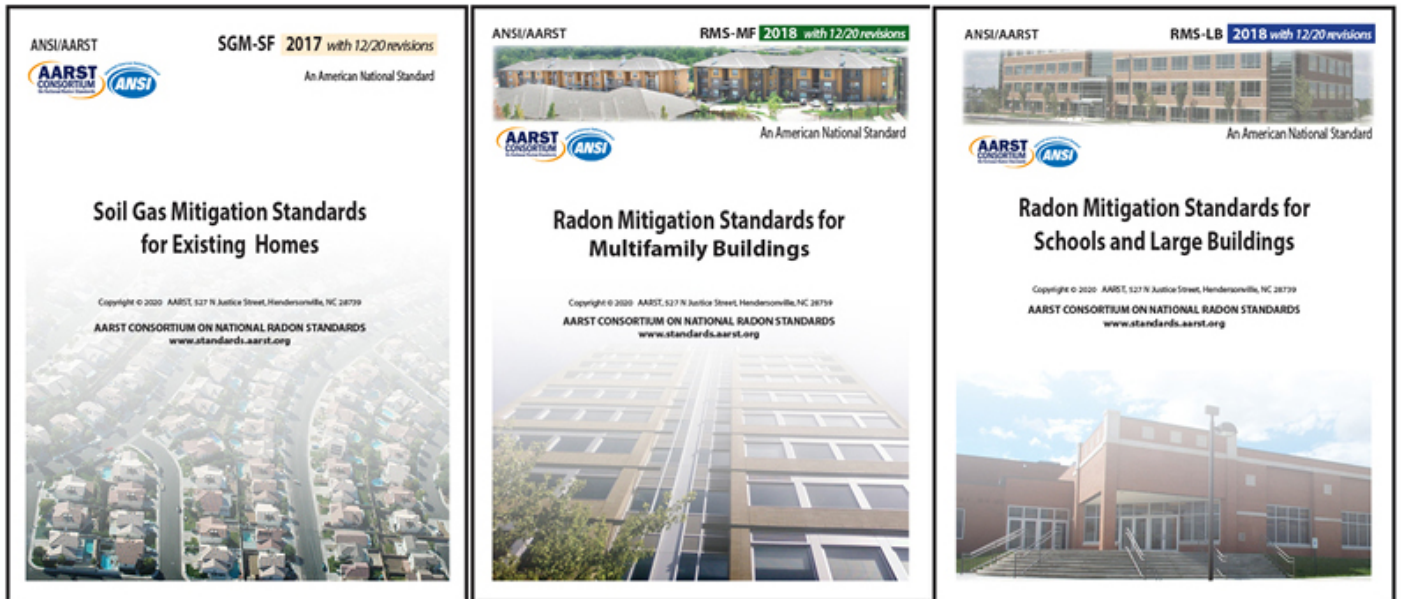


Harmonization effort for
SGM-SF, RMS-MF and RMS-LB Mitigation Standards
Continuous maintenance efforts to improve these standards are currently ongoing.



Read me

The work, as contained herein, resulted in harmonized updates that would replace Section 11 (Health and Safety) to read the same in SGM-SF (existing homes); RMS-MF (existing multifamily buildings) and RMS-LB (existing schools and large buildings).

This proposed change provides improved focus on actions that result in safe practices. These proposed revisions are applicable to:

- SGM-SF 2017 rev12/20
- RMS-MF 2018 rev12/20
- RMS-LB 2018 rev12/20

Latest published versions of those standards are available for comparison at www.standards.aarst.org where all ANSI/AARST standards can be found for review at no charge and for purchase.

The current mitigation standards committee roster (consensus body) can be linked to from www.standards.aarst.org/public-review. The current work project includes (1) harmonization, where possible, for all portions of these documents to read the same for the same tasks; (2) update based on new experiences, and (3) renderings that are more conducive to stakeholders who are involved in compliance assessment.

