



SLOVENSKI STANDARD
SIST EN 482:1998
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Učinki delovne atmosfere - Splošne zahteve za izvedbo postopkov za merjenje kemičnih snovi

Workplace atmospheres - General requirements for the performance of procedures for the measurement of chemical agents

Arbeitsplatzatmosphäre - Allgemeine Anforderungen an Verfahren für Messung von chemischen Arbeitsstoffen

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Atmospheres des lieux de travail - Exigences générales concernant les performances des procédures de mesurage des agents chimiques

[SIST EN 482:1998](https://standards.itih.ai/catalog/standards/sist/d02868ec-0dcb-4a58-8009-471d8310984f/sist-en-482-1998)

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EUROPEAN STANDARD

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English version

**Workplace atmospheres - General requirements
for the performance of procedures for the
measurement of chemical agents**

Atmosphères des lieux de travail - Exigences
générales concernant les performances des
procédures de mesurage des agents chimiques

Arbeitsplatzatmosphäre - Allgemeine
Anforderungen an Verfahren für Messung von
chemischen Arbeitsstoffen

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This European Standard was approved by CEN on 1994-07-27. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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CEN

European Committee for Standardization.
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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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of an identical text or by endorsement, at the latest by January 1995, and conflicting national standards shall be withdrawn at the latest by January 1995.

In accordance with the CEN/CENELEC Internal Regulations, 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 United Kingdom.

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0 Introduction

National laws and regulations based on European Directives require the assessment of the potential exposure of workers to chemical agents in workplace air. One way of assessing such exposure is to measure the concentration of the chemical agent in air in the worker's breathing area. The procedures used for such measurements shall give reliable and valid results so that when compared with set limit values a correct decision can be made, for instance, as to whether the exposure level is acceptable or control measures need to be applied.

Because of their importance in the process of exposure assessment, the measurement procedures shall fulfil some general requirements, which are given in this European Standard. Specific standards will be prepared for different types of measuring procedures and measuring devices. These include standards for dust samplers, diffusive samplers, sorption tubes for active sampling, detector tubes, sampling pumps and direct reading instruments. In these specific standards additional requirements will be included for the procedure or device in question, such that the general requirements of this standard are not compromised. Where no specific standard exists, only the general requirements apply.

Performance requirements given in this standard include unambiguity, selectivity, overall uncertainty (a combination of precision and bias) for minimum specified measuring ranges, averaging time, etc. These requirements should ideally also apply under environmental conditions present at the workplace. Because of the wide range of these environmental conditions the requirements laid down in this European Standard shall be fulfilled by the measuring procedures under prescribed laboratory conditions.

For some workplaces it may be necessary for the measuring procedures to meet the performance requirements over a wider range of environmental influences. This shall be decided from case to case and cannot be covered by this general standard.

The test methods for the measuring procedures are given in this standard in general terms. As test methods depend on the specific measuring procedures or devices, detailed test methods will be specified in the specific standards. These detailed test methods shall be consistent with the general test methods given in this European Standard.

It is the user's primary responsibility to choose appropriate procedures or devices that meet the requirements in this European Standard. One way of doing this is to obtain information or confirmation from the manufacturer. Type-testing, or more generally, the assessment of performance criteria of procedures or devices, may be undertaken by the manufacturer, user, test house or research and development laboratory, as is most appropriate. Guidance on the most appropriate of these options in specific cases will be given in the specific standards.

This standard is a basis for forthcoming standards for specific procedures and devices for workplace measurements. These specific standards will contain more detailed requirements and test methods for specific measuring procedures or devices which may necessitate elaboration of the requirements laid down in this standard. However, reasons for specific changes will be given while the basic level of requirements in this standard shall not be reduced.

Note:

A number of existing procedures for workplace measurements have been tested over part of the required minimum specified measuring range but not over the entire range (see table 1) or have not been tested for all environmental influences and potential interferences. If these procedures meet the performance requirements of this standard they may nevertheless be used at present. It is recommended that these procedures are tested over the full ranges as soon as is reasonably practicable. If there is no measuring procedure for a chemical agent, which meets the requirements of this standard, it is recommended to use a procedure, whose performance is nearest the specified requirements.

1 Scope

This standard specifies general performance requirements for procedures for determining the concentration of chemical agents in workplace air. Such requirements apply to all measuring procedures, irrespective of the chemical nature or physical form (gas, vapour, suspended matter) of the agent, and irrespective of the sampling method or analytical method used.

This standard is applicable to all stages of a measuring procedure, including transportation and storage of the sample where appropriate.

