



Designation: D6245 – 24

Standard Guide on the Relationship of Indoor Carbon Dioxide Concentrations to Indoor Air Quality and Ventilation¹

This standard is issued under the fixed designation D6245; 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 describes the relationship of indoor carbon dioxide (CO_2) concentrations to indoor air quality (IAQ) and building ventilation.

1.2 This guide contains background information on the health, comfort, and performance impacts of indoor CO_2 exposure, as well as indoor CO_2 limits contained in various standards and regulations.

1.3 This guide describes the estimation of CO_2 generation rates from people as a function of sex, age, body mass, and level of physical activity.

1.4 This guide describes the relationship of CO_2 to IAQ, including how CO_2 relates to the perception of human body odor, limitations on the application of CO_2 as a metric of IAQ, and the relationship of CO_2 to the risk of infectious aerosol exposure.

1.5 This guide describes how CO_2 concentration measurements can be used to evaluate building ventilation including mass balance analysis to determine the percent outdoor air intake at an air handler, tracer gas decay measurements to estimate whole building air change rates, and use of the constant injection tracer gas technique at equilibrium to estimate whole building air change rates.

1.6 This guide discusses concentration measurement issues, such as calibration and sensor location, and continuous indoor concentration monitoring but does not include specific test methods for either application.

1.7 This guide discusses the use of indoor CO_2 concentrations for demand control ventilation (DCV) but does not contain detailed application guidance.

1.8 *Units*—The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.9 *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.*

1.10 *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:²

- D1356 Terminology Relating to Sampling and Analysis of Atmospheres
- D3249 Practice for General Ambient Air Analyzer Procedures
- E741 Test Method for Determining Air Change in a Single Zone by Means of a Tracer Gas Dilution

2.2 Other Documents:

- ASHRAE Standard 62.1-2022 Ventilation and Acceptable Indoor Air Quality³
- ISO 12569: 2017 Thermal performance of buildings and materials — Determination of specific airflow rate in buildings — Tracer gas dilution method⁴
- ISO 16000-26: 2012 Indoor Air – Part 26, Sampling strategy for carbon dioxide (CO_2) method⁴

3. Terminology

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

3.2 Definitions of Terms Specific to This Standard:

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

³ Available from American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (ASHRAE), 1791 Tullie Circle, NE, Atlanta, GA 30329, <http://www.ashrae.org>.

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

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 May 1, 2024. Published June 2024. Originally approved in 1998. Last previous edition approved in 2018 as D6245 – 18. DOI: 10.1520/D6245-24.