Public Review: SF-MF-LB 12-21
COMMENT DEADLINE: January 31st, 2022

REQUESTED PROCESS AND FORM FOR FORMAL PUBLIC REVIEW COMMENTS

Submittals (MS Word preferred) may be attached by email to StandardsAssist@gmail.com

1) Do not submit marked-up or highlighted copies of the entire document.

- 2) If a new provision is proposed, text of the proposed provision must be submitted in writing. If modification of a provision is proposed, the proposed text must be submitted utilizing the strikeout/underline format.
- 3) For substantiating statements: Be brief. Provide abstract of lengthy substantiation. (If appropriate, full text may be enclosed for project committee reference.)

REQUESTED FORMAT

Title of Public Review Draft: **SF-MF-LB 06-21**

- **Name:** _____ Affiliation: _____
 - **Clause or Subclause:** _____
 - **Comment/Recommendation:** _____
 - **Substantiating Statements:** _____
- Check here if your comment is supportive in nature and does not require substantive changes in the current proposal in order to resolve your comment.

Repeat the five bullet items above for each comment.

Requested registration of your contact information and copyright release.

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Notice regarding unresolved objections: While each committee seeks to resolve objections, please notify the committee responsible for an action or inaction if you desire to recirculate any unresolved objections to the committee for further consideration. Notice of right to appeal. (See Bylaws for the AARST Consortium on National Radon Standards - Operating Procedures for Appeals available at www.radonstandards.us, Standards Forum, Bylaws): (2.1) 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.

AARST Consortium on National Radon Standards

Website: www.standards.aarst.org Email: standards@aarst.org

527 N Justice Street, Hendersonville, NC 28739

The Consortium Consensus Process

The consensus process 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) has been applied throughout the process of approving this document.

Continuous Maintenance

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.

User Tools: User tools are posted online (www.standards.aarst.org/public-review) as they become available (such as templates for field notices, inspection forms, interpretations and approved addenda updates across time).

Notices

Notice of right to appeal: Bylaws for the AARST Consortium on National Radon Standards are available at www.standards.aarst.org/public-review. 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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11.0 HEALTH AND SAFETY

Advisory Notice

This document cannot address all health and safety concerns associated with *mitigation* installations. Users of this document are responsible for establishing and implementing appropriate safety practices and compliance with applicable federal, state and local regulations relating to *worker* health and safety.

11.1 Safety Management

The *contractor* shall establish, maintain and follow a written safety management program. The program shall address health hazards and safety for jobsite workers and others, as it specifically pertains to *mitigation* activities. Where *worker safety regulators* require review of worker safety programs, the *contractor* shall provide the safety management program and related records as required by federal or local jurisdictional authority.

Definition. Worker safety regulators: Authorities that have been granted authorization with resources to regulate worker safety, such as OSHA.

11.1.1 Resources

The program policies shall address a means for making personal safety equipment available to all *jobsite workers*, including, but not limited to: eye protection, hearing protection, respiratory protection, knee pads, fire extinguishers, hard hats, and steel-toe boots and protective gloves.

11.2 Safety Training

The safety management program shall address a means to inform and educate *jobsite workers* on safety practices and policies by way of educational courses or staff briefings.

Note—Confirmation of *jobsite worker* knowledge of the safety management program should be logged in QC records with the *jobsite worker's* signature and date after each educational or briefing event.

11.2.1 Worker training

Safety precautions reviewed no less than annually with all *jobsite workers* shall include review and discussion of:

