



CITY OF
GRAND RAPIDS
IT'S IN MINNESOTA'S NATURE

RADON

City of Grand Rapids
Building Department

218-326-7601

www.cityofgrandrapidsmn.com



This handout is intended only as a guide and is based in part on the 2015 Minnesota State Building Code, Grand Rapids City Ordinances, and good building practice. While every attempt has been made to insure the correctness of this handout, no guarantees are made to its accuracy or completeness. Responsibility for compliance with applicable codes and ordinances falls on the owner or contractor. For specific questions regarding code requirements, refer to the applicable codes or contact your local Building Safety Division.

REQUIRED. Effective June 1, 2009, a passive sub-slab depressurization system must be provided in all new single-family dwellings, two-family dwellings, and townhouses. This applies to buildings with basements, conditioned or unconditioned crawl spaces, and slab-on-grade buildings.

SUMMARY OF SELECTED PORTIONS

1) Subfloor. A 4-inch layer of one of the following must be placed under any basement or crawl space floor slab or assembly:

- A layer of clean aggregate consisting of material that will pass through a 2-inch sieve and be retained by a 1/4-inch sieve or
- A layer of sand ***overlain by a layer or strips of geotextile drainage matting.***
- Other material, systems, or floor designs with demonstrated capability to permit depressurization across the entire sub-floor area.

2) Soil-gas-retarder. A minimum 6-mil or 3-mil cross-laminated polyethylene sheeting shall be placed on top of the sand or aggregate base or the soil in the case of a crawl space. The sheeting must:

- cover the entire floor area with separate sections lapped at least 12 inches,
- fit closely around any pipe, wire, or penetration of the material, and
- have any punctures or tears sealed.

The sheeting is **not** required to be sealed at laps or where placed on footings.

3) Floor openings. Openings around bathtubs, showers, water closets, pipes, wires or other objects that penetrate concrete slabs or other floor assemblies shall be filled with a polyurethane caulk or equivalent sealant.

4) Joints. All control joints, isolation joints, construction joints, and any other joints in concrete slabs or between slabs and foundation walls must be sealed with a polyurethane caulk or other elastomeric sealant.

5) Sumps. Sumps open to soil or serving ***interior*** drain tile loops must have a gasketed or sealed lid.

6) Masonry foundation walls. A continuous course of solid masonry, one course of solid grouted masonry, or a solid concrete beam shall be provided at or above finished ground level. Brick ledges shall be sealed.

7) Waterproofing/dampproofing. Exterior surfaces of foundation walls must be waterproofed/dampproofed in accordance with IRC Section R406.2

8) Ducts. Ducts passing through or beneath a slab shall be seamless. Ductwork in crawl spaces shall have seams and joints sealed.

9) Vent pipe. A 3- or 4- inch tee shall be inserted beneath the soil-gas-retarder. Ten feet of 3- or 4-inch diameter perforated pipe must be connected to **each** side of the tee. The horizontal pipe must be embedded in the sub-slab permeable material when a slab or floor assembly exists. Instead of a tee, the pipe may be inserted directly into an interior perimeter drain tile loop or through a sealed sump cover where the sump is exposed to the sub-slab aggregate or connected to it through a drainage system. A 3- or 4-inch vertical pipe shall extend from the tee, the drain tile loop, or the sump through the conditioned space of the building terminating at least 12 inches above the roof at least 10 feet from any window or other opening into conditioned spaces that is less than 2 feet below the exhaust point and at least 10 feet from any window or opening into an adjoining or adjacent building.

10) Active systems. If an active system is installed, the vent pipe may be routed through unconditioned space ***within the building or garage, provided the vent pipe is insulated to a minimum of R-4.***

11) Monitoring system. A monitoring system is required on all **active** systems.

12) Divided basements. When sub-slab aggregate is separated by footings or other barriers, each area must have an individual vent pipe. Individual vents may be connected into a single terminal vent.

