Designation: D7297 – 21

Standard Practice for Evaluating Residential Indoor Air Quality Concerns[1]

This standard is issued under the fixed designation D7297; 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 standard practice describes procedures for evaluating indoor air quality (IAQ) concerns in residential buildings.

1.2 The practice primarily addresses IAQ concerns encountered in single-family detached and attached (for example, townhouse or duplex design) residential buildings. Limited guidance is also provided for low- and high-rise multifamily dwellings, such as condominiums and apartments.

1.3 The IAQ evaluation procedures are comprised of interviews with the homeowner or resident(s) (including telephone interviews and face-to-face meetings) and on-site investigations (including walk-through, assessment, and measurements). For application practicality, these procedures are divided into three separate phases, which may occur over one or more site visits.

1.4 The procedures described in this standard practice are aimed at identifying potential causes contributing to an IAQ issue or concern. Such findings can be the basis for recommending corrective measures. This standard practice does not describe problem resolution or corrective measures, and the standard is not intended to evaluate the impact of corrective measures.

1.5 This practice describes a pathway for characterizing indoor air, though using this practice does not guarantee that an investigator will be able to identify or resolve an IAQ complaint for one or more of the following reasons: *(1)* the diversity of sources and contaminants in indoor air; *(2)* other factors that may affect occupant perception and acceptance of indoor air quality, such as air temperature, humidity, noise, lighting, and psychological stress; *(3)* the range of susceptibility in the population.

1.6 Implementation of procedures given in this standard requires the investigator (or investigative team) to have adequate background in several areas: general principles of IAQ; interviewing techniques; building design and construction practices; basic understanding of heating and cooling systems and appliances; use of IAQ measurement equipment; interpretation of IAQ data; and technical report writing.

1.7 Although many elements described in this standard practice may be useful in training of IAQ investigators, it should not be used as the sole basis for specifying or conducting such training.

1.8 *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.* For additional safety precautionary information, see Section 6.

1.9 *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

D1357 Practice for Planning the Sampling of the Ambient Atmosphere

D4861 Practice for Sampling and Selection of Analytical Techniques for Pesticides and Polychlorinated Biphenyls in Air (Withdrawn 2021)[3]

D5197 Test Method for Determination of Formaldehyde and Other Carbonyl Compounds in Air (Active Sampler Methodology)

D5438 Practice for Collection of Floor Dust for Chemical Analysis

D5466 Test Method for Determination of Volatile Organic Compounds in Atmospheres (Canister Sampling, Mass Spectrometry Analysis Methodology)

D5952 Guide for the Inspection of Water Systems for

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

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[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.

[3] The last approved version of this historical standard is referenced on www.astm.org.

Legionella and the Investigation of Possible Outbreaks of Legionellosis (Legionnaires' Disease or Pontiac Fever)
D5955 Test Methods for Estimating Contribution of Environmental Tobacco Smoke to Respirable Suspended Particles Based on UVPM and FPM
D6196 Practice for Choosing Sorbents, Sampling Parameters and Thermal Desorption Analytical Conditions for Monitoring Volatile Organic Chemicals in Air
D6271 Test Method for Estimating Contribution of Environmental Tobacco Smoke to Respirable Suspended Particles Based on Solanesol
D6333 Practice for Collection of Dislodgeable Pesticide Residues from Floors
E241 Guide for Limiting Water-Induced Damage to Buildings
E609 Terminology Relating to Pesticides
E620 Practice for Reporting Opinions of Scientific or Technical Experts
E741 Test Method for Determining Air Change in a Single Zone by Means of a Tracer Gas Dilution
E779 Test Method for Determining Air Leakage Rate by Fan Pressurization
E943 Terminology Relating to Biological Effects and Environmental Fate
E1186 Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems
E1554 Test Methods for Determining Air Leakage of Air Distribution Systems by Fan Pressurization
E1827 Test Methods for Determining Airtightness of Buildings Using an Orifice Blower Door
E2121 Practice for Installing Radon Mitigation Systems in Existing Low-Rise Residential Buildings
E2128 Guide for Evaluating Water Leakage of Building Walls

2.2 *ISO Standards:*[4]
ISO 16017-2 Indoor, ambient and workplace air — Sampling and analysis of volatile organic compounds by sorbent tube/thermal desorption/capillary gas chromatography — Part 2: Diffusive sampling
ISO 16000-4 Indoor air — Part 4: Determination of formaldehyde — Diffusive sampling method

2.3 *USEPA Documents:*[5]
USEPA 402-F-91-102 Building Air Quality: A Guide for Building Owners and Facility Managers
USEPA 402-K-01-001 Mold Remediation in Schools and Commercial Buildings
USEPA 600-R-94-173 Technical Notes on Drinking Water Methods
USEPA QA/G-5 EPA Guidance for Quality Assurance Project Plans
USEPA QA/G-9 Guidance for Data Quality Assessment: Practical Methods for Data Analysis
USEPA TO-11A Determination of Formaldehyde in Ambient Air Using Adsorbent Cartridge Followed by High Performance Liquid Chromatography (HPLC)
USEPA TO-15 Toxic Organics – 15 (TO-15): Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)
USEPA TO-17 Determination of Volatile Organic Compounds in Ambient Air Using Active Sampling onto Sorbent Tubes

2.4 *Other Documents:*
ANSI/AARST SGM-SF 2017 Soil Gas Mitigation Standards for Existing Homes[6]
ANSI/AARST RMS-MF 2018 Radon Mitigation Standards for Multifamily Buildings[6]
ANSI/AARST MAH 2019 Protocol for Conducting Measurements of Radon and Radon Decay Products in Homes[6]
ANSI/AARST MAMF 2017 Protocol for Conducting Measurements of Radon and Radon Decay Products in Multifamily Buildings[6]
ANSI/AARST MS-QA 2019 Radon Measurement Systems Quality Assurance[6]
ANSI/AARST MW-RN 2020 Protocol for the Collection, Transfer and Measurement of Radon in Water[6]
ANSI/ACCA 4 QM – 2019 Quality Maintenance of Residential HVAC Systems[7]
ANSI/ASHRAE 62.2-2019 Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings[8]

3. Terminology

3.1 *Definitions*—For definitions of terms used in this practice, refer to Terminologies D1356, E609, and E943.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *hypothesis, n*—a provisional theory set forth to explain certain indoor air quality problems or phenomena.

3.2.2 *pause point, n*—an interim step within a procedural sequence designed to allow subsequent actions to be based on the analysis and evaluation of recently collected data.

3.2.3 *stack effect, n*—air movement resulting from air buoyancy as influenced by differences in air temperature, density or pressure.

4. Summary of Practice

4.1 IAQ-based complaints and problems in residential buildings include discomfort and health symptoms arising from exposure to indoor air pollutants, as well as adverse indoor environmental conditions such as mold or bacterial growth or persistent odors.

[4] Available from International Organization for Standardization (ISO), ISO Central Secretariat, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, https://www.iso.org.

[5] Available from United States Environmental Protection Agency (EPA), William Jefferson Clinton Bldg., 1200 Pennsylvania Ave., NW, Washington, DC 20460, http://www.epa.gov.

[6] Available from American Association of Radon Scientists and Technologists (AARST), Hendersonville, NC, https://standards.aarst.org/.

[7] Available from Air Conditioning Contractors of America (ACCA), 1330 Braddock Place, Suite 350, Alexandria, VA 22314, https://www.acca.org/home.

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