

Second edition  
2010-04-15

Corrected version  
2010-06-15

---

---

**Laboratory glassware — Volumetric  
instruments — Methods for testing of  
capacity and for use**

*Verrerie de laboratoire — Instruments volumétriques — Méthodes de  
vérification de la capacité et d'utilisation*



Reference number  
ISO 4787:2010(E)

© ISO 2010

**PDF disclaimer**

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

This document is a preview generated by EVS



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2010

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

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.org](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

Published in Switzerland

# Contents

Page

Foreword .....	iv
<b>1 Scope .....</b>	<b>1</b>
<b>2 Normative references .....</b>	<b>1</b>
<b>3 Terms and definitions .....</b>	<b>2</b>
<b>4 Summary of method .....</b>	<b>2</b>
<b>5 Volume and reference temperature .....</b>	<b>2</b>
5.1 Unit of volume .....	2
5.2 Reference temperature .....	2
<b>6 Apparatus and calibration liquid .....</b>	<b>2</b>
<b>7 Factors affecting the accuracy of volumetric instruments .....</b>	<b>3</b>
7.1 General .....	3
7.2 Temperature .....	3
7.3 Cleanliness of glass surface .....	3
7.4 Quality of used volumetric instruments .....	4
7.5 Delivery time and waiting time .....	4
<b>8 Setting the meniscus .....</b>	<b>4</b>
8.1 General .....	4
8.2 Meniscus of transparent liquids .....	4
8.3 Meniscus of opaque liquids .....	5
<b>9 Calibration procedure .....</b>	<b>5</b>
9.1 General .....	5
9.2 Test room .....	5
9.3 Filling and delivery .....	6
9.4 Weighing .....	7
9.5 Evaluation .....	7
<b>10 Use .....</b>	<b>7</b>
10.1 General .....	7
10.2 Volumetric flasks (see ISO 1042) .....	8
10.3 Measuring cylinders (see ISO 4788) .....	8
10.4 Burettes (see ISO 385) .....	8
10.5 Pipettes .....	9
<b>Annex A (informative) Cleaning of volumetric glassware .....</b>	<b>10</b>
<b>Annex B (normative) Calculation of volume .....</b>	<b>11</b>
<b>Bibliography .....</b>	<b>21</b>

## 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 2.

The main task of technical committees is to prepare International Standards. 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 document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 4787 was prepared by Technical Committee ISO/TC 48, *Laboratory equipment*, Subcommittee SC 6, *Laboratory and volumetric ware*.

This second edition cancels and replaces the first edition (ISO 4787:1984), which has been technically revised to incorporate the following changes:

- a) the potassium dichromate cleaning method in Annex A has been deleted;
- b) new tables for calculation of test results have been added to Annex B;
- c) the description of the test (calibration) methods has been modified to be more precise;
- d) test methods have been separated from recommendations for use.

This corrected version of ISO 4787:2010 incorporates the following corrections:

- Figure 1 on page 5 has been corrected to show the correct setting of the meniscus as described in the text;
- Figure 2 on page 5 has been improved to better illustrate what the user of the instrument really sees when setting the meniscus.

# Laboratory glassware — Volumetric instruments — Methods for testing of capacity and for use

## 1 Scope

This International Standard provides methods for the testing, calibration and use of volumetric instruments made from glass in order to obtain the best accuracy in use.

**NOTE** Testing is the process by which the conformity of the individual volumetric instrument with the appropriate standard is determined, culminating in the determination of its error of measurement at one or more points.

The International Standards for the individual volumetric instruments include clauses on the definition of capacity; these clauses describe the method of manipulation in sufficient detail to define the capacity without ambiguity. This International Standard contains supplementary information.

The procedures are applicable to volumetric instruments with nominal capacities in the range of 0,1 ml to 10 000 ml. These include: single-volume pipettes (see ISO 648) without subdivisions; graduated measuring pipettes and dilution pipettes, with partial or complete subdivisions (see ISO 835); burettes (see ISO 385); volumetric flasks (see ISO 1042); and graduated measuring cylinders (see ISO 4788). The procedures are not recommended for testing of volumetric instruments with capacities below 0,1 ml such as micro-glassware.

This International Standard does not deal specifically with pycnometers as specified in ISO 3507. However, the procedures specified below for the determination of volume of glassware can, for the most part, also be followed for the calibration of pycnometers.

## 2 Normative references

The following referenced documents are indispensable for the application 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 385, *Laboratory glassware — Burettes*

ISO 648, *Laboratory glassware — Single-volume pipettes*

ISO 835, *Laboratory glassware — Graduated pipettes*

ISO 1042, *Laboratory glassware — One-mark volumetric flasks*

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

ISO 4788, *Laboratory glassware — Graduated measuring cylinders*

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