



## SOIL GAS VENTING SYSTEM FOR LOW-RISE CONSTRUCTION

Peace of Mind from the Ground Up™



## TECHNICAL MANUAL AND INSTALLATION METHODS GUIDE



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## Section A: General Information

IT IS IMPORTANT TO READ AND UNDERSTAND THIS GUIDE. IT CONTAINS INFORMATION TO HELP MAINTAIN SAFETY AND PREVENT PROBLEMS.

Improper installation or use of RadonX<sup>TM</sup> can result in radon gas leak, personal injury and/or property damage. It is important to be aware of and recognize safety alert messages as they appear in this manual.

The types of safety alert messages are described below.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid personal injury or death.

### **WARNING**

**"WARNING"** Indicates a hazardous situation which, if not avoided, could result in severe injury or death.

### **CAUTION**

**"CAUTION"** Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

### **NOTICE**

**"NOTICE"** Indicates a hazardous situation which, if not avoided, could result in system failure and property damage.

**"NOTE"** signifies special instructions which are important but are not related to hazards.

## RadonX Safety Alerts

### **⚠ WARNING**

NEVER use or test RadonX with compressed air or other compressed gases.

**Use of compressed air or gas in RadonX pipe and fittings can result in explosive failures and cause severe injury or death.**



### **⚠ WARNING**

Follow all preparation and installation procedures.

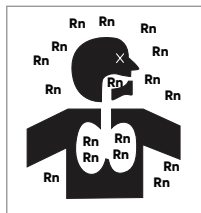
### **NOTICE**

READ & UNDERSTAND the instruction manual and safety messages before installing a RadonX soil gas venting piping system.

### **⚠ WARNING**

Long term exposure to radon gas can cause lung cancer.

Test for indoor radon levels. If measured radon gas concentrations exceed the Canadian guideline level, contact a mitigation professional certified by C-NRPP, National Radon Proficiency Program.



### **⚠ WARNING**

For ease of identification, RadonX pipe and fittings are grey in colour with yellow markings and warning labels. DO NOT ALTER or DISCONNECT any of these components.

### **⚠ WARNING**

RadonX is a PVC piping system to be used in soil gas depressurization systems to reduce indoor radon concentrations. Once the building is occupied, continued radon concentration measurements shall be performed. Consult the C-NRPP, National Radon Proficiency Program at [c-nrpp.ca](http://c-nrpp.ca) for details as to frequency and guidelines to follow.

## Supplemental information – DO'S and DON'TS

### CAUTION

Refer to the contents of this guide for complete instructions and guidelines.

### DO'S

- Follow recommended safe work practices
- Always adhere to local jobsite and work place safety regulations
- Contact Local Building Officials about restrictions and installation inspection in your area
- Keep pipe and fittings clean and in original packaging until needed
- If pipe and fittings are stored outdoors, cover with a well ventilated white tarp and never store other products on top of pipe
- Follow handling and storage procedures found in this guide
- Only use tools on RadonX pipe and fittings as described in this guide
- Cut the pipe ends squarely
- Deburr and bevel the pipe end with a chamfering tool before solvent welding
- Slowly rotate the pipe a quarter turn when inserting pipe in fitting socket when solvent welding
- Follow RadonX recommended set times found in this guide before commissioning the vent system
- Avoid puddling of solvent cement in fittings and pipe
- Ensure excess solvent cement and primer does not run inside pipe and fittings
- Check all joints for proper joint construction
- Allow for movement due to expansion and contraction
- If a radon fan is installed with RadonX pipe and fittings, read fan manufacturer's installation instructions carefully and install product accordingly

### DON'TS

- DO NOT mix pipe, fitting or joining methods from different manufacturers
- DO NOT use RadonX pipe and fittings for any application other than soil gas venting
- DO NOT use or install perforated RadonX gas collection pipe above ground
- DO NOT use or install access tee fittings with RadonX vent pipe
- DO NOT terminate passive vent stacks with a side-wall discharge near ground level
- DO NOT solvent weld pipe to fans directly
- DO NOT solvent weld rain cap to pipe directly
- DO NOT use solvents or cements other than what is required by this guide
- DO NOT install adhesive tape in direct contact with RadonX product
- DO NOT use solvent cement that has exceeded its shelf life or has become discoloured or jelled
- DO NOT use solvent cement near sources of heat or open flame, or when smoking
- DO NOT subject vent system to compressed air
- DO NOT cut pipe with dull or broken cutting-tool blades
- DO NOT use ratchet cutters or reciprocating saw to cut pipe
- DO NOT use RadonX product that's been stored unprotected outdoors and is faded in colour
- DO NOT allow threaded rod to come in contact with the pipe; for example, threaded rods used to connect pipe hangers

## Product Application

RadonX™ Soil Gas Venting (SGV) Piping System is intended to vent soil gases and help reduce