



Designation: D6306 – 17

Standard Guide for Placement and Use of Diffusive Samplers for Gaseous Pollutants in Indoor Air¹

This standard is issued under the fixed designation D6306; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This guide covers the placement and use of diffusive samplers in an indoor environment.

1.2 The primary use of diffusive samplers is to measure the exposure concentrations of specific gaseous air contaminants for occupants in a variety of indoor environments.

1.3 Diffusive samplers within this guide are used to measure concentrations of air contaminants in residences, public buildings, offices, and other non-industrial environments. A diffusive sampler is any air sampler that does not utilize electrical or mechanical power in order to supply air to the sorbent media or chemical reactant within the sampler and that samples according to Fick's first law of diffusion.

1.4 The purpose of this guide is to ensure uniformity of sampling within a variety of indoor environments and to facilitate comparison of results.

1.5 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.7 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

¹ This guide is under the jurisdiction of ASTM Committee D22 on Air Quality and is the direct responsibility of Subcommittee D22.05 on Indoor Air.

Current edition approved Oct. 1, 2017. Published October 2017. Originally approved in 1998. Last previous edition approved in 2010 as D6306 – 10. DOI: 10.1520/D6306-17.

2. Referenced Documents

2.1 *ASTM Standards*:²

D1356 Terminology Relating to Sampling and Analysis of Atmospheres

D1357 Practice for Planning the Sampling of the Ambient Atmosphere

D3614 Guide for Laboratories Engaged in Sampling and Analysis of Atmospheres and Emissions

D4840 Guide for Sample Chain-of-Custody Procedures

D6196 Practice for Choosing Sorbents, Sampling Parameters and Thermal Desorption Analytical Conditions for Monitoring Volatile Organic Chemicals in Air

3. Terminology

3.1 *Definitions*—For definitions of terms used in this guide, refer to Terminology D1356.

4. Summary of Guide

4.1 Contaminants in air are sampled by collection with a sorbent or chemically reactive medium in order to undergo subsequent analysis for determination of concentration. Contaminants in air are transported to the sorption medium or reacting chemical through vapor or gas diffusion. During the sampling process, the compounds, in a molecular state, diffuse from the environment adjacent to the sampler through a first region of defined geometric structure and into a second adsorbing region containing the sorbent. Samplers are resealed at the end of the exposure period and sent to a laboratory for analysis.

4.2 Guidance is provided for the placement, handling, and use of diffusive samplers within an indoor environment.

5. Significance and Use

5.1 Diffusive samplers provide a useful sampling option for studying time-weighted average indoor air concentrations of

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

vapor-phase pollutants. They are easy and cost-effective to deploy enabling the collection of relatively large data sets.

5.2 The objective of this guide is to provide guidance for the placement and use of diffusive samplers that when uniformly applied enables the user to eliminate many potential interferences that may occur in diffusive sampling of indoor air. Since the analysis of the indoor environment by diffusive sampling is influenced by many factors other than the method of sampling, efforts are made to minimize interfering factors and maintain the air at conditions typical of the measurement location within the vicinity of the diffusive sampler. However, when performing certain diagnostic or special measurements, non-typical indoor air environmental conditions may be desirable or required. Thus, the objectives of a sampling study determine the conditions needed for sampling.

5.3 Diffusive sampling provides for time integrated measurements. Diffusive samplers are usually placed in an indoor environment over a time period to obtain a time weighted average concentration; hence, interfering factors potentially occurring over this period should be anticipated and eliminated where possible. Diffusive samplers often lack the sensitivity to measure short-term peak concentrations.

5.4 With suitable instruction regarding placement of diffusive samplers, placement, and retrieval of the samplers can be performed by unskilled personnel (for example, occupants).

6. General Principles

6.1 The choice of a diffusive sampler, characteristics of the sampling site, number of sampling points, sampling duration, number of samplers, and number of sampling periods depends on the objectives of the sampling program.

6.2 Diffusive samplers rely on air currents within an indoor environment for circulation of a representative sample atmosphere in the vicinity of the sampler. Therefore, it is essential that air circulation in the vicinity of the sampler be sufficient to maintain representative ambient concentrations near the monitoring surface and prevent localized concentration depletion by the sampler.

6.3 The objective of the study may affect the type of sampler selected and its positioning. In general terms, Practice **D1357** will acquaint the user with overall study considerations.

6.4 The study design typically needs to take into consideration a wide range of building operating parameters and conditions. The success of the study, in many cases, will depend upon controlling or quantifying key parameters such as building ventilation and occupancy as examples.

6.5 The following sections provide numerous recommendations for procedures, precautions, and other courses of action. Decisions regarding all of these actions are to be made based on the objectives of the study and its data quality requirements.

7. Sampling with Diffusive Samplers

7.1 Inspect the sampler and package carefully. The sampler or its protective packaging may have been damaged during

shipment. Depending on the type of sampler and its subsequent analysis, the user should not directly contact the sampler with bare skin and, in no case, permit anything to contact the sampling opening or surface.

7.2 *Sampling Time (Exposure Period)*—Determine the required sampling time from the manufacturer's guidance and taking in to account the sampling rates published for the specific target compounds. Determine if the associated analytical sensitivity will be sufficient given the study objectives and the expected air concentrations.

NOTE 1—Information relating to calibration of the system used for subsequent analysis is described separately, in relevant standards (for example, Practice **D6196**).

7.3 The sampling period begins when the lid, cover, or protective container of the sampler is removed to permit air to enter the sampler. The starting date and time of the sampling period should be transcribed to a logbook or an appropriate form and on the sampler label. The writing instrument, for example, a marker, should not be a source of potential contamination to the sample. An adequate means of resealing or replacing the sampler lid or cover should be ensured. (See, for example, Practice **D6196**.)

7.4 Each sampler should have a permanently attached identification code or serial number that should be transcribed to a logbook or an appropriate form. The logbook should include information describing the location of each sampler and pertinent information regarding the building and the deployment area, such as construction, type of heating system, occupancy number and patterns, locations of major appliances, presence of possible sinks/sources, locations of air vents and air management systems, and other relevant features. Include a diagram of the sampling locations in the building or study area, depicting the major features listed herein. If the occupant deploys the samplers, detailed instructions should be provided regarding proper location selection and sampling procedures. An organized form should be provided for easy collection of occupant recorded information.

7.5 If the sampler is deployed for other than a screening measurement, the sampler should be placed by an experienced professional familiar with the sampler used.

7.6 *Recovery of the Diffusive Sampler:*

7.6.1 The sampling or exposure period is terminated when the sampler is sealed so that air can no longer enter the sampler.

7.6.2 Record the date and time of termination of sample collection in a logbook or on an appropriate form and on the sampler label.

7.6.3 Adequate information should be entered into the logbook or an appropriate form to permit assessment of data quality and the interpretation of results. Any variation in the sampling location, building structure, or building systems should be recorded.

7.6.4 The sampler should be analyzed within the time specifications of the specific sampler used.