
**Workplace air — Gases and vapours
— Requirements for evaluation of
measuring procedures using pumped
samplers**

*Air des lieux de travail — Gaz et vapeurs — Exigences pour
l'évaluation des procédures de mesure à l'aide de dispositifs de
prélèvement par pompage*



This document is a preview generated by EUS



COPYRIGHT PROTECTED DOCUMENT

© ISO 2020

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Symbols and abbreviated terms	2
5 Sampler types	3
6 Requirements	3
6.1 General	3
6.2 Sampler requirements	3
6.2.1 Flow resistance	3
6.2.2 Sampler leak test (for Type B samplers)	4
6.2.3 Shelf life	5
6.2.4 Sampler identification	5
6.2.5 Marking	5
6.2.6 Instructions for use	5
6.3 Measuring procedure requirements	5
6.3.1 Sampling procedure requirements	5
6.3.2 Analytical procedure requirements	6
6.3.3 Expanded uncertainty	7
6.3.4 Method description	7
7 General test conditions	8
7.1 Reagents	8
7.2 Apparatus	8
7.3 Calibration gas mixture	8
7.3.1 Generation	8
7.3.2 Determination of mass concentration	9
7.3.3 Independent method	9
8 Test methods	9
8.1 General	9
8.2 Sampler test methods	10
8.2.1 Flow resistance	10
8.2.2 Sampler leak test (for Type B samplers)	10
8.2.3 Shelf life (for Type A impregnated supports)	10
8.2.4 Sampler identification	11
8.2.5 Marking	11
8.2.6 Instructions for use	11
8.3 Measuring procedure test methods	11
8.3.1 Determination of the recommended sampling conditions	11
8.3.2 Analytical procedure test methods	14
8.3.3 Method recovery and method precision	15
8.4 Uncertainty of measurement	17
8.4.1 Identification of random and non-random uncertainty components	17
8.4.2 Estimation of individual uncertainty components	17
8.4.3 Calculation of expanded uncertainty	19
9 Test report	19
Annex A (informative) Examples for the determination of the breakthrough volume	20
Annex B (informative) Experiments for method validation	22
Annex C (informative) Estimation of uncertainty of measurement	24

Annex D (informative) Example for estimation of expanded uncertainty	34
Bibliography	37

This document is a preview generated by EVS

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 146, *Air quality*, Subcommittee SC 2, *Workplace atmospheres*.

This second edition cancels and replaces the first edition (ISO 22065:2019), of which it constitutes a minor revision. The changes compared to the previous edition are as follows:

— Editorial updates.

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

This document provides a framework for assessing the performance of procedures for measuring gases and vapours against the general requirements for the performance of procedures for measuring chemical agents in workplace atmospheres as specified in ISO 20581. It enables manufacturers and users of pumped samplers and developers and users of procedures for measuring gases and vapours to adopt a consistent approach to method validation (see [Annex B](#)).

Workplace air — Gases and vapours — Requirements for evaluation of measuring procedures using pumped samplers

1 Scope

This document specifies performance requirements and test methods under prescribed laboratory conditions for the evaluation of pumped samplers used in conjunction with an air sampling pump and of procedures using these samplers for the determination of gases and vapours in workplace atmospheres.

This document addresses requirements for method developers and/or manufacturers.

NOTE 1 For the purposes of this document, a manufacturer can be any commercial or non-commercial entity.

NOTE 2 For the sampling of semi-volatile compounds which can appear as a mixture of vapours and airborne particles in workplace atmospheres see EN 13936.

This document is applicable to pumped samplers and measuring procedures using these samplers in which sampling and analysis are carried out in separate stages.

This document is not applicable to:

- pumped samplers which are used for the direct determination of concentrations, for example, length-of-stain detector tubes;
- samplers which rely on sorption into a liquid, and subsequent analysis of the solution (bubblers).

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 8655-2, *Piston-operated volumetric apparatus — Part 2: Piston pipettes*

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

ISO 13137:2013, *Workplace atmospheres — Pumps for personal sampling of chemical and biological agents — Requirements and test methods*

ISO 18158, *Workplace air — Terminology*

ISO 20581, *Workplace air — General requirements for the performance of procedures for the measurement of chemical agents*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 18158 apply.

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/>