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Workplace exposure — Procedures for measuring a chemical agent present as a mixture of airborne particles and vapour — Requirements and test methods

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Foreword

This document (EN 13936:2014) has been prepared by Technical Committee CEN/TC 137 “Assessment of workplace exposure to chemical and biological agents”, 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of an identical text or by endorsement, at the latest by July 2014, and conflicting national standards shall be withdrawn at the latest by July 2014.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

EN 482 specifies general requirements for the performance of procedures that methods for the measurement of the concentration of chemical agents in workplace atmospheres should meet. These performance criteria include maximum values of expanded uncertainty achievable under prescribed laboratory conditions for the methods to be used. Chemical agents in workplace air are often present in both gaseous and non-gaseous phases at the same time and therefore validated methods are required that can measure the combined concentration of the chemical agent in both phases. Examples include: processes that generate aerosols of volatile or semi-volatile liquids or solids such a paint spraying, metalworking with coolants and lubricants, acid pickling etc. and hot processes which generate vapours of chemical agents that are normally in the liquid or solid phase under ambient conditions, e.g. road surfacing with bitumen.

For health-related sampling of mixed-phase aerosols, it is necessary to measure the mass concentration of the inhalable fraction of hazardous chemical agents, regardless of whether they are present as airborne particles or vapour. This generally means drawing air through two or more collection media in series. If a chemical agent is collected in the form of airborne particles and it has a significant vapour pressure under ambient conditions, it will wholly or partly volatilise during sampling. Subsequently the resulting vapour needs to be collected so that the total mass of the chemical agent can be measured; the chemical agent can also be lost from the collected airborne particles after sampling if it is not stabilised.

In some cases, it might also be necessary to measure the distribution of chemical agents between the particulate and vapour phases as well as the mass concentration of the inhalable fraction. For example, there can be compounds whose toxicology is known to differ significantly depending on whether they exist as airborne particles or vapour. In addition, control measures in the workplace can depend on which phase dominates. Exposure limits can be phase-specific. However, the separate quantification of airborne particles and vapour is technically complex and subject to error using existing sampling technologies. For this reason, this European Standard is not applicable to methods that differentiate between the sampled airborne particles and vapour.

1 Scope

This European Standard specifies performance requirements and test methods for the evaluation of procedures for measuring a chemical agent present as a mixture of airborne particles and vapour in workplace air.

This European Standard establishes general principles to enable developers and users of mixed-phase samplers and methods to adopt a consistent approach to method validation and provides a framework for the assessment of method performance in accordance with EN 482.

Annex A of this European Standard gives guidance on possible approaches to sample mixtures of airborne particles and vapour and Annex B gives information about their physical behaviour.

This European Standard is not applicable to methods that differentiate between the sampled airborne particles and vapour.

This European Standard is not applicable to a chemical agent present in different chemical and physical forms (for example, mercury in the form of Hg (0) and Hg (II)).

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

EN 482, *Workplace exposure - General requirements for the performance of procedures for the measurement of chemical agents*

EN 1076, *Workplace exposure - Procedures for measuring gases and vapours using pumped samplers - Requirements and test methods*

EN 1540:2011, *Workplace exposure - Terminology*

prEN 13205-1[1], *Workplace exposure — Assessment of sampler performance for measurement of airborne particle concentrations — Part 1: General requirements*

EN 13890, *Workplace exposure - Procedures for measuring metals and metalloids in airborne particles - Requirements and test methods*

EN ISO 13137, *Workplace atmospheres - Pumps for personal sampling of chemical and biological agents - Requirements and test methods (ISO 13137)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1540:2011 and the following apply.

3.1
single component aerosol
aerosol in which the airborne particles and vapour are composed of the same chemical agent

1) To be published.