the user.

5.3 Type testing of the adjustment shall satisfy the performance requirements specified in clause 6 when the dispenser is tested in accordance with ISO 8655-6.

6 Metrological performance requirements

The conformity test (type evaluation) specified in ISO 8655-6 evaluates the total system of the dispenser comprising the drive and, if applicable, the change-over unit (see clause 4) including aspiration and delivery tubing. The conformity test is carried out in accordance with ISO 8655-6 by

— the supplier prior to the issuance of a supplier's declaration of conformity, or

— a test house or other authorized body prior to the issuance of a certificate of conformity.

For conformity tests, the maximum permissible errors given in Tables 1 and 2 shall apply.

Table 1 — Maximum permissible errors for single-stroke dispensers

Nominal volume	Maximum permissible systematic error		Maximum permissible random error	
ml	± %	± µl [a]	± % [b]	± µl [c]
0,01	2,0	0,2	1,0	0,1
0,02	2,0	0,4	0,5	0,1
0,05	1,5	0,75	0,4	0,2
0,1	1,5	1,5	0,3	0,3
0,2	1,0	2,0	0,3	0,6
0,5	1,0	5,0	0,2	1,0
1	0,6	6,0	0,2	2,0
2	0,6	12,0	0,2	4,0
5	0,6	30,0	0,2	10,0
10	0,6	60,0	0,2	20,0
25	0,6	150,0	0,2	50,0
50	0,6	300,0	0,2	100
100	0,6	600,0	0,2	200
200	0,6	1 200	0,2	400

[a] Expressed as the deviation of the mean of a tenfold measurement from the nominal volume or from the selected volume (see ISO 8655-6:2002, 8.4).

[b] Expressed as the coefficient of variation of a tenfold measurement (see ISO 8655-6:2002, 8.5).

[c] Expressed as the repeatability standard deviation of a tenfold measurement, (see ISO 8655-6:2002, 8.5).

Table 2 — Maximum permissible errors for multiple-delivery dispensers

Nominal volume	Maximum permissible systematic error		Maximum permissible random error	
ml	± %	± µl [a]	± % [b]	± µl [c]
0,001	5,0	0,05	5,0	0,05
0,002	5,0	0,1	5,0	0,1
0,003	2,5	0,075	3,5	0,11
0,01	2,0	0,2	2,5	0,25
0,02	1,5	0,3	2,0	0,4
0,05	1,0	0,5	1,5	0,75
0,1	1,0	1,0	1,0	1,0
0,2	1,0	2,0	1,0	2,0
0,5	1,0	5,0	0,6	3,0
1	1,0	10	0,4	4,0
2	0,8	16	0,4	8,0
5	0,6	30	0,3	15
10	0,5	50	0,3	30
25	0,5	125	0,3	75
50	0,5	250	0,25	125
100	0,5	500	0,25	250
200	0,5	1 000	0,25	500

[a] Expressed as the deviation of the mean of a tenfold measurement from the nominal volume or from the selected volume (see ISO 8655-6:2002, 8.4).

[b] Expressed as the coefficient of variation of a tenfold measurement (see ISO 8655-6:2002, 8.5).

[c] Expressed as the repeatability standard deviation of a tenfold measurement, (see ISO 8655-6:2002, 8.5).