

# Standardisation of Passive Sampling for Air Quality Monitoring

**passam info**

last updated: 2021

## Introduction

The standardisation of measurement methods is an important tool to ensure the quality of measurement results. Decades of experience with air pollutant measurements by passive samplers has been compiled by expert groups in national and international standards. The standards that have resulted from this describe procedures for the validation and handling of passive samplers for various pollutants and different areas of application. This information provides an overview of the available standards and guidelines for air pollutant measurements using passive samplers. First, all relevant documents for ambient air quality are summarized. Second, all standards for assessing indoor air quality are listed and finally the relevant standards for assessing workplace air quality by passive samplers.



## Ambient Air

The European multi-part standard EN 13528 deals with gases and vapours in ambient atmospheres. Diffusive samplers used to measure air quality have to fulfil some general requirements, which are given in **EN 13528-1**. These requirements include unambiguity, selectivity and Data Quality Objectives, including uncertainty. In addition, diffusive samplers used to measure air quality shall also fulfil some specific requirements which are given in **EN 13528-2**. And finally, **EN 13528-3** gives guidance on the selection, use and maintenance of diffusive samplers used to measure ambient air quality.

While the multi-part standard EN 13528 is not specific to any air pollutant, the following standards relate to specific gases measured by diffusive samplers:

- *Nitrogen dioxide (NO<sub>2</sub>)* described in **EN 16339**
- *Ammonia (NH<sub>3</sub>)* described in **EN 17346**
- *Benzene* measurements by thermal desorption described in **EN 14662-4**
- *Benzene* measurements by solvent desorption described in **EN 14662-5**
- *Volatile organic compounds (VOCs)* by thermal desorption described in **EN ISO 16017-2**

Also for particle measurements by passive sampling a guideline from the Association of German Engineers (VDI) has been described for ambient air: **VDI 2119**

## Indoor Air

---

As for ambient air quality measurements, the general and specific requirements (EN 13528-1 and EN 13528-2) may also be appropriate for other measuring objectives used in the assessment of indoor air quality. **EN 14412** gives guidelines for the selection, use and maintenance of diffusive samplers used to analyse gaseous pollutants in indoor air including measurement strategy and planning. This document is applicable to indoor air quality assessment because crucial differences to ambient air measurement have to be taken into account concerning environmental parameters, measurement strategy, as well as the nature, number, source and abundance of indoor air pollutants.

Beside this general standard for measuring indoor air quality (EN 14412) also standards are described for the measurement of specific pollutants:

- *Formaldehyde (CH<sub>2</sub>O)* in **ISO 16000-4**
- *Nitrogen dioxide (NO<sub>2</sub>)* in **EN ISO 16000-15**
- *Volatile organic compounds (VOCs)* by thermal desorption described in **EN ISO 16017-2**

## Workplace

---

**EN ISO 23320** specifies performance requirements and test methods under prescribed laboratory conditions for the evaluation of diffusive samplers and of procedures using these samplers for the determination of gases and vapours in workplace atmospheres. This document replaces former standards ISO 16107 and EN 838.

For the measurement of workplace air quality, two specific standards related to VOCs are described:

- **EN ISO 16017-2**
- **ISO 16200-2**

## Literature

---

**EN 13528-1:** Ambient air quality - Diffusive samplers for the determination of concentrations of gases and vapours - Requirements and test methods - Part 1: General requirements

**EN 13528-2:** Ambient air quality - Diffusive samplers for the determination of concentrations of gases and vapours - Requirements and test methods - Part 2: Specific requirements and test methods

**EN 13528-3:** Ambient air quality - Diffusive samplers for the determination of concentrations of gases and vapours - Part 3: Guide to selection, use and maintenance

**EN 16339:** Ambient air - Method for the determination of the concentration of nitrogen dioxide by diffusive sampling

**EN 17346:** Ambient Air - Standard method for the determination of the concentration of ammonia using diffusive samplers

**EN 14662-4:** Ambient air quality - Standard method for measurement of benzene concentrations - Part 4: Diffusive sampling followed by thermal desorption and gas chromatography

**EN 14662-5:** Ambient air quality - Standard method for measurement of benzene concentrations – Part 5: Diffusive sampling followed by solvent desorption and gas chromatography

**EN ISO 16017-2:** Indoor, ambient and workplace air – Sampling and analysis of volatile organic compounds by sorbent tube/thermal desorption/capillary gas GC – Part 2: Diffusive sampling

**VDI 2119:** Ambient air measurements - Sampling of atmospheric particles > 2,5 µm on an acceptor surface using the Sigma-2 passive sampler - Characterisation by optical microscopy and calculation of number settling rate and mass concentration

**EN 14412:** Indoor air quality - Diffusive samplers for the determination of concentrations of gases and vapours - Guide for selection, use and maintenance

**ISO 16000-4:** Indoor air - Part 4: Determination of formaldehyde - Diffusive sampling method

**EN ISO 16000-15:** Indoor air - Part 15: Sampling strategy for nitrogen dioxide (NO<sub>2</sub>)

**EN ISO 23320:** Workplace air — Gases and vapours — Requirements for evaluation of measuring procedures using diffusive samplers

**ISO 16200-2:** Workplace air quality - Sampling and analysis of VOCs by solvent desorption/gas chromatography - Part 2: Diffusive Sampling Method