This standard is applicable to measuring procedures with separate sampling and analysis stages, and also to direct-reading devices.

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 481	Workplace atmospheres - Size fraction definition for measurement of airborne particles
prEN 689	Workplace atmospheres - Guidance for the assessment of exposure to chemical agents for comparison with limit values and measurement strategy
ISO 78/2	Layouts for standards - Part 2: Standard for chemical analysis. 1982
ISO 3534-1	Statistics - Vocabulary and symbols - Part 1: Probability and general statistical terms
ISO 6879	Air quality - Performance characteristics and related concepts for air quality measuring methods 1983

3 Definitions

For the purpose of this standard the following definitions apply:

3.1 averaging time: A period of time for which the measuring procedure yields a single value.

Note:

For direct reading instruments the averaging time is related to the internal electrical time constant. For other procedures it is normally equal to the sampling time.

3.2 bias: Consistent deviation of the results of a measurement process from the true value of the air quality characteristic itself (ISO 6879).

Note:

In this European Standard "Air quality characteristic" means the concentration of a chemical agent in air.

3.3 chemical agent: Any chemical element or compound, on its own or admixed as it occurs in the natural state or as produced by any work activity, whether or not produced intentionally and whether or not placed on the market.

Note:

This definition is taken from a proposal for a European Directive.

3.4 exposure (by inhalation): A situation in which a chemical agent is present in air which is inhaled by a person.

3.5 limit value: Reference figure for the concentration of a chemical agent in air.

Note:

Limit values are mostly set for reference periods of 8 h, but may also be set for shorter periods or concentration excursions.

The limit values for gases and vapours are stated in terms independent of temperature and air pressure variables in ml/m³ (ppm V/V) and in terms dependent on those variables in mg/m³ for a temperature of 20 °C and a pressure of 101,3 kPa.

The limit values for suspended matter are given in mg/m³ or multiples of that for actual environmental conditions (temperature, pressure) at the workplace. The limit values of fibres are given in fibres/m³ or fibres/cm³ for actual environmental conditions (temperature, pressure) at the workplace.

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3.6 measuring procedure: Procedure for sampling and analysing one or more chemical agents in the air including storage and transportation of the sample.

3.7 overall uncertainty (of a measuring procedure or of an instrument): Quantity used to characterize as a whole the uncertainty of the result given by an apparatus or a measuring procedure. It is expressed, as a percentage, by a combination of bias and precision usually according to the formula

$$\frac{|\bar{x} - x_{ref}| + 2s}{x_{ref}} \times 100$$

where:

\bar{x} is the mean value of results of a number n of repeated measurements;

x_{ref} is the true or accepted reference value of concentration;

s is the standard deviation of measurements.

Note:

In strict mathematical terms there is no way to combine precision (a variance) and bias (an absolute number). However by occupational hygiene precedent and time honoured convention they have been combined according to the above formula.

3.8 precision: The closeness of agreement between the results obtained by applying the method several times under prescribed conditions. (ISO 6879)

3.9 selectivity: Degree of independence from interferences.

3.10 species: The different forms in which a chemical agent may be present, each form being defined by its chemical composition and/or detailed physical characteristics.

3.11 specified measuring range: The set of values of the concentration for which the overall uncertainty of a measurement procedure is intended to lie within specified limits.

3.12 true value (of a quantity): The value which characterizes a quantity perfectly defined in the conditions which exist at the moment when that quantity is considered.

Note:

The true value of a quantity is a theoretical concept and, in general, cannot be known exactly. (ISO 3534-1)

3.13 validation: The process of evaluating the performance of a measuring procedure and checking that the performance meets certain pre-set criteria.

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4 Classification

4.1 General

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The measurement procedures are classified with regard to measurement tasks. As a result of the measurement strategy, as laid down in prEN 689, the following measurement tasks are specified and explained (see also table 1).

prEN 689 also describes a number of measurement strategies which involve a combination of these measurement tasks (see annex A).

4.2 Screening measurements of time weighted average concentration

These are performed to obtain relatively crude quantitative information on the exposure level in order to decide whether an exposure problem exists at all and if so to appraise its possible seriousness. These measurements can also be used to determine if the exposure is well below or well above the limit value.

4.3 Screening measurements of variation of concentration in time and/or space

These measurements are used in order to:

- provide information on the likely pattern of concentration of chemical agents;
- identify locations and periods of elevated exposure;
- set the duration and frequency of sampling for measurements for comparison with limit values;
- locate emission sources;
- estimate the effectiveness of ventilation or other technical measures.