

## How the EPA Single-Family Standards Differ from the ANSI-AARST Single-Family Standards

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K-State Radon Programs

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## History of KS Radon Standards

Kansas became a **REGULATORY** state for radon July 1, 2011

- KDHE Division of Public Health Radiation Control Section
  - Adopted the original 1993 U.S. EPA radon standards by regulation
  - Measurement Standards
    - Indoor Radon and Radon Decay Product Measurement Device Protocols
    - Protocols for Radon and Radon Decay Product Measurements in Homes
  - Mitigation Standards
    - Radon Mitigation Standards

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## History of KS Radon Standards

- The U.S. EPA **RECOMMENDS** no longer using the now very dated standards
  - **RECOMMENDS** using the AARST-ANSI consensus standards

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## History of KS Radon Standards

Kansas became a **REGULATORY** state for radon July 1, 2011

- KDHE Division of Public Health Radiation Control Section
  - In 2021, began the regulatory process to replace the U.S. EPA radon standards with the ANSI-AARST Standards
  - Adoption process expected to be complete 1<sup>st</sup> Quarter 2023

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## History of KS Radon Standards

Kansas became a **REGULATORY** state for radon July 1, 2011

- KDHE Division of Public Health Radiation Control Section
  - To-Be Adopted ANSI-AARST Standards
    - Single-Family Buildings
    - Large Buildings
      - Multi-Family
      - Schools and other Large Buildings
  - Not To-Be Adopted ANSI-AARST Standards New Construction
    - Radon in Water
    - Quality Assurance
    - RRNC standards

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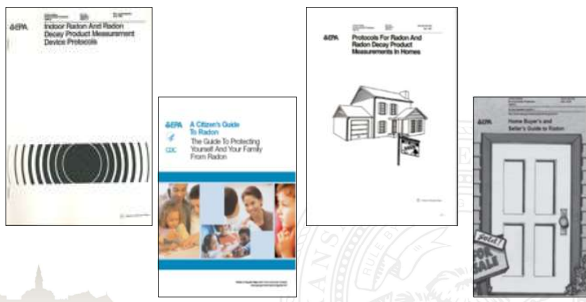
Pay attention to the SHOULD be that became SHALLS...

## PRACTICE CHANGES FROM THE EPA MEASUREMENT PROTOCOLS TO THE AARST MAH STANDARD

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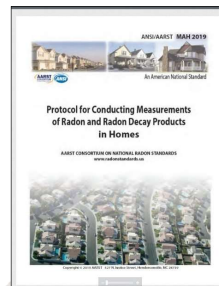
## EPA Radon Measurement Protocols and Parallel Consumer Documents



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## AARST Radon Standards



<https://standards.aarst.org/>

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## Measurement Protocol Differences

- EPA: When to test a single-family building
  - For areas with significant closed-building habitation
    - Can be tested **ANY TIME OF YEAR**
  - For areas without any significant closed-building operation
    - Evaluate across multiple seasons

### AARST MAH

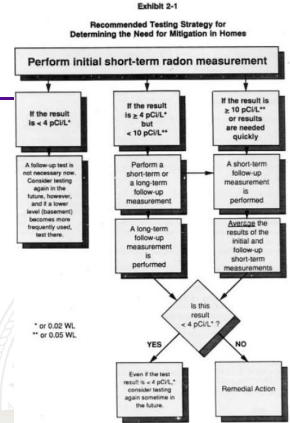
#### Informative Advisories:

- 2.2.1 **Test at the earliest opportunity.**  
Homes can be tested at any time of the year.
- 2.2.2 **Test whenever moving to a new residence.**  
To prevent the possibility of long-term exposure to a radon hazard, take the opportunity to test in association with moving into any new or existing home or dwelling.
- 2.2.3 **Severe weather.**  
Avoid testing during unusual local severe weather if the test period is less than 4 days. When severe conditions occur during a test, retesting may be appropriate.
- 2.2.4 **Seasonal considerations.**  
While some buildings respond differently to seasonal changes, tests conducted when a heating system operates both day and night are more likely to provide a clear characterization of potential radon hazards.



## EPA Extended Testing Protocol

- Short- or long-term measurements made in the lowest **LIVED-IN** level of the house



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## AARST MAH Extended Testing Protocol

- Conducted in the lowest level of the home **OCCUPIED**

5.3 The Extended Testing Protocol

Note: This protocol builds upon protocols developed by EPA relative to EPA's "A Citizen's Guide to Radon."