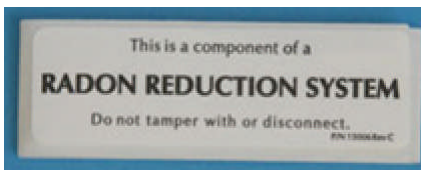
13) Multi-level basements/crawl spaces. When multilevel basements or combination basement/crawl spaces occur, each type of foundation must have a separate vent pipe.

14) Vent drainage. All vents must be pitched to provide positive drainage.

15) Access. Where vent pipes pass through attics, a working space not less than 24 inches in diameter and 36 inches high must be provided.

16) Identification. Each vent pipe must be identified with a label reading “Radon Reduction System” on each floor and in attics even if located in a concealed space.

17) Power source. An electrical circuit terminated in an approved box must be installed in the attic adjacent the vent pipe.



IDENTIFICATION LABELS

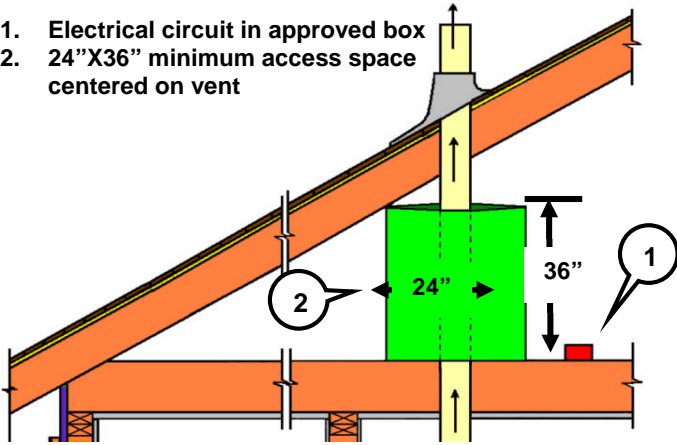


MONITORING SYSTEMS

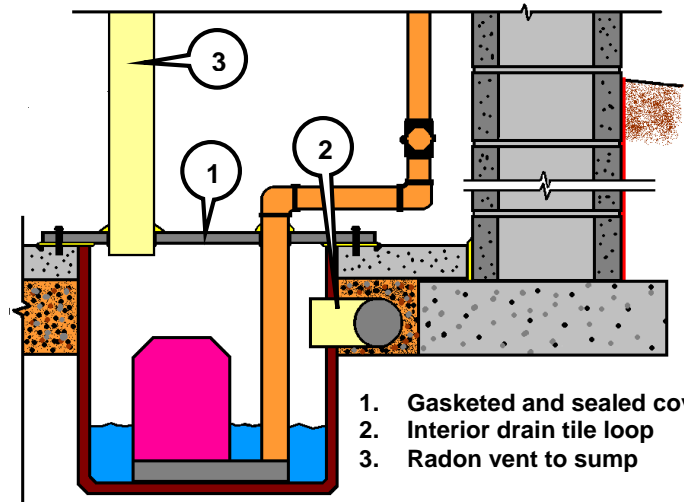


ACCESS TO FUTURE FAN LOCATION REQUIRED

1. Electrical circuit in approved box
2. 24"X36" minimum access space centered on vent



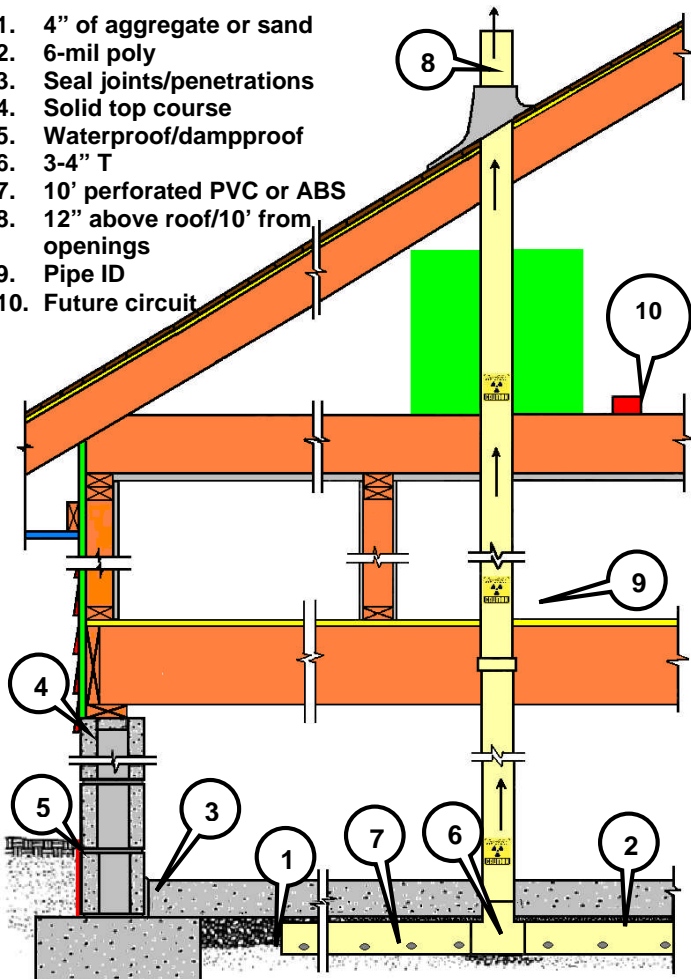
SUMPS



1. Gasketed and sealed cover
2. Interior drain tile loop
3. Radon vent to sump

PASSIVE SYSTEM (Minimum Required)

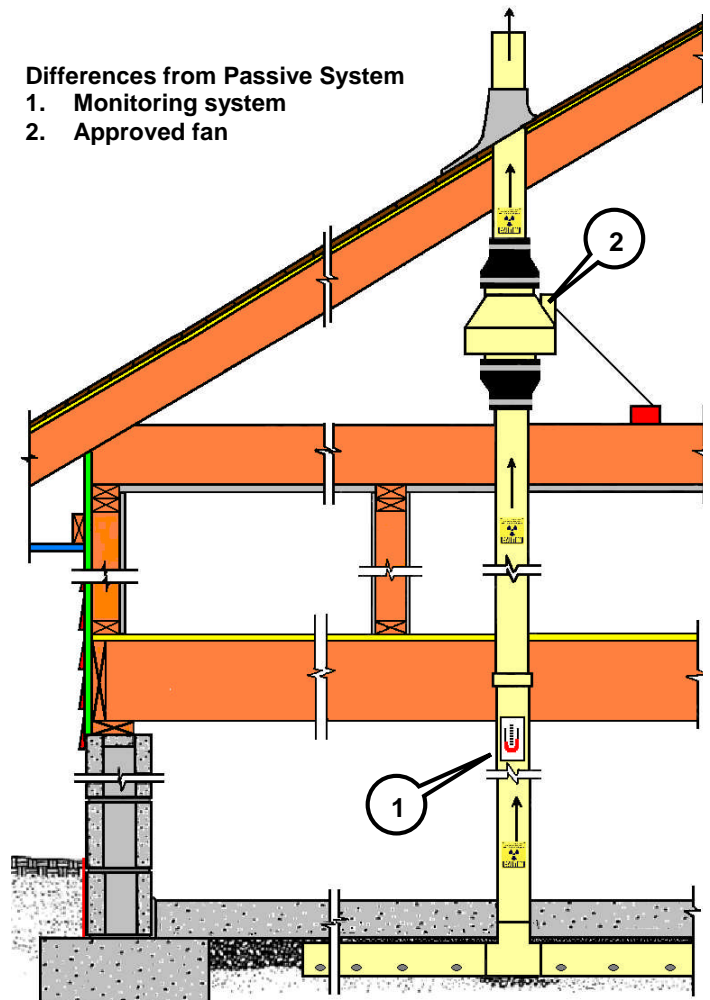
1. 4" of aggregate or sand
2. 6-mil poly
3. Seal joints/penetrations
4. Solid top course
5. Waterproof/dampproof
6. 3-4" T
7. 10' perforated PVC or ABS
8. 12" above roof/10' from openings
9. Pipe ID
10. Future circuit