- a) Ventilation of work areas to reduce exposure to radon, *radon* decay products, hazardous vapors and other airborne hazards;
- b) Safe use of all jobsite equipment including safe practices when using ladders or scaffolding, and identifying and avoiding electrical hazards;
- c) Safety procedures, that should often include a buddy system, whenever conducting work in *crawl spaces*, confined spaces and where hazards exist from excavation, falling or heat exhaustion. This discussion to include symptoms and appropriate responses to heat exhaustion and Hantavirus;
- e) Safety procedures prior to and while drilling through slabs, such as efforts to identify if there are utility lines below slabs or steel tendons within post-tension slabs;
- f) Personal safety equipment, to include:
 1. Eye protection from flying dust and debris, such as during sawing and drilling;
 2. Ear protection from repetitious exposure to loud noise, such as generated by hammer drills;
 3. Respiratory tract protection from airborne particulates and biological hazards, such as masks to protect against airborne silica dust, asbestos, glass fibers and communicable diseases; and
 4. Protection against bodily harm by way of protective gloves, steel toe boots and hard hats; and
- h) Safe driving practices, including parking and backing up at jobsites, and procedures to minimize harm that can result from repetitious muscle strain activity;
- i) Safety considerations relative occupational exposure to radon, chemicals and hazardous gases, to include safety data sheets (SDS) and how to access SDS information related with hazardous compounds in products used during construction, such as caulk and glues or bonding products.

11.2.2 *Oversight training*

Person(s) physically onsite who are deemed responsible for overseeing jobsite, educational or briefing events shall additionally include, but not limited to, discussion of:

- a) Stopping work until safe conditions can be secured;
- b) Posting or providing notice for occupants regarding observed hazards;
- c) Hazardous building conditions identified in **Section 11.3**; and
- d) Responses to and reporting work-related accidents or illness.

11.3 **Hazardous Building Conditions**

In any planned work area where it is suspected that contaminants such as asbestos, lead paint, mold or other toxins exist, work shall be conducted in a manner that meets applicable regulations and maintains consideration for the health and safety of both workers and occupants.

11.3.1 *Asbestos*

In any planned work area where it is known or suspected that asbestos may exist and be disturbed, work shall not be conducted until an accredited asbestos inspector who, where applicable, is licensed by the state or local jurisdiction determines that such work will be undertaken in a manner that complies with applicable asbestos regulations.

Informative advisory—Deteriorating, damaged or disturbed asbestos-containing products can pose a serious health threat to occupants and workers. Asbestos-containing materials can include certain materials for insulation, fireproofing, acoustical materials, floor tiles and adhesives. Care should be taken to recognize that asbestos inspection reports do not always specify the location of asbestos and that previously hidden asbestos-containing materials that can be exposed during construction or renovations.

Note—The *client* should be notified that proper assessment and abatement procedures are to be followed as regulated by NESHAP, OSHA, the LSHR and state and local regulations for the protection of the health and safety of occupants, and *contractors*. For more information, see www.epa.gov/asbestos

11.3.2 *Lead-Based Paint*

Informative advisory—Common renovation activities such as sanding and demolition can create hazardous lead dust and chips, which can be harmful to adults and children.

Note 1—Any activity that disturbs paint (unless it is known by testing to not be lead-based paint) in pre-1978 target housing is subject to the EPA Lead Renovation, Repair and Painting (RRP) rule (40 CFR 745, Subparts E and Q). EPA has established the Lead-Safe Certification Program for *contractors* in response to this concern. For more information, see a reference such as www.epa.gov/getleadsafe

Note 2—In addition, all target housing that is federally owned and target housing receiving federal assistance fall under “The Lead Safe Housing Rule” (24 CFR Part 35 Subparts B through R). Please refer to Subpart R—Methods and Standards for Lead-Paint Hazard Evaluation and Hazard Reduction Activities (24 CFR Sections 35.1300 through 35.1355) for HUD specific methods and standards that would be applied for target housing. The Lead Safe Housing Rule and additional HUD information is available at www.hud.gov/healthyhomes.

11.3.3 *Flue Gas Spillage*

Clients and impacted residents shall be advised of *flue gas spillage* that is encountered during the course of *mitigation* activities. If *flue gas spillage* is observed to result from the *mitigation system* operation, the system shall be deactivated until the condition has been evaluated and corrected. In such event, the *client* or impacted resident shall be advised to contact an *HVAC contractor* or other qualified person to evaluate and correct *flue gas spillage* condition as well as to verify proper appliance installation and performance.

Note—the *client* or impacted resident should be directed to sources of additional information such as:

- www.epa.gov/iaq/homes/hip-combustion.html
- Appendix D of the International Fuel Gas Code (as published by the International Code Council).

