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ADVISORY COMMITTEE COMMENT FORM
FOR PROPOSED CODE CHANGES
(This form must be submitted electronically)

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Code Change Proposal # 22 B

Proposed Code Change - Language

The following code change affects two definitions and the section dealing with sub-membrane preparation. These code changes are listed together because they should be voted up or down based on all three changes taken as a group.

- Existing Language Proposed in DOLI Chapter 1303 Draft, Ver. 2 dated 9-26-11, with updates with amendments that were approved with consensus votes.

DEFINITIONS

GAS PERMEABLE MATERIAL. "Gas permeable material" means

1. A uniform layer of clean aggregate, a minimum of 4 inches (102 mm) thick. The aggregate shall consist of material that will pass through a 2-inch (51 mm) sieve and be retained by a ¼ -inch (6.4 mm) sieve;

2. A uniform layer of sand (native or fill), a minimum of 4 inches (102 mm) thick, overlain by a layer or strips of geotextile drainage matting designed to allow the lateral flow of soil gases; or

~~3. Other materials, systems, or floor designs with demonstrated capability to permit depressurization under the entire soil gas membrane .~~ [as amended on 12/13/2011 by Radon Advisory Comm proposal #8, rev 12-4-11]

[Currently there are no definitions are proposed for "interior drain tile loop", "drain tile" or "drain tile loop".]

Sub-membrane preparation. A gas permeable material shall be placed on the prepared subgrade under all concrete floors or other floor systems within dwellings when the concrete floor or other floor system

is constructed at, on, or below grade. [as amended on 12/13/2011 by Radon Advisory Comm proposal #8, rev 12-4-11]

- Alternate Code Language Proposed for DOLI Chapter 1303 Draft, Ver. 2 dated 9-26-11

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~~3. Other materials, systems, or floor designs with demonstrated capability to permit depressurization under the entire soil gas membrane.~~

INTERIOR DRAIN TILE LOOP. A continuous length of 4" minimum diameter perforated pipe that is located in a bed of gravel along all interior footings.

Sub-membrane preparation. A gas permeable material shall be placed on the prepared subgrade under all concrete floors or other floor systems within dwellings when the concrete floor or other floor system is constructed at, on, or below grade. The gas-permeable material shall consist of one of the following:

1. A uniform layer of clean aggregate, a minimum of 4 inches (102 mm) thick. The aggregate shall consist of material that will pass through a 2-inch (51 mm) sieve and be retained by a 1/4-inch (6.4 mm) sieve.
2. A uniform layer of sand (native or fill), a minimum of 4 inches (102 mm) thick, overlain by a layer or strips of geotextile drainage matting designed to allow the lateral flow of soil gases.
3. A uniform minimum 4 inch (102 mm) layer of Group I soil (GW, GP, SW, SP, GM, SM) as defined by the International Residential Code. Native soil or fill is allowed. An interior drain tile loop shall be buried in a trench at least 1 foot (0.3m) wide and at least 4 inches (102 mm) deep that follows no more than 1 foot (0.3m) away from the interior perimeter of all foundation footings containing conditioned space or crawlspaces. The trench shall be filled with clean aggregate, a minimum of 4 inches (102 mm) thick. The aggregate shall consist of material that will pass through a 2-inch (51 mm) sieve and be retained by a ¼ -inch (6.4 mm) sieve.
4. Other materials, systems or floor designs with demonstrated capability to permit depressurization across the entire subfloor area~~.~~

Proposed Code Change – Need and Reason

This code change is needed to allow a proven, low-cost method of installing a passive radon system.

To determine whether or not this code proposal is reasonable it is important to understand a few things about radon.
1) Not all homes in Minnesota require radon remediation. The Minnesota Department of Health states that, "in Minnesota, one in three homes (1/3) has radon levels that pose a significant health risk." This also

means that radon levels in two in three (2/3) of Minnesota homes do not have radon levels that pose a significant health risk.
2) It is impossible to predict which homes will have high radon levels until after they are built. If there were a test that could determine post-construction radon levels then the radon code provisions could be targeted to the houses that would have the highest radon levels. If the test could also determine where radon would not be a problem, those houses wouldn't need any radon protection.
3) Less than 2/3rd of houses built in Minnesota don't have radon levels that pose a significant health risk and 1/3 of houses do. This means the Minnesota State Building Code (SBC) needs to provide the lowest cost options for passive radon systems for homes that will never need to activate them by adding a fan. The SBC also needs to have passive systems that can be cost effectively reduce radon levels by turning them active if any of the 1/3 of the population in newly constructed homes decides to test their houses and reduce radon levels.