Table 5.3 Extended Testing Protocol (Required Procedure and Summary)	
Step 1	<b>Single Short-Term Test</b> Testing is conducted using a short-term detector at each test location.
Step 2	<b>Retest</b> locations where the initial short-term tests meet or exceed the action level, e.g., 4 pCi/L. If the first short-term test is twice the action level or greater, a second short-term test is to be conducted without delay. <sup>1</sup> If the first short-term test exceeds the action level but is less than twice the action level, either a second short-term test or a long-term test is to be conducted.
Step 3	<b>Decisions to Fix the Building</b> Mitigation decisions are to be based on the long-term test results or the average of the two short-term test results. <sup>2</sup> <b>Fix the building</b> If test results meet or exceed the action level, e.g., 4 pCi/L, consider fixing the building if results are greater than half the action level, e.g., between 2 and 4 pCi/L.

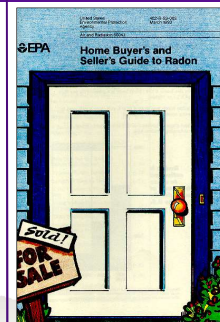
<sup>1</sup> Note: While decisions to mitigate at any time are not prohibited, the second test aids confidence that decisions are not being made based on a faulty test device or unexpected conditions.

<sup>2</sup> Note: If two short-term test results disagree in terms of making a mitigation decision, see Section 7.2.

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## EPA Time-Sensitive Protocol



- Options
  - Sequential testing
  - Simultaneous testing
  - Single test with Continuous Radon (CR) or Continuous Working Level Monitor (CW).
- Outlined in EPA's Home Buyer's and Seller's Guide

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## AARST MAH Time-Sensitive Testing Protocol

- Conducted in the lowest level of the home that **COULD** be occupied

5.2 The Time-Sensitive Testing Protocol  
 Note—This protocol builds upon protocols developed by EPA relative to EPA's "Home Buyer's and Seller's Guide to Radon."

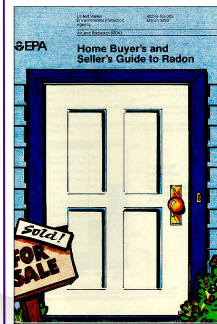
Table 5.2 Time-Sensitive Testing Protocol (Required Procedure and Summary)	
Step 1	<b>Simultaneous Testing</b> Tests are to be conducted using two short-term test devices at the same time in the same location, 4 to 8 inches (10-20 cm) apart.
Options	<b>Continuous Monitor</b> Tests are to be conducted using a monitor that records retrievable hourly measurements.
Step 2	<b>Decisions to Fix the Building</b> Mitigation decisions are to be based on the average result from a continuous monitor or the average of two test results conducted at the same time in the same location. Fix the building if test results meet or exceed the action level, e.g., 4 pCi/L. Consider fixing the building if results are greater than half the action level, e.g., between 2 and 4 pCi/L.

<sup>1</sup> Note—If two short-term test results disagree in terms of making a mitigation decision, see Section 7.2

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## EPA Closed-Building Conditions



- For ANY short-term test
  - Closed-house conditions **SHOULD** be maintained as much as possible
  - For tests <96 hours
    - SHOULD** be maintained 12 hours prior to the test
    - SHOULD** be maintained during the test as much as possible

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## AARST MAH Closed-Building Conditions

- Closed-building conditions (per winter heating season) are **REQUIRED** when short-term results are used for mitigation decisions
  - Initiated 12 hours prior to a test <96 hours
  - Maintained thru the test for tests <91 days