Informative advisory—Altering air pressure in a building, intentionally or unintentionally, may cause *flue gas spillage*. A potentially serious unintentional air pressure alteration occurs for ASD when the volume of air needed to achieve mitigation goals is mostly coming from a confined airspace that contains an atmospherically-vented combustion device.

11.4 Radon Mitigation

All *jobsite workers* physically installing *radon mitigation* systems shall be advised of occupational hazards of exposure to *radon* and the need to apply protective measures.

11.4.1 Jobsite worker exposure to radon

Where the purpose of mitigation includes mitigation of radon gas, the safety management program shall include a means to monitor each worker’s exposure to *radon* at each work site based on:

- The highest pre-*mitigation* indoor *radon* measurements; or
- Actual *jobsite* measurements of radon or radon decay products; or
- Measurements from a *radon* dosimeter such as an alpha track or comparable device consistently worn at the job site and stored in a low-*radon* environment during nonworking hours; or
- As required by jurisdictions of authority.

11.4.2 Radon exposure limits

Jobsite worker exposure shall be limited to 4 working level months (WLM) or 400 pCi/L-Months (pCi/L-M) over any 12-month period in accordance with requirements in a) or b) of this Section 11.4.2.

Note—Less than 1 WLM or 100 pCi/L-M over any 12-month period is a recommended goal that is commonly met for concentrations *jobsite workers* typically encounter day to day.

- WLM calculations** shall be based upon the *jobsite worker’s* exposure hours times the exposure concentration, as expressed in working level (WL) units of measurement. Working level hours (WLH) shall be derived from WL measurements multiplied times exposure hours. Ongoing totals of WLH shall be divided by 170 workhours/month to achieve working level months (WLM).

Table 11.4.2 a Example Spreadsheet Calculations (WLM)

	A	B	C	D	E	F	G
0	Data Entry Date	Data Entry Hours	Data Entry pCi/L	WL	WLH	WLM	WLM Totals
1	1/12/2021	8	32	0.32	2.56	0.015	Total to not exceed 4 WLM in any 12-month period
2	1/13/2021	4	5	0.05	0.20	0.0012	
3	1/13/2021	4	7	0.07	0.28	0.0016	
4	1/14/2021	8	10	0.10	0.80	0.0047	
5	1/15/2021	8	22	0.22	1.76	0.0104	
6	1/16/2021	4	22	0.22	0.88	0.0052	
<i>Calculations</i>							
	Data Entry	Data Entry	Data Entry	=pCi/L / 100 If calculating 50% ER: =(pCi/L/100) * 0.5	=WL * Hours	=WLH / 170	=(SUM) WLM Column

Note—The limits in this standard are based on 100% equilibrium ratio (ER). Where required to report WLM using 50% equilibrium ratio, the WL value would be 50% of the *radon* (pCi/L) measurements.

- b. **Equivalent pCi/L-M calculations** shall be based upon the *jobsite worker's* exposure hours times the exposure concentration expressed in pCi/L units of measurement. pCi/L- hours shall be derived from *radon* (pCi/L) measurements multiplied times exposure hours. Ongoing totals of pCi/L-M shall be divided by 170 workhours/month to achieve picocurie months (pCi/L-M).

Table 11.4.2 b Example Spreadsheet Calculations (pCi/L-M)

	A	B	C	E	F	G
0	Data Entry Date	Data Entry Hours	Data Entry pCi/L	pCi/L-Hours	pCi/L-Months	pCi/L-Month Totals
1	1/12/2021	8	32	256	1.5	3.93
2	1/13/2021	4	5	20	0.18	Total to not exceed 400 pCi/L-Months in any 12-month period
3	1/13/2021	4	7	38	0.22	
4	1/14/2021	8	10	80	0.47	
5	1/15/2021	8	22	176	1.04	
6	1/16/2021	4	22	88	0.52	
<i>Calculations</i>						
	Data Entry	Data Entry	Data Entry	= pCi/L Hours	= pCi/L hours / 170	=(SUM) pCi/L -Month Column

11.5 Soil Gas Mitigation

11.5.1 Chemical vapor Intrusion (VI)

All *jobsite workers* physically installing systems intended to reduce occupant exposure to hazards from chemical vapors or other soil gas of concern shall be advised of occupational hazards from exposure to such substances and the need to apply protective measures when handling and controlling such hazardous substances. The health and safety program shall include additional educational courses or staff briefings that include review and discussion of a) and b) of this **Section 11.7.1**:

- a) Understanding chemical exposure scenarios.

