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An American National Standard

Radon Mitigation Standards for Multifamily Buildings

AARST CONSORTIUM ON NATIONAL RADON STANDARDS

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RMS-MF

Radon Mitigation Standards for Multifamily Buildings

Scope Summary and Introduction

This standard specifies practices, minimum requirements and general guidance for mitigation of radon in existing multifamily buildings including both low-rise and high-rise multifamily buildings.

The techniques addressed in this standard provide whole-building consideration yet also apply to portions of a multifamily building or individual dwellings.

This standard is intended to:

- Provide minimum requirements and uniform standards that emphasize safety, system quality and effectiveness in the design and installation of mitigation systems for existing multifamily buildings.
- Provide a means to evaluate mitigation systems in multifamily buildings.

Significance of Purpose

Radon is the second leading cause of lung cancer in the general population and the leading cause of lung cancer among nonsmokers.¹ Most people receive their greatest exposure to radon in their home or dwelling. Radon concentrations in ground-contact apartments have been found to be similar to those in low-rise residential buildings located in the same area.² Radon in homes and dwellings is the cause of approximately 21,000 U.S. lung cancer deaths each year.³ This risk is largely preventable.

This document contains minimum requirements and guidance designed to respond to the health threat of radon in dwellings within multifamily buildings.

Significance of Use

This document is intended to assist in the installation and inspection of mitigation systems by citizens, radon mitigation professionals, property owners, residence/facility managers, residents, consultants, regulators, state radiation control programs and anyone concerned with radon mitigation, to reduce indoor radon concentrations in multifamily buildings.

Applicability: The practices in this standard can be adopted as requirements for contractual relationships or adopted as recommendations or requirements of an authority or jurisdiction such as for state, private proficiency programs or governmental body. AARST recommends that any authority or jurisdiction considering substantial modifications of this document as a condition of its use seek consensus within the consortium process at AARST Consortium on National Radon Standards prior to adopting a modified version. This provides the jurisdiction with a higher degree of expertise

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

² Swedish Radiation Protection Authority, "Radon in Estonia Dwellings, Stockholm" 2003; and Valmari, T, Arvela, T and Reisbacka, "Radon in Finnish Apartment Buildings, Radiation Protection Dosimetry" 2012

³ National Academy of Sciences, "Biological Effects of Ionizing Radiation" (BEIR VI Report) 1999

and offers the Consortium on National Radon Standards an opportunity to update this document if appropriate.

Historical Perspective

In the 1950s, studies confirmed increased incidence of radon-induced lung cancer for workers in underground mines.

Beginning in the 1980s, studies found that exposure to radon in homes can exceed exposures found in studies of mine workers.

It is urged that all homes be tested for radon as a result of these findings. Health authorities urging all homes be tested include: The office of the U.S. Surgeon General; the American Lung Association, the U.S. Environmental Protection Agency, the World Health Organization, the U.S. Centers for Disease Control and Prevention, the American Medical Association, the Consumer Federation of America, the National Safety Council and many more.

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.

In 1999, the National Academy of Sciences confirmed that any exposure to radon holds a degree of risk with publication of BEIR VI.³

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* highlights an *ultimate* public health goal for the elimination of preventable radon-induced cancer. This plan 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).

Document History

Previous radon mitigation standards were developed primarily for radon mitigation in single-family, detached residential buildings. They were not intended to address the wider scope of challenges associated with multifamily residential housing. This standard seeks to harmonize existing practices with inclusion of specific enhancements applicable to most multifamily buildings.

Keywords

Radon, Radon Gas, Radon Mitigation, Multifamily, Multifamily Housing, Radon Test

Normative References

"Protocol for Conducting Radon and Radon Decay Product Measurements In Multifamily Buildings" (ANSI/AARST MAMF) For information see: <http://www.aarst.org>

Metric Conversions

Conversions from English-American measurement units to the International System of Units (SI) are rendered herein with literal conversion. The conversions are not always provided in informational text or tables. It is acknowledged that rounding off to a similar numeric conversion is common (i.e., 4.0 pCi/L rounded to 150 Bq/m³ rather than literal conversion to 148 Bq/m³) for locations where SI units of measurement are used in standard practice. Conversions should apply as commonly used in such locations or jurisdictions.

Consensus Process

The consortium consensus processes developed for the AARST Consortium on National Radon Standards and 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.

