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Werkplekatmosfeer - Procedures voor het meten van metalen en metalloïden in in de lucht verspreide deeltjes - Eisen en beproevingsmethoden

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Workplace atmospheres - Procedures for measuring metals and metalloids in airborne particles - Requirements and test methods

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ICS

English version

**Workplace atmospheres - Procedures for measuring metals and metalloids in airborne particles - Requirements and test methods**

Atmosphères des lieux de travail - Procédures de mesurage des métaux et métalloïdes dans les particules en suspension dans l'air - Exigences et méthodes d'essai

Arbeitsplatzatmosphäre - Verfahren zur quantitativen Bestimmung von Metallen und Metalloiden in Schwebstoffen - Anforderungen und Prüfverfahren

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Preview  
prEN 13890:2000

## Foreword

This Draft European Standard has been prepared by Technical Committee CEN/TC 137, Assessment of workplace exposure, the secretariat of which is held by DIN.

Forbiede  
Preview

## Introduction

EN 482 prescribes general requirements for the performance of procedures for measuring chemical agents in workplace atmospheres. These requirements include maximum values of overall uncertainty (a combination of precision and bias) achievable under prescribed laboratory conditions.

This European Standard provides a framework for assessing the performance of procedures for measuring metals and metalloids against the criteria specified in EN 482. It enables producers and users of procedures for measuring metals and metalloids in airborne particles to adopt a consistent approach to method validation.

Orbital  
Preview

## 1 Scope

This European Standard specifies performance requirements and test methods for procedures for measuring metals and metalloids in airborne particles collected on a suitable substrate, e.g. a filter.

This European Standard is not applicable to procedures for measuring metals or metalloids in inorganic gases or vapours, e.g. mercury, arsine, etc (see EN 838 and EN 1076), or to procedures for measuring metals and metalloids in compounds that could be present as a particle/vapour mixture, e.g. arsenic trioxide (see EN (00137016)).

This European Standard is applicable to measuring procedures in which sampling and analysis is carried out in separate stages, but it does not specify performance requirements for collection, transport and storage of samples, since these are dealt with in prEN 13205.

This European Standard specifies a method for determining the bias and precision of the analytical method and combining this with the bias and precision of the sampling method to estimate the overall uncertainty of the measuring procedure as a whole.

If there is no procedure for measuring a particular metal or metalloid which meets the requirements of this European Standard, it is recommended to use a measuring procedure whose performance is nearest to the specified requirements.

## 2 Normative reference(s)

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 481, *Workplace atmospheres — Size fraction definitions for measurement of airborne particles*

EN 482, *Workplace atmospheres — General requirements for the performance of procedures for the measurement of chemical agents*

EN 838, *Workplace atmospheres — Diffusive samplers for the determination of gases and vapours — Requirements and test methods*

EN 1076, *Workplace atmospheres — Pumped sorbent tubes for the determination of gases and vapours — Requirements and test methods*

EN 1232, *Workplace atmospheres — Pumps for personal sampling of chemical agents — Requirements and test methods*

EN 1540, *Workplace atmospheres — Terminology*

EN 12919, *Workplace atmospheres — Pumps for sampling of chemical agents with a volume flow rate of over 5 l/min — Requirements and test methods*

prEN 13205, *Workplace atmospheres — Assessment of performance of instruments for measurement of airborne particle concentrations*

EN (00137016), *Workplace atmospheres — Measurement of chemical agents present as mixtures of airborne particles and vapour — Requirements and test methods*

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

ISO 15202-2, *Workplace air — Determination of metals and metalloids in airborne particulate matter by inductively coupled plasma atomic emission spectrometry — Part 2: Sample preparation*



### 3 Principle

Sampling bias and precision are estimated by examining sampler performance data reported in the scientific literature.

For measuring procedures that specify a method for the determination of soluble metals and metalloids, the analytical bias is, by definition, taken to be zero.

For measuring procedures that specify a method for the determination of total metals and metalloids that involves sample dissolution, the analytical bias is determined by assessing the effectiveness of the sample dissolution method described in the procedure. This is achieved by analysing test samples, which can be pure compounds, bulk reference materials and/or samples of dust on collection substrates, and determining the analytical recovery of the metals and metalloids of interest. The analytical recovery is then carefully scrutinised to determine a typical upper limit for the analytical bias.

For measuring procedures that do not involve sample dissolution, e.g. X-ray fluorescence spectrometry, the analytical bias is determined by comparison with a reference method or by analysis of a reference material. Alternatively, in some instances, it can be estimated theoretically.

For measuring procedures that involve sample dissolution, the analytical precision is determined by analysing test samples prepared by spiking collection substrates with standard solutions of the metals and metalloids of interest. The repeatability of measurements made on collection substrates spiked with various sample loadings (corresponding to different concentrations of metal or metalloid in air and air sample volumes) gives a measure of the precision of the analytical method for different averaging times across the measuring ranges specified in EN 482.

For measuring procedures that do not involve sample dissolution, the analytical precision is determined in a similar manner, by analysing test samples prepared by loading test collection substrates with known amounts of dust. Alternatively, in some instances, it can be estimated theoretically.

The determined analytical bias and analytical precision are combined with the estimated sampling bias and precision to estimate the overall uncertainty of the measuring procedure as a whole. This is then assessed against the general performance requirements prescribed in EN 482.

### 4 Definitions

For the purposes of this standard, the following definitions apply:

#### 4.1 EN 1540 definitions

Averaging time, bias, chemical agent, limit value, measuring procedure, overall uncertainty, precision, specified measuring range, true value, validation:

Definitions for these terms are as in EN 1540.

#### 4.2 Measurement terms

##### 4.2.1 analysis

all operations carried out after sample preparation to determine the amount or concentration of the metals or metalloids of interest present in the sample

##### 4.2.2 analytical method

all steps of the measuring procedure that describe the overall process of sample preparation and analysis

##### 4.2.3 sampling method

all steps of the measuring procedure that describe the process of collecting an air sample

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