Table 4-A ESSENTIAL CLOSED-BUILDING PROTOCOL REQUIREMENTS	
Windows	Keep closed on all levels of the building, including areas not being tested.
Exterior doors (except for momentary entry and exit)	Set to normal occupied operating conditions with temperature settings between 65° and 80° F (18°-27° C).
Heating and cooling systems	Set to normal occupied operating conditions with temperature settings between 65° and 80° F (18°-27° C).
Systems that temporarily ventilate with outdoor air for seasonal comfort or energy savings	Set to the lowest seasonal ventilation condition that occurs during the year.
Whole-house fans	Do not operate.
Fireplaces (that burn solid, liquid or gas fuels unless a primary/normal source of heat for the building)	Avoid excessive operation.
Clothes dryers, range hoods and bathroom fans	Required building operation also includes components identified for clarification in Exhibit 1.
Table 4-B ADDITIONAL REQUIREMENTS FOR NEW CONSTRUCTION, RENOVATIONS AND REPAIRS	
All openings to the exterior (due to incomplete construction, structural defect or damage)	These openings to the exterior shall be closed or sealed at least 12 hours prior to initiating the test.
Heating/cooling systems active and set to a normal occupied temperature	These items shall be completed or installed at least 12 hours prior to initiating the test.
All windows and exterior doors installed with hardware and seals	
All insulation and exterior siding	
All wall and ceiling coverings to be completed including interior drywall or paneling; does not include decorative finishing of walls, floors or ceilings	
All fireplace and fireplace dampers installed	

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## Actions Based on Test Results

### Action Level Guidance

#### Action Level Guidance

Countries worldwide have adopted action levels for radon exposures. The action level observed should comply with the guidance of the country, state or local jurisdiction of authority where the test is being conducted.

U.S. Action Level. The following action level descriptions reflect guidance from the United States Environmental Protection Agency (EPA):

- 4 pCi/L or greater ( $\geq 150 \text{ Bq/m}^3$ )**  
 Fix the building. The higher the radon concentration, the more quickly action should be taken to reduce the concentrations.
- Below 4 pCi/L ( $< 150 \text{ Bq/m}^3$ )**

Consider fixing the building if test results indicate that radon concentrations are greater than half the action level, such as between 2 and 4 pCi/L (75 and 150 Bq/m<sup>3</sup>).

With observance that hazards from radon are virtually the same for radon concentrations that are near action level thresholds, it is noteworthy that the World Health Organization recommends limiting long-term exposures to less than 2.7 pCi/L (100 Bq/m<sup>3</sup>).

When measurement devices indicate concentrations lower than about 2.0 pCi/L (75 Bq/m<sup>3</sup>), test data should normally be interpreted as being lower than the test device can accurately measure.

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## Significant SGM Mitigation Changes

Three Significant Changes in Mitigation under the AARST-ANSI SGM

- Labeling requirements
  - All labels **SHALL**
    - Be made of durable materials
    - All lettering **SHALL** be in color contrast to the background
  - Primary labels
    - A system description label **SHALL** be placed on a primary component of each system
    - Label duct piping: interior duct piping **SHALL** be marked not less than one label per floor
    - Disconnect switches **SHALL** be labeled to indicate function
    - Sealed components **SHALL** be labeled to indicate function

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## Significant SGM Mitigation Changes

Three Significant Changes in Mitigation under the AARST-ANSI SGM

- Labeling requirements



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## Significant SGM Mitigation Changes

Three Significant Changes in Mitigation under the AARST-ANSI SGM

- System Monitoring
  - All fan-driven mitigation systems **SHALL** include a viewable operating range monitor
    - Includes a continuous display
    - Has start-up values clearly marked
  - In addition to viewable operating range features, a monitoring mechanism is **REQUIRED** that actively alerts occupants in the event of a mechanical failure, which **SHALL**
    - Provide an audible alert, or
    - Visual light alert, or
    - Telemetric notification

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## Significant SGM Mitigation Changes

Three Significant Changes in Mitigation under the AARST-ANSI SGM

- System Monitoring Cont.
  - **REQUIRED** for ALL system monitors
    - System monitors **SHALL** be protected from the elements and durable for the ambient environmental conditions
    - System monitors **SHALL** be labeled as such
    - Battery operated components **SHALL NOT** be used unless equipped with a low-power warning feature
    - Components requiring electricity **SHALL** be on non-switched circuits and designed to reset automatically when power is restored
    - Components requiring electricity for indication of system failure **SHALL NOT** be powered by the same branch as the system fan

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## Significant SGM Mitigation Changes

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- System monitoring requirements



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## Significant SGM Mitigation Changes

Three Significant Changes in Mitigation under the AARST-ANSI SGM

- System Exhaust Discharge Changes
  - The exhaust point for all soil gas vent systems **SHALL** be located outdoors
  - Exhaust trajectories of 45 degrees **SHALL NOT** encounter openings/points of congregation within 10 ft
  - Exhaust trajectories of 11 degrees **SHALL NOT** encounter openings/points of congregation within 20 ft
  - Point of exhaust **SHALL** be located not less than 10 feet above grade
    - Not less than 10 ft horizontally AND not less than 4 ft above operable openings

