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Normklasse: T 96

Werkplaatsatmosferen - Adsorptiebuizen met pomp voor de bepaling van gassen en dampen - Eisen en beproevingsmethoden (+AC:1997)

Atmosphères des lieux de travail - Tubes à adsorption avec pompage pour la détermination des gaz et vapeurs - Exigences et méthodes d'essai (+AC:1997)

Workplace atmospheres - Pumped sorbent tubes for the determination of gases and vapours - Requirements and test methods (+AC:1997)

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English version

**Workplace atmospheres - Pumped sorbent tubes
for the determination of gases and vapours -
Requirements and test methods**

Atmosphères des lieux de travail - Tubes à
adsorption avec pompage pour la détermination
des gaz et vapeurs - Exigences et méthodes
d'essai

Arbeitsplatzatmosphäre - Pumpenbetriebene
Sammelröhrchen zur Bestimmung von Gasen und
Dämpfen - Anforderungen und Prüfverfahren

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CEN

European Committee for Standardization
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Foreword

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

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 1997, and conflicting national standards shall be withdrawn at the latest by November 1997.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

CEN/TC 137 "Assessment of workplace exposure" has proposed general performance criteria that methods of determining the concentration of chemical agents in workplace atmosphere should meet (see EN 482). These performance criteria include maximum values of overall uncertainty (a combination of precision and bias) achievable under prescribed laboratory conditions for the methods to be used. In addition, the performance criteria should also be met under a wider variety of environmental influences, representative of workplace conditions.

1 Scope

This European Standard specifies performance requirements and test methods under prescribed laboratory conditions for a pumped sorbent tube used in conjunction with an air sampling pump for the determination of gases and vapours in workplace atmospheres.

Additional tests designed to establish whether the performance characteristics of the pumped sorbent tube are affected by the wider range of environmental influences that may be encountered in field use are described in annexes C and D.

If there is no pumped sorbent tube for measuring a particular chemical agent which meets the requirements of this European Standard, it is recommended to use a pumped sorbent tube whose performance is nearest to the specified requirements.

Some of the test methods described in this European Standard require the use of an air sampling pump. The specification for such a pump is covered by EN 1232.

The European Standard is applicable to pumped sorbent tubes which are used for the indirect determination of concentrations, by sampling and analysis in separate stages.

These tubes can be divided into:

- type A samplers which rely on sorption onto a solid or onto a support impregnated with a reagent, desorption with solvent, and subsequent analysis of the desorbate;
- type B samplers which rely on sorption onto a solid or onto a support impregnated with a reagent, desorption by heat, and analysis of the desorbate.

NOTE 1: Type A samplers usually consist of two beds of sorbent in series, i.e. with a back-up section, and contain an active sorbent (e. g. charcoal) or a support impregnated with reagent. The back-up section is not used in the breakthrough tests, but in field use is a protection against unexpected breakthrough.

NOTE 2: Type B samplers usually consist of a single bed of active sorbent (e. g. porous polymer resin).

Specific aspects of the use of reagent impregnated systems will be covered in additional parts of this standard.

The European Standard does not apply to:

- pumped sorbent tubes 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).

This European Standard should enable manufacturers and users of pumped sorbent tubes to adopt a consistent approach to sampler validation and provide a framework for the assessment of sampler performance against criteria specified in EN 482. It is the responsibility of the manufacturer or of those who assemble the pumped sorbent tubes to ensure that the sampler complies with the overall uncertainty requirements under the specified laboratory conditions given in this European Standard including such environmental influences (e. g. temperature and humidity) that may be expected to affect performance.

No useful performance requirements can be given for the effect of interferents (with the exception of water vapour). However, the user of pumped sorbent tubes should be cautioned that interferences may occur (see 5.8.e)).

NOTE 3: Annexes C and D relating to field tests are not obligatory as part of this European Standard but are directed primarily to the users of such devices, who are in the best position to know the specific factors that can significantly affect sampler performance.

NOTE 4: Because of the known relationship between atmosphere pressure and atmospheric concentrations, a pressure test is normally not necessary.

2 Normative references

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 482 : 1994 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 1232 Workplace atmospheres - Pumps for personal sampling of chemical agents - Requirements and test methods

3 Definitions

For the purposes of this standard, the definitions for bias, limit value, measuring procedure, overall uncertainty, precision, true value and validation given in EN 482, as well as the following definitions apply.

3.1 breakthrough volume: The volume of a known atmosphere that can be passed through the tube before the concentration of vapour eluting from the tube reaches 5 % of the applied test concentration.

3.2 retention volume: The elution volume at peak maximum of a small aliquot of a vapour eluted from the tube by atmosphere (or chromatographic carrier gas).

3.3 desorption efficiency: The ratio of the mass of analyte desorbed from a sampling device to that applied.

3.4 pumped sampler: A device which is capable of taking samples of gases and vapours from the atmosphere and consisting of a sampling medium, such as a sorbent tube, and an air sampling pump.

NOTE: The sampling pump to be used should conform to the specification as laid down in EN 1232.

3.5 sorbent tube: A tube, usually made of metal or glass, containing an active sorbent or a reagent-impregnated support, through which sampled atmosphere is passed at a rate controlled by an air sampling pump.

3.6 loading: The product of concentration expressed in parts per million (volume per volume) or milligrams per cubic metre (ppm (V/V) or $\text{mg} \cdot \text{m}^{-3}$) and the sampled atmosphere volume (flow rate x sampling time).

4 Symbols and abbreviations

- C* the measured concentration of analyte, in milligrams per cubic metre;
- C'* the measured concentration of analyte, in parts per million (volume/volume) or volume per volume;
- d* the desorption efficiency;
- LV the limit value;
- m_b* the mass of analyte which is desorbed from the tube blank, in micrograms;
- m_d* the mass of analyte desorbed from the spiked tube, in micrograms ;
- m₁* the mass loss from permeation tube, in milligrams per minute;
- M* the molar mass of the analyte, in grams per mol;
- p* the actual pressure of the atmosphere sampled, in kilopascals;
- T* the temperature of the atmosphere sampled, in Kelvin;
- v* the volumetric flow of air, in cubic metres per minute;
- V* the volume of atmosphere sampled, in litres.