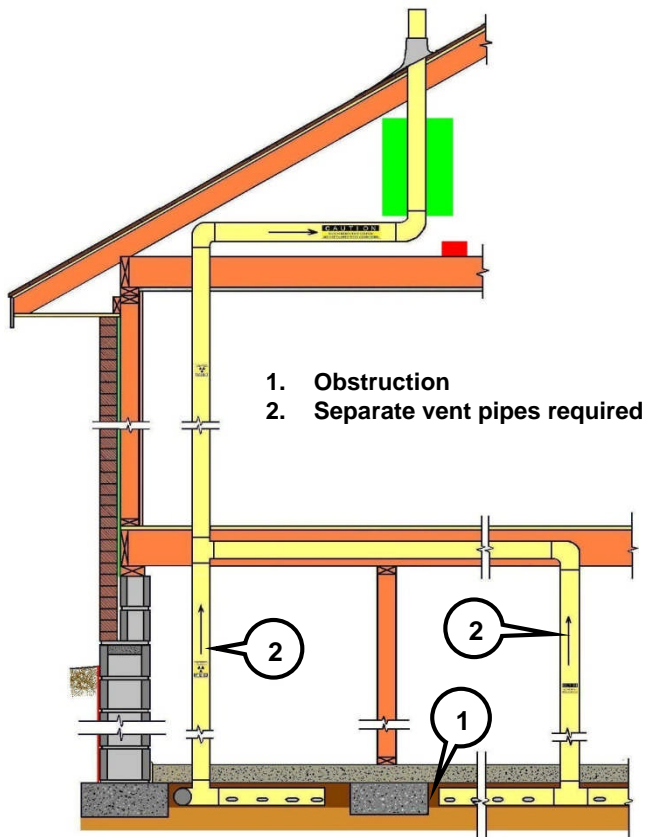
ACTIVE SYSTEM

Differences from Passive System

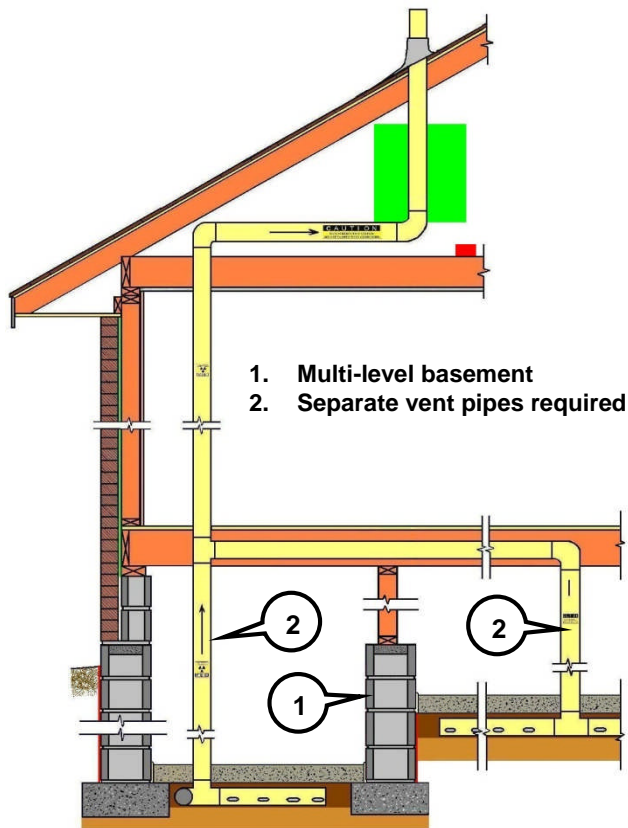
1. Monitoring system
2. Approved fan



OBSTRUCTED SUB-SLAB AGGREGATE



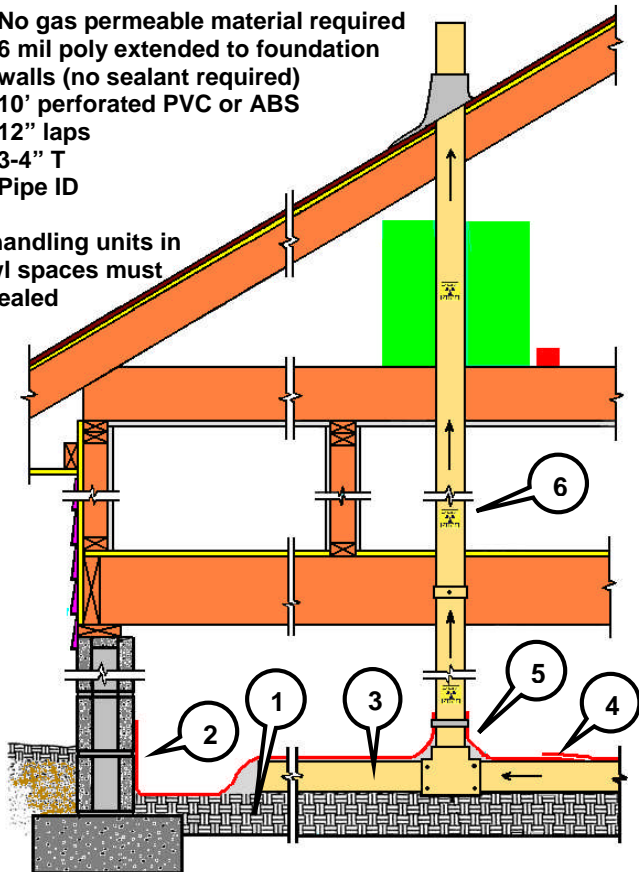
MULTI-LEVEL BASEMENTS



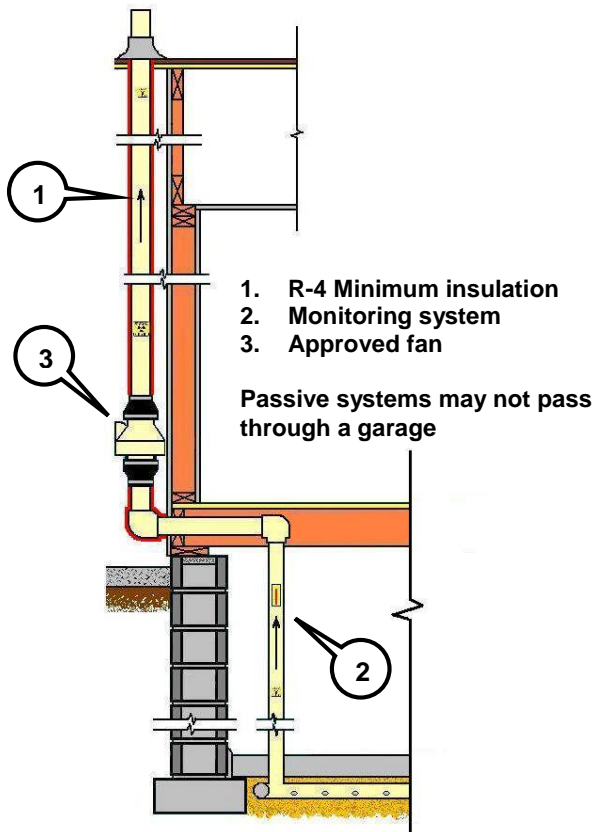
CONDITIONED CRAWL SPACES

1. No gas permeable material required
2. 6 mil poly extended to foundation walls (no sealant required)
3. 10' perforated PVC or ABS
4. 12" laps
5. 3-4" T
6. Pipe ID

Air handling units in crawl spaces must be sealed



ACTIVE SYSTEM THRU GARAGE



Q & A

Q. How do I measure the working space?

A. There must be a clear working space 24 inches wide by 36 inches high centered on the vent. The dimensions are measured between framing members. Insulation should not encroach into the working space.

Q. How close must the vent be to the attic access?

A. There is no minimum distance specified in the code however access cannot be obstructed by roof designs. For ease of future fan installation, it is recommended that the vent be located as close to the attic access as practicable.

Q. Must the **passive** vent be insulated where it passes through an attic?

A. No. The code does not require the vent be insulated when it passes through an attic.

Q. Who must install the sub-slab depressurization system?

A. The code is silent on who must install the system. The rules are part of the Minnesota State Building Code. The person obtaining the building permit is responsible for compliance and correction orders for violations will be directed to the permit holder.

Q. Must I install an outlet adjacent the vent pipe access?

A. The code only requires that an electrical circuit be provided that terminates in an approved box. It doesn't require an outlet.

Q. How close must the power source be to the vent pipe?

A. The code only states that an electrical circuit in an approved box be installed at the anticipated location of the vent pipe fan. We suggest that the box be within three feet of the anticipated location.

Q. Must I seal the soil gas retarder at laps or where it contacts footings or penetrations?

A. No. The code only requires that the retarder cover the entire floor area and be lapped at least 12 inches.

Q. If I use sand and a geotextile drainage mat, must I still use a soil gas retarder?

A. Yes. The geotextile drainage mat does not take the place of the soil gas retarder.

Q. Can I install the vent pipe through the garage or in an exterior wall?

A. No. The vent must extend through the floors of the dwelling and be in conditioned space. Exterior walls and garages are not conditioned space by definition.

Q. Is there no way to install the vent through the garage or an exterior wall?

A. The code permits active systems to be installed in exterior walls and garages. This means a fan and monitoring system must be installed and the vent must be insulated to a minimum of R-4.

Q. Is there a limit on how far a vent can run horizontally or how many elbows can be used?

A. Horizontal piping and elbows should be avoided if possible for the passive vent to work most effectively but there are no limitations on the length of horizontal runs or elbows.

Q. What pitch is required on horizontal runs?

A. The code only requires that horizontal sections provide positive drainage to the ground beneath the slab. There is no minimum pitch specified.

Q. Where should the pipe identification be located?

A. The vent must be identified on each floor including basements and attics. This includes where the vent may be concealed behind wall finishes. It is suggested that the identification be located at eye level in exposed locations and approximately two feet above the floor in concealed locations.

Q. Can I install the vent into the sump or drain tile?

A. Yes. The vent can be installed into a T that is inserted into an interior drain tile loop or into a sump. Sump lids must be designed to accommodate the vent pipe and be gasketed or sealed to the sump basket.

Q. Must I caulk control joints?

A. The code requires that control joints, isolation joints, construction joints, and joints between slabs and foundation walls be sealed with a caulk or sealant. We believe this applies only when the joint goes completely through the slab. If joints are saw cut or if strips are installed that penetrate only an inch or so into the slab, we don't believe the code intends these areas be caulked. The stated purpose of the soil gas retarder is to bridge any future cracks that may develop in the slab.

Q. How do I treat the basement floor opening around a tub drain?

A. While the code requires that the area be filled with a polyurethane caulk, we believe this is not practical in many situations. An acceptable alternate would be to seal the area with a section of 6-mil poly. Contact points should be caulked or sealed to the floor.

Q. In some cities, I am permitted to do things that you say aren't permitted. How come?

A. We try to enforce the rules as they are written. But, some portions are subject to interpretation. If anyone disagrees with the way a rule is enforced, they should discuss the matter with the Building Safety Division. If you are proposing to install a radon system that differs with what the rules require, you must submit drawings and supporting documentation with your building plans for review and approval **before** you undertake that design in the field.

Q. Where can I get more information about radon rules?

A. Additional information regarding radon systems can be found on the web site of the Builders Association of Minnesota (<http://www.bamn.org/>) or from the Minnesota Department of Labor and Industry (<http://www.doli.state.mn.us/CCLD/EnergyConservation.asp>).