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## Significant SGM Mitigation Changes

Three Significant Changes in Mitigation under the AARST-ANSI SGM

- System Exhaust Discharge Changes
  - The exhaust point **SHALL** be not less than 10 ft above or horizontal to the side of exterior flooring surfaces
  - The exhaust point **SHALL** be directed upward at an angle that DOES NOT deviate more than 45 degrees from vertical
  - The exhaust point **SHALL** be
    - Not less than 1 ft above a pitched roof at the point penetrated
    - Not less than 6 inches above the edge of the roof when ASD is attached to the side of the building, and
    - Not less than 18 inches above a flat roof

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## Significant SGM Mitigation Changes

Three Significant Changes in Mitigation under the AARST-ANSI SGM

- System Exhaust Discharge Changes
  - The exhaust point **SHALL** be permitted below the edge of the roof IF all of the following are complied with
    - A written justification **SHALL** be recorded in the OM&M
    - The exhaust point **SHALL NOT** be less than 20 ft above grade
    - Testing **SHALL** be conducted within the occupiable area immediately adjoining the discharge point

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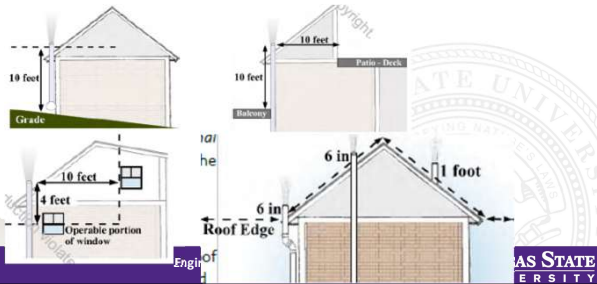
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Three Significant Changes in Mitigation under the AARST-ANSI SGM

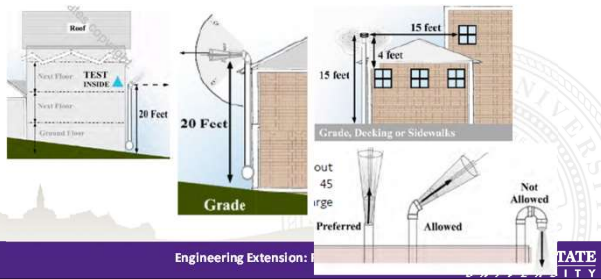
- System Exhaust Discharge Changes



## Significant SGM Mitigation Changes

Three Significant Changes in Mitigation under the AARST-ANSI SGM

- System Exhaust Discharge Changes



## Business Considerations

A non-comprehensive list of things to think about

- System Design Considerations
  - 'Ask me anything BUT for time!'
  - Cost projections
    - Staffing, devices, report development
- Business practice reminders
  - Kansas **DOES NOT** recognize the lower-tier mitigation certification AARST-NRPP offers in non-certification states
  - Kansas **REQUIRES** the state-certified mitigation professional to be on-site during measurement work

Cause, boy do I have answers...

**QUESTIONS?**



## Standards Update CE

The Kansas Radon Program will provide no-cost CE opportunities on these standards when they are in-place

- Single-family CE
  - 4-hour AARST-ANSI MAH standards review course (webinar)
  - 4-hour AARST-ANSI SGM standards review course (webinar)
- Large-building CE
  - 4-hour introduction to the Multi-family/Large Building Measurement Standards (webinar)
  - 4-hour introduction to the Multi-family/Large Building Mitigation Standards (webinar)

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## We're From the Government, We're Here to Help

Kansas Radon Chamber

[www.ksuradonchamber.org](http://www.ksuradonchamber.org)

National Radon Program Services

[www.sosradon.org](http://www.sosradon.org)

Kansas Radon Program

[www.kansasradonprogram.org](http://www.kansasradonprogram.org)

MURC Radon Training

<https://radoncourses.com/>

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## Resources for You

- Call Kansas Radon Program
  - 800.693.5343
  - <https://kansasradonprogram.org/home>
- Brian Hanson
  - 785.532.4996
  - [bhanson@ksu.edu](mailto:bhanson@ksu.edu)

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