



An American National Standard



Soil Gas Control Systems In New Construction of Buildings

*This document does not address 1 & 2 Family Dwellings
and Townhouses that are three stories or fewer above grade.*

AARST CONSORTIUM ON NATIONAL RADON STANDARDS

www.radonstandards.us

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Scope Summary and Introduction

The provisions in this standard provide prescriptive minimum requirements for the construction of any building intended for human occupancy, except for 1 and 2 family dwellings, in order to reduce occupant exposure to radon and other hazardous soil gases. This standard addresses construction of buildings that include, among others, the use of a building or structure, or a portion thereof for multifamily or congregate residential occupancies, educational occupancies and commercial occupancies.

Purpose

Radon is the second leading cause of lung cancer in the general population and the leading cause of lung cancer among nonsmokers.¹ Radon exposure is the cause of approximately 21,000 U.S. lung cancer deaths each year.² This risk is largely preventable.

Historical Perspective

Since 1988, the Indoor Radon Abatement Act has authorized U.S. state and federal activities to reduce citizen risk of lung cancer caused by indoor radon concentrations. Since the early 1990s, the U.S. Environmental Protection Agency (EPA) has advised all U.S. schools to test for radon and to reduce levels to below 4 pCi/L³.

In 1999, the National Academy of Sciences confirmed that any exposure to radon holds a degree of risk with publication of BEIR VI.² In addition, the Academy's BEIR VII committee stated that exposure to radiation, including any concentration of radon, carries risk.

In 2009, the World Health Organization's *WHO Handbook on Indoor Radon* confirmed the association between indoor radon exposure and lung cancer, even at the relatively low radon levels found in residential buildings.¹

Initiated in 2010, the U.S. *Federal Radon Action Plan (FRAP)*, followed by the *National Radon Action Plan (NRAP)*, has highlighted an *ultimate* public health goal of eliminating preventable radon-induced cancer. The FRAP is the result of a collaborative effort led by the U.S. Environmental Protection Agency (EPA) with the U.S. Departments of Health and Human Services (HHS), Agriculture (USDA), Defense (DOD), Energy (DOE), Housing and Urban Development (HUD), Interior (DOI), Veterans Affairs (VA) and the General Services Administration (GSA). And the NRAP, led by American Lung Association, represents a collaborative effort between several federal and national organizations including American Association of Radon Scientists and Technologists (AARST) and the Conference of Radon Control Program Directors (CRCPD).

¹ World Health Organization, "WHO Handbook on Indoor Radon: A Public Health Perspective" 2009

² National Academy of Sciences, "Biological Effects of Ionizing Radiation" (BEIR VI Report) 1999

³ USEPA, "Radon Measurement In Schools", July 1993 (EPA-402-R-92-014)

2018 Updates for CC-1000

Section 9 *Exhaust Locations* has been rewritten as a result of harmonization efforts with 2018 publications of ANSI/AARST RMS-MF and RMS-LB mitigation standards for multifamily and large buildings.

Continuous Maintenance of This Standard

This standard is under continuous maintenance by the AARST Consortium on National Radon Standards which has established procedures as accredited to meet essential requirements for American National Standards by the American National Standards Institute (ANSI) have been applied throughout the process of approving this document include timely, documented, consensus action requests for change to any part of the standard. The change submittal form and instructions may be obtained in electronic form at www.radonstandards.us

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Keywords

Radon, Radon Gas, Radon Test, Radon Mitigation, Radon Resistant New Construction, RRNC, New Construction, Schools, Large Buildings, Multifamily

Metric Conversions

Conversions from English-American measurement units to the International System of Units (SI) are rendered herein with literal conversion.

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Soil Gas Control Systems in New Construction of Buildings



SECTION 1: SCOPE

1.1. General

The provisions in this standard provide prescriptive minimum requirements for the construction of any building intended for human occupancy, except for 1 and 2 family dwellings^{4,5} in order to reduce occupant exposure to radon and other hazardous soil gases.

This standard and informational supplement⁶ address construction of buildings that include, among others, the use of a building or structure, or a portion thereof for multifamily or congregate residential occupancies, educational occupancies and commercial occupancies.

1.2 Significance of use

This standard of practice stipulates requirements to:

- ensure buildings are capable of mitigating soil gas entry;
- provide a means for qualified personnel to inspect and evaluate installed mitigation systems; and
- provide responsible practices that can be recommended or adopted for use as requirements of a contract or local jurisdiction.

1.3 Applicability

This standard can be adopted as requirements for contractual relationships or as recommendations or requirements of an authority or jurisdiction.

Informative—When deciding whether to require or apply practices set forth in this standard, note the following:

- Radon and other hazardous soil gas can be found in any location or building site regardless of existing surveys, maps or listed sites;
- Local state radon programs often publish updated information on how often radon has been found locally; and
- An older radon zone map published by EPA (www.epa.gov/radon), can be helpful where local data are not published.

⁴ As point of reference, see the International Building Code (IBC) (as published by the International Code Council) for occupancy groups A, B, E, F, H, I, M and R unless regulated by the International Residential Code (IRC) (as published by the International Code Council) for 1 & 2 Family Dwellings.

⁵ For 1 & 2 Family Dwellings, see ANSI/AARST CCAH "Reducing Radon in New Construction of 1 & 2 Family Dwellings and Townhouses"

⁶ For details on technology and best practices, see the CC-1000 Companion Guidance Document"

1.4 Non-normative optional provisions

A choice of prudent protective options in addition to minimum requirements in this standard are provided in Annexes. Provisions not required unless specifically referenced in an adopted ordinance, contract or design requirements include: Annex A (Compliance inspections); Annex B (Active soil depressurization required); Annex C (Provide radon test kits); and Annex D (Conduct testing prior to occupancy).

1.5 Limitations

1.5.1 1- and 2-family dwellings and townhouse

While this standard expands into technical specifics associated with any radon resistant construction effort, more simplified minimum requirements for dwellings with a footprint of less than 2,500 square feet are provided in other standards⁵.

1.5.2 Action levels and guarantee

Compliance with provisions herein do not guarantee reduction of soil gas entry to the degree needed to achieve compliance with federal, state or local jurisdiction action levels for radon or soil gas hazards.

1.5.3 Passive qualities for reducing soil gas entry

1.5.3.1 *Informative*—Any benefits in reducing soil gas entry with passive systems are negated if a continuous barrier has not been established between soil gas and airspaces within a building.

1.5.3.2 *Informative*—Building designs intended to optimize passive benefits can require more soil gas vent systems than the minimum requirements herein. In 1994, EPA recommended to rough-in active soil depressurization (ASD) systems during construction of schools and large buildings but did not recommend using passive systems.⁷

1.5.4 Alternate mitigation methods

Designs that employ heating, cooling or ventilation (HVAC) systems to supplement mitigation shall comply with ANSI/AARST RMS-MF *Radon Mitigation Standards for Multifamily Buildings* or ANSI/AARST RMS-LB *Radon Mitigation Standards for Schools and Large Buildings*, as applicable. Effectiveness requires sustained control of complex pressure relationships and air exchange rates within a building at all times a building is occupied over the life of the building.

1.5.5 Hazardous soil gases other than radon

While methods and techniques employed in this standard are applicable for most soil gases, this standard does not include all design and safety features that can be required for soil gas or vapors other than radon. For additional health and safety considerations when the purpose of soil gas control is

⁷ "Radon Prevention in the Design and Construction of Schools and other Large Buildings" EPA/625/R-92/016