

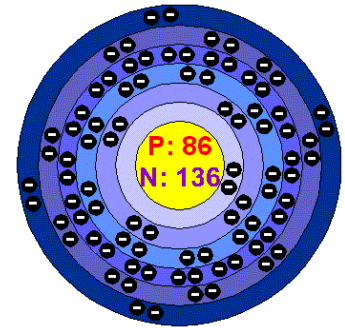
Radon Mitigation and Emerging Technologies



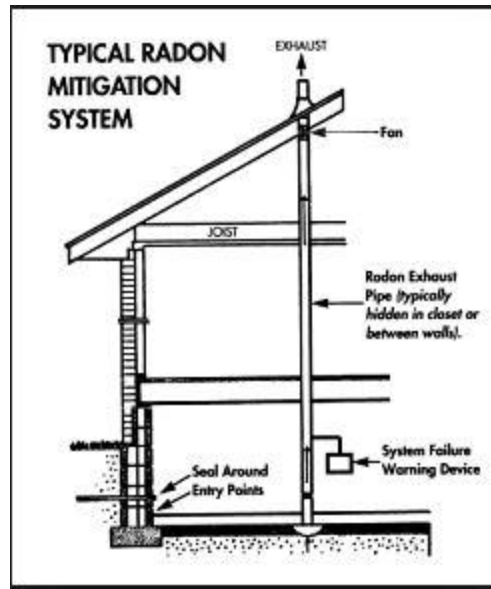
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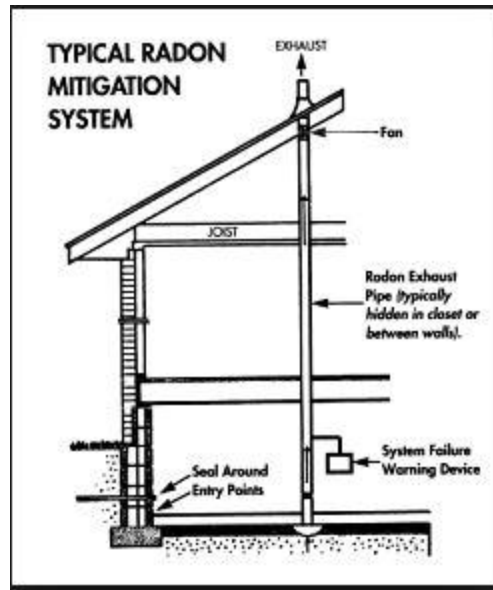


SSDS



- Sub slab depressurisation systems installed in many thousands of US homes
- Most popular system in US and Canada
- Reduces radon at source
- Recommended by HC

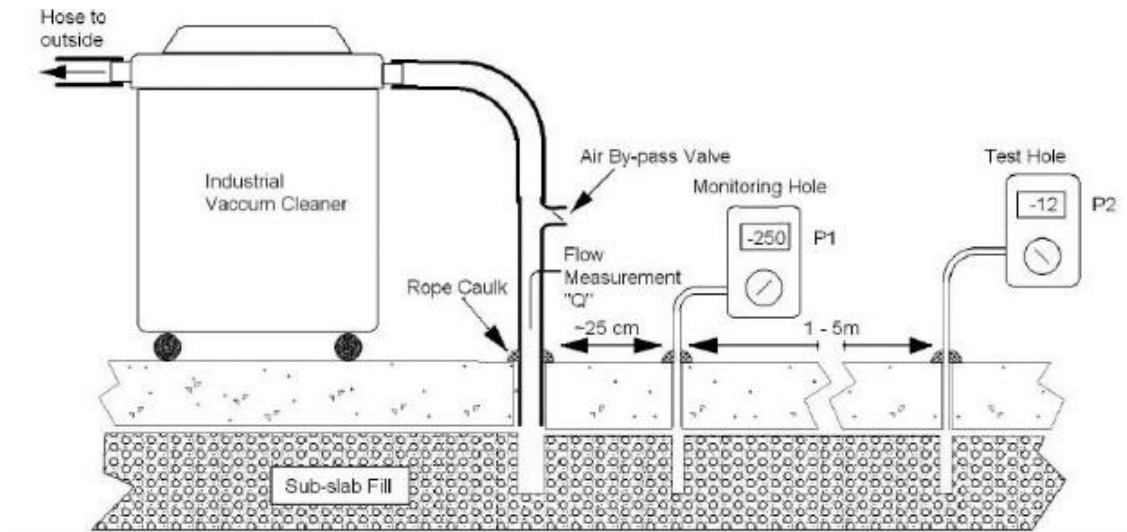
What's the Problem with SSDS?



