



Designation: D4490 – 23

Standard Practice for the Use of Detector Tubes in the Measurement of Toxic Gases and Vapors¹

This standard is issued under the fixed designation D4490; 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 practice covers the detection and measurement of concentrations of toxic gases or vapors using detector tubes (**1, 2**).² A list of some of the gases and vapors that can be detected by this practice and their measurement ranges are provided in **Annex A1**. This list is given as a guide and should be considered neither absolute nor complete.

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

1.3 *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.*

1.4 *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.*

2. Referenced Documents

2.1 ASTM Standards:³

D1356 Terminology Relating to Sampling and Analysis of Atmospheres

D5337 Practice for Flow Rate Adjustment of Personal Sampling Pumps

¹ This practice is under the jurisdiction of ASTM Committee **D22** on Air Quality and is the direct responsibility of Subcommittee **D22.04** on Workplace Air Quality.

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² The boldface numbers in parentheses refer to the list of references at the end of this practice.

³ 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.

2.2 Other Documents:

29 CFR 1910 Federal Occupational Safety and Health Standard Title 29⁴

ISO 13137 Workplace Atmospheres – Pumps for Personal Sampling of Chemical and Biological Agents – Requirements and Test Methods⁵

3. Terminology

3.1 For definitions of terms used in this method, refer to Terminology **D1356**.

4. Summary of Practice (3)

4.1 Detector tubes may be used for either short-term sampling (grab sampling; 1 min to 10 min typically) or long term sampling (actively or passively; 1 h to 8 h) of atmospheres containing toxic gases or vapors.

4.1.1 *Short-Term Sampling (Grab Sampling) (4-18)*—A given volume of air (specified by the manufacturer) is pulled through the tube by a pump also specified by the manufacturer in a time period on the order of 1 min to 10 min. The length-of-stain is related to the amount of air sampled and the contaminant concentration during the sample period. For most detector tubes the concentration is determined by interpreting the length of color change compared to the calibration curve affixed to the glass tube. There are some detector tubes which rely on the interpretation of the intensity of a color change compared to a color standard or standards provided by the manufacturers. The resultant color reaction may change over time and must be evaluated immediately by the user.

4.1.2 *Long-Term Active Sampling (Long-Term Tubes) (19-22)*—A sample is pulled through the detector tube at a slow, constant flow rate specified by the manufacturer by a pump over a 1 h to 8 h period. The length of color change and the sampling time are used to determine the time weighted average (TWA) concentration of the contaminant.

⁴ *Code of Federal Regulations*, Part 1910.1000 Subpart 2 and Part 1926.55 Subpart D.

⁵ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.