Note—Three groups of people, or “receptors,” can potentially be exposed to chemical contaminants at residential locations where mitigation systems are installed;

Informative Table 11.7 Chemical Exposure Scenarios

Summary of various exposure scenarios

Receptor (Persons)	Media to Which Exposed	Routes of Exposure	Common Exposure Durations	Hazards Related to Installations	Hazards Related to Frequency of Exposure
Personnel: Installation of Mitigation System for Chemical Vapor Intrusion	Sub-slab soil	1. Dermal contact 2. Ingestion following hand-to-mouth 3. Inhalation of vapor / particulates 4. Ingestion of particulates	2 hr/event	Varies depending upon chemicals present on each jobsite and materials used during <i>mitigation system</i> installation	Varies from one-time acute exposure to a series of acute exposures over many years (that can combine to result in a subchronic or chronic risk scenario)
	Indoor air	Inhalation of vapor and, to a lesser extent, particulates	6 hr/event		
Personnel: Monitoring Events	Indoor air	Inhalation of vapor	1 hr/event		
Residents	Indoor air	Inhalation of vapor	12-24 hours/day	Short-term and dependent upon materials used during <i>mitigation system</i> installation	

- b) Personal protection regarding contaminated soil, contaminated indoor air and explosive or fire hazard situations.

Note—For guidance, see:

- The NIOSH pocket guide to chemical hazards: www.cdc.gov/niosh/npg/ ;
- ATSDR (The Agency for Toxic Substances and Disease Registry) list of contaminants commonly encountered: www.atsdr.cdc.gov/SPL ; and
- For their minimal risk levels: www.atsdr.cdc.gov/mrls.

Informative advisory—Confirmation of *jobsite worker* knowledge of the safety plan should be logged in QC records with the *jobsite worker's* signature and date after each educational or briefing event.

11.5.3 **Safety oversight**

Where the purpose of mitigation includes mitigation of chemical vapors or other soil gas of concern, the safety management program shall designate a person to oversee activities who is:

- a) trained and qualified in OSHA's HAZWOPER requirements; and
- b) authorized to stop work until safe conditions can be secured.

11.5.3.1 Jobsite hazards

Prior to mitigating any structure for chemical vapor intrusion or explosive gas the *contractor* shall request in writing that the *client* provide a written statement confirming any need, or if there is not a need, for special considerations regarding site conditions and handling or control of hazardous substances, to include:

- a) Worker Exposures (relative to maximum concentrations that workers should expect to encounter from inhalation, ingestion and dermal exposures to hazardous substances);
- b) Handling of Toxic Soil and Groundwater (including groundwater that might be found in *sump* wells or intruding above slabs or into *crawl spaces*); and
- c) Flammable or Explosive Gasses or Vapors.

Note—The health and safety practices needed can depend identifying known hazards at the jobsite(s). If *client* does not furnish appropriate information and guidance related to known chemical or explosive gas hazards, the *contractor*, who is ultimately responsible for jobsite safety, is denied the capacity to institute safe practices.

11.5.3.2 OSHA Requirements

Informative advisory—OSHA mandates special requirements and worker training under certain circumstances. For guidance see:

- OSHA Hazwoper training requirements: www.osha.gov/html/faq-hazwoper.html ; and
- OSHA requirements for "Permit-required confined spaces": OSHA's 29 CFR 1910.146, clause (c)(5)(ii)(C), on test, subclause (1), Oxygen content, (2), Flammable gases and vapors, an (3), Potential toxic air contaminants.