This standard is under continuous maintenance by the AARST Consortium on National Radon Standards for which the Executive Stakeholder Committee has established a documented program for regular publication of addenda or revisions, including procedures for timely, documented, consensus action on 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.

Notice of right to appeal: (See Bylaws for the AARST Consortium on National Radon Standards available at www.radonstandards.us .) Section 2.1 of Operating Procedures for Appeals (Appendix B) states, "Persons or representatives who have materially affected interests and who have been or will be adversely affected by any substantive or procedural action or inaction by AARST Consortium on National Radon Standards committee(s), committee participant(s), or AARST have the right to appeal; (3.1) Appeals shall first be directed to the committee responsible for the action or inaction."

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1.0 SCOPE

1.1 This standard specifies practices, minimum requirements and general guidance for mitigation of radon in existing multifamily buildings including both low-rise and high-rise multifamily buildings.

This standard addresses a wide range of multifamily buildings including, among others, buildings or structures, or a portion thereof used as townhouses, apartment houses, convents, dormitories, military congregate residences, fraternities and sororities, and nontransient boarding houses, hotels, live/work units, monasteries, motels and vacation timeshare properties.⁴

Practices outlined in this standard can also be applied where the occupants of the building, or portion thereof are primarily transient in nature, including buildings such as: boarding houses, hotels and motels.⁵

1.2 This standard addresses practices that are applicable to structures be they rented or owned including condominiums, co-op owned buildings and timeshare properties.

1.3 The techniques addressed in this standard provide whole building consideration yet also apply when implemented to portions of a multifamily building or individual dwelling.

1.4 This standard is intended:

1.4.1 To provide minimum requirements and uniform standards that emphasize safety, system quality and effectiveness in the design and installation of mitigation systems for existing multifamily buildings.

1.4.2 To provide a means to evaluate mitigation systems in multifamily buildings.

1.5 Limitations

1.5.1 This standard is not intended to be used as a design manual, and compliance with its provisions will not guarantee reduction of indoor radon to any specific concentration.

1.5.2 This standard is not intended to address all of the safety concerns associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices. It is the responsibility of the user of this standard to determine the applicability of regulatory limitations prior to use.

1.5.3 This standard does not contain all code or other requirements of the jurisdictions where the radon mitigation system is being installed. Although the provisions in this standard have been reviewed for potential conflicts with other regulatory requirements, adherence to this standard does not guarantee or supersede compliance with the applicable codes or regulations of any federal, state or local agency with jurisdiction.

1.5.4 This standard does not address all mitigation techniques such as may be needed for airborne radon that results from radon in water, building materials or other less common sources of radon gas.

2.0 SIGNIFICANCE OF USE

2.1 This document is intended to assist in the installation of mitigation systems by radon mitigation professionals and those trained in radon mitigation practices, and to assist in the inspection of mitigation systems by citizens, radon mitigation professionals, property owners, residence/facility managers, residents, consultants, regulators, state radiation control programs and anyone concerned with efforts to reduce indoor radon concentrations in multifamily buildings.

2.2 **Conventions:** The term “shall” indicates those provisions herein that are considered mandatory, while terms such as “should” or “recommended” indicate provisions considered helpful or good practice, but which are not mandatory.

2.3 Applicability

2.3.1 These standards of practice can be adopted as requirements for contractual relationships or adopted as recommendations or requirements of an authority or jurisdiction such as for private proficiency programs, a state radon program or other governmental body.

2.3.2 If the minimum requirements of this document exceed local, state or federal requirements for the locale in which the mitigation is conducted, then this document’s minimum requirements shall be followed.

2.3.3 **Prior Systems:** This standard shall not apply to radon mitigation systems installed in multifamily buildings prior to its effective date, except when a previously installed system is altered. This standard shall apply to only the aspects of the system that are altered, and the Contractor shall recommend to the Client in writing that the noncompliance items be upgraded or altered to meet current standards. A written estimate of the cost for the proposed upgrade(s) should also be provided. For the purposes of this standard, altering a radon mitigation system does not include activities such as replacing worn out equipment while leaving the remainder of the system unchanged.

3.0 QUALIFIED CONTRACTORS

3.1 The practices outlined in this standard are intended for the use of a contractor or management teams among which at least one individual is specifically trained in the technology of radon reduction.

⁴ As point of reference, see the International Building Code (IBC) Section 310 for Residential Group R2 (as published by the International Code Council).

⁵ As point of reference, see the International Building Code (IBC) Section 310 for Residential Group R1 (as published by the International Code Council).