

# New, Vented Crawl Spaces Should Be Illegal

**Most building science research condemns the classic vented crawl space, at least in certain climate zones, even if the crawl space meets code**

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**Dark, damp, and unappealing.** Crawl spaces often suffer from several problems. Venting them to the outside just makes the situation worse.

For new homes, vented crawl spaces should be illegal. That may seem harsh, considering the entrenchment of this common, code-compliant construction detail. I am on board for most local and common practices when they're done right, but it's tough denying that most building science research is condemning the classic vented crawl space in a humid climate. It's time for this building practice to be outlawed for new construction.

There are plenty of crawl spaces that seem to do fine, but even a dry crawl space can have negative effects on indoor air quality in the living spaces above. Most vented crawl spaces are not dry; they are building science disasters. Do you really think building a cave below your house is a good idea?

There is danger in breathing air that comes from open earth. Radon is one of the most alarming forms of indoor-air pollution. While radon can be an issue for all foundation types, homes on slabs (stem walls or basements) offer more control over water and soil gases like radon than houses built over a crawl space.

## **An unvented crawl space — or, better yet, no crawl space**

In humid climates, vented crawl spaces don't make sense because they increase moisture problems. In an unvented crawl space, plastic sheeting seals the ground and keeps most of the soil gases out of the air. But it's easier said than done.

The plastic should be completely sealed to the walls, piers, and any other penetrations from the ground. In areas prone to groundwater during heavy rains, the crawl space grade should be sloped to a daylight drain. Crawl space walls should be insulated, while allowing access to some portion of the wall for termite inspection.

Finally, unvented crawl spaces need some method of dehumidification or space conditioning, which adds to energy costs and maintenance needs.

One of our arguments against crawl spaces is that cramped conditions leads to inferior work from all parties involved with the home: carpenters, plumbers, electricians, HVAC contractors, crawl space encapsulation workers, energy raters, the builder, and finally the homeowner. Show of hands: Who wants to go spelunking to ensure craftsmanship and maintenance?

Proper unvented crawl space encapsulation is not cheap. Moisture and ongoing energy loads have big lifecycle costs.

## **Consider a basement or stem walls with slab instead**

Stem walls with slabs work anywhere that is suited for a crawl space. It's better building science, because the building envelope is more defined.

Moisture and soil gases like radon are big risks to indoor-air quality. Building researchers seemingly agree it's easier to create a solid separation of the ground with a slab. This is largely due to the even bed of clean gravel and vapor barrier called for in good slab construction. Simple perforated drain pipes can do double duty as sub-slab drainage and passive radon mitigation systems. The taller the stem wall and more volume of clean gravel, the better the protection.

Slabs are the most common foundation type in some areas of the country, but many people still object to them. I find that opinions against slabs mostly come from those uncomfortable with concrete work. The best argument against them: it's hard to change plumbing. Changing or adding waste lines under slabs is most intensive, but usually not a problem as the house is likely undergoing major renovation anyway.

## **Other possible arguments against slabs**

There are a few other concerns raised about slabs. One of them is that slabs can cause joint and other orthopedic problems because they're so hard. We have yet to see any research supporting this theory. There are studies suggesting that dogs might develop toenail problems, but that should apply to all hard surfaces, including tile and hardwood.

I disagree that wood or wood-framed floors are significantly more forgiving. Modern, code-built floors have immeasurable deflection from normal foot traffic. The only finish where I notice a difference is rug or carpet with thick padding, which is among the worst material choices for those with indoor-air quality concerns. A better strategy for joint and related concerns are orthopedic insoles.

Yes, slabs can be cold, but we include insulation under our slabs, making them close to the same temperature as the indoor air. This also reduces the chance of condensation and creates another redundant barrier to soil moisture and gases like radon.

## **The risks of flooding and high groundwater**

Flooding problems, which are usually small plumbing leaks, are more quickly discovered with a slab. Subfloors and framing are more at risk of rot than concrete. Leaks getting past the slab drain harmlessly through the gravel. When a leak pools in a crawl space, it increases humidity, energy costs, and the risks of mildew and mold.

Higher groundwater from a heavy rain is less of a risk with raised gravel drained to daylight. With a crawl space, it's usually tougher to get positive drainage around the house. It's also tougher to get daylight drains from under the house because of the sub-grade conditions.

Crawl spaces contribute to higher humidity, mold, and mildew. They are also tougher to remediate for radon and other soil gases, making them a poor choice for those concerned with indoor air quality. They also contribute to higher energy costs, which is not good for outdoor-air quality.

If you're still not convinced, at least be sure that your crawl space is properly encapsulated and unvented. That advice goes for existing homes, too.

Eventually, vented crawlspaces will be an illegal building practice in new construction. This is why our company will not include them directly below living spaces. We will do unvented crawlspaces, but we think there are usually better options.