The intent of the radon code is described in this section of the code:

> "**Requirements for passive depressurization systems**
> The construction techniques in this section shall be used to resist radon entry and prepare the building for post-construction active radon mitigation."

The intent of the radon rules is not to provide a passive system that will reduce radon levels; it is to produce a cost-effective passive radon system that can be cost-effectively transformed into an active radon system, if the homeowner chooses to do this after occupying their home.

If the radon code were designed to have the most effective passive radon system possible there would be requirements to limit how straight the vent pipe would need to be to maximize the stack effect. The code does not. There is no limit to the number of elbows that can be used on the vent pipe.

Why is this method in this code proposal a reasonable way of mitigating radon? Because it is the preferred method used by radon mitigation contractors for existing houses. Radon mitigation contractors typically fill all cracks in the foundation and slab as a first low cost mediation step. If this doesn't decrease the radon levels they route a radon vent pipe and install a radon fan. If further mitigation is needed they break up the slab around the perimeter of the foundation and install a drain tile system in a gravel bed. The remaining soil under the slab is left intact. When the new drain tile system is connected to an active radon fan this is a very effective method for reducing high radon levels.

More importantly, the gas permeable layer in this proposal goes above and beyond the requirement of *ASTM E-1465 Standard Practice for Radon Control Options for the Design and Construction of New Low-Rise Residential Buildings*. A Type 5 Gas-Permeable Layer as described in *ASTM E-1465 Table 2. Gas-Permeable Layer (GPL) Types Comparison* describes a layer of polyethylene placed over a "flexible corrugated perforated pipe under membrane". A minimum 4" pipe is required and "no aggregate is used". The gas-permeable layer required by this code proposal includes installing the pipe in a trench with gravel, therefore making it more effective at reducing radon than the ASTM standard requires. The proposed code language also requires builders to use gas permeable soil as fill such as sand or better.

Currently the International Residential Code as adopted and amended by the Minnesota Building Code does not require interior drain tile in slab-on-grade homes or those with basements. Exterior drain tile is required in the IRC in soils that aren't well drained. As a best practice many builders go above code and install interior drain tile and a sump pump in homes with basements to control moisture. Interior drain tile is typically not used on slab-on-grade homes. In many parts of the state aggregate is expensive and builders are already installing interior drain tile in a gravel-filled trench. Requiring an added 4" of gravel under the entire slab increases the cost of a passive radon system that will never be used more than 2/3 of the time. This is once again because only 1/3 of the homes will have high radon levels and not all of these homeowners will choose to add a fan to their passive mitigation system.

Proposed Code Change – Cost/Benefit Analysis

BAM is currently collecting data from our members. At our Decemer 23, 2011 meeting we will bring bids from around that state for adding 4” of pea gravel under existing basements where they currently are using interior drain tile in a gravel bed.

Other Factors to Consider Related to Proposed Code Change

1. Is this proposed code change meant to:

   ☐ change language contained in a published code book? If so, list section(s).

   ☐ change language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

   ☐ delete language contained in a published code book? If so, list section(s).

   ☐ delete language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

   ☒ neither; this language will be new language, not found in the code book or in Minnesota Rule.

2. Is this proposed code change required by a Minnesota Statute or new legislation? If so, please provide the citation to the Statute or legislation.
   No

3. Will this proposed code change impact other sections of a published code book or of an amendment in Minnesota Rule? If so, please list the affected sections or rule parts.
   No, interior drain tile is not addressed by the IRC.

4. Will this proposed code change impact other parts of the Minnesota State Building Code? If so, please list the affected parts of the Minnesota State Building Code.
   No

5. Who are the parties affected or segments of industry affected by this proposed code change? Home builders, homeowners, building code officials

6. Can you think of other means or methods to achieve the purpose of the proposed code change? If so, please explain what they are and why your proposed change is the preferred method or means to achieve the desired result. Yes, home builders could propose this code language as an alternate method but most building code officials do not have enough experience with the issue of radon to determine if this system can demonstrate the "capability to permit depressurization across the entire subfloor area." A few local code officials have said they will not allow this method of construction in their community until "the State tells us it is okay." This has lead to confusion and inconsistent enforcement of the radon code. Putting this method directly into the code language will allow another proven low cost construction method for home builders to use for meeting the provisions of the code and keep construction costs low.

7. Are you aware of any federal requirement or regulation related to this proposed code change? If so, please list the regulation or requirement.

No