Kansas Radon Program

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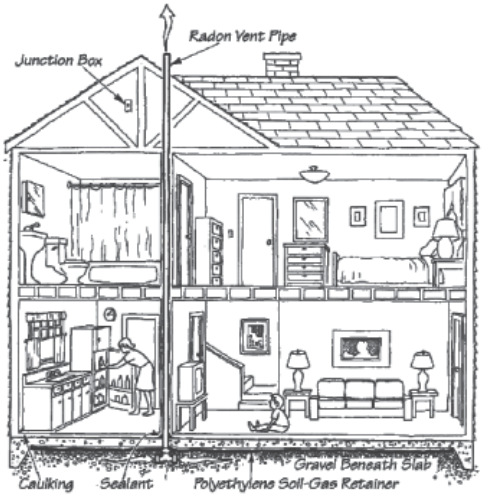
Building a Radon Resistant New Home

Protect your family by building it right

Kansas has significant radon potential with sixty-four Zone 1 (high potential) and forty-one Zone 2 (medium potential) counties, and with a statewide average of 25-35% of existing homes likely to have elevated radon levels.

There is no way to predict radon levels before construction of a new home begins. Testing the soil will only waste money and confirm that radon is present. Whether or not radon levels are elevated when the house is complete, can only be determined by testing. Fortunately, effective low-cost techniques can be installed by your builder to reduce the potential for high radon, and make the home easy to mitigate if it becomes necessary.



This fact sheet should help you and your builder communicate about what steps to take to build a radon-resistant new home. These steps have been developed and codified into the latest version (2009) of the International Residential Code building code and are described in Appendix F of that document. Check with your local code official to see if the Code and Appendix F have been adopted by your city. If so, the steps described here should be accomplished as part of the builder's compliance with local codes. If not, you will need to work with your builder to incorporate the steps into the design and construction process for your new home.

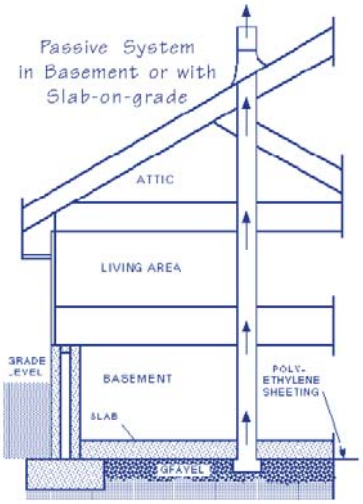
Currently, there are three communities in Kansas that have adopted Appendix F or a similar ordinance requiring that all new single- and two-family residences be built radon resistant. Manhattan, KS, adopted the Appendix F in 2001. Topeka, KS, adopted a stand-alone ordinance modeled on Appendix F in 2005. Lawrence, KS, adopted the Appendix F in 2007.

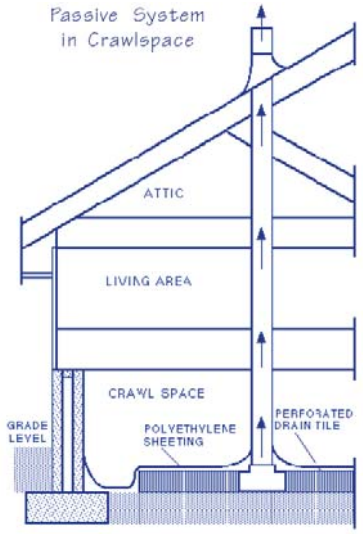
Some of the techniques may already be installed by your builder, and adopting the new steps could be minimal. The five key concepts are:

A. Gas permeable layer – Usually a 4-inch layer of clean coarse gravel is used beneath the slab to allow the soil gas to move freely underneath the house. Other options are to install a loop of perforated pipe or soil gas collection mat if sand or other soils are used under the slab.
B. Plastic Sheeting – Polyethelene sheeting is placed on top of the gas permeable layer to help prevent the soil gas from entering the home. The sheeting also keeps concrete from clogging the gas permeable layer when the slab is poured.
C. Vent Pipe – A 3- or 4- inch (recommended) PVC or other gas-tight pipe (commonly used for plumbing) runs

from the gas permeable layer up through the house in as straight a line as possible to safely vent radon and other soil gases above the house. Airflow through the pipe is induced by routing the pipe through warm spaces, creating a draft by natural stack effect.

D. Junction Box – An attic location near the pipe is wired with an electrical junction box in case an electric venting fan is needed later to activate the system.
E. Sealing and Caulking – All openings in the concrete foundation floor are sealed to prevent soil gas from entering the home. This is more easily done during construction than when the home is finished and occupied.





How effective are the techniques? Passive radon systems reduce radon by an average of about 36% if properly installed. Common errors that reduce system effectiveness include failure to seal sump lids, running vent pipes through unheated spaces like a garage or exterior wall cavity, and having more horizontal pipe run than vertical run. Allowing for the future installation of an in-line fan to activate the system is an important hedge to guarantee achieving low radon levels. A 30-inch vertical run of pipe is needed above or outside the living area of the house to enable fan installation, along with an un-switched electrical junction box. To prevent the radon vent pipe from being mistaken for a sewer system, the exposed portions of the pipe should be labeled where it exits the slab, at each floor level and in the attic.

These techniques could add $300-$500 to the cost of a new home, depending on current construction practices. Fixing an existing home could cost $800 to $2000 depending on its features. This clearly makes incorporating radon-resistant construction techniques cost effective.

For builders and their clients, a more detailed booklet provides thorough information, construction drawings and answers frequently asked questions. ***Building Radon Out*** is available from the Kansas Radon Program by calling 1-800-693-5343 or by download from the EPA's website: ***http://www.epa.gove/radon***.

KANSAS STATE UNIVERSITY