- Needs “good communication” to be effective
- Continuous fan operation after installation
- Large building may require multiple installations and suction points
- Large open plan areas may require suction points in inappropriate locations

How to verify potential of SSDS?

- **Pressure field extension test (communication test)**
- **Suction applied to test hole with vacuum cleaner**
- **Pressure change measured at various distance from suction point**



Barriers to SSDS?

- **Poor communication**
– slab on clay
or sandy soil
with no coarse
fill



Barriers to SSDS?

- **Bare rock walls in basement**



Barriers to SSDS?

- **In-slab ductwork**



Barriers to SSDS?

- **In-slab heating system**



Barriers to SSDS?

- **High Quality Floor Finishes**



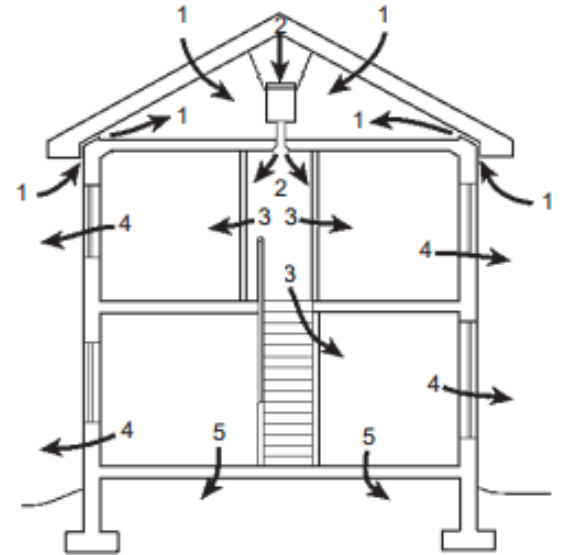
Barriers to SSDS?

- **Longevity?**
- **Potential for particulate to block system over time**
- **Whatever system used wise to monitor e.g. CRM**



Alternatives to SSDS?

- **Positive pressurization**
- **#1 recommended radon reduction measure in UK for properties where 50% reduction in radon level is needed**



Alternatives to SSDS?

- **Attic or wall mounted systems**



Figure 1: Roof-located positive ventilation system



Figure 2: Wall-mounted positive ventilation system

Alternatives to SSDS?

- **Using existing forced air heating systems or HRV systems**



Additional Benefits

- **Improved indoor air quality**
- **Reduced condensation**



Case Study

- **Large Federal Building in Northern BC**
- **Health Canada long term tests showed radon levels up to 484Bq/m^3**



Case Study

Multiple cracks in floor, big gap round perimeter, sumps and drains in slab



Case Study

- Pressure testing indicated strong negative pressure in building compared with outdoors and under slab
- Pressure field extension testing showed poor communication
- Large open plan office area inconvenient for suction points installation



Case Study

- Rooftop air handling unit fans were simply reprogrammed to provide continuous fresh air
- Immediate reduction in radon levels to less than 40 Bq/m³ throughout the building
- Building owners energy manager estimated however that the additional energy costs would be approximately \$10,000 per year plus the life of the unit fans would be shortened.



Case Study

- One room particular problem with radon levels up to 3000 Bq/m³
- Small room – large perimeter gaps
- Communication test suggested SSD would be feasible in that location (just)
- SSD installed in that room



Case Study

- Initially considered adjusting the fans to operate on a timer and carry out continuous monitoring to see how long a set-back was feasible while still keeping radon levels within criteria
- New technology from France introduced to Canada in 2014 - Radostats



Case Study

- Radostats trigger the fans at 150 Bq/m³ keeping radon levels below HC criteria
- 3 weeks of testing since installation suggests that typical radon levels can be maintained at around 100 Bq/m³

Cost Comparisons (US data)

Method	Typical Radon Reduction	Typical installation costs (contractor)
Fan-based mitigation system (sub-slab depressurization)	80%-99%	\$800-2,500
Drain-tile suction with a fan	90%-99%	\$800-1,700
Block-wall suction with a fan	50%-99%	\$1,500-3,000
Sump hole suction with a fan	90%-99%	\$800-2,500
Caulking of radon entry routes	0%-50%	\$100-600
Basement pressurization	50%-99%	\$500-1,500

Conclusions

- Radon control by positive pressurization can be effective in many instances
- Particularly suitable for:
 - newer homes which are more airtight
 - commercial or civic buildings
- Typical installation costs likely to be significantly less than SSD, especially if forced air system is already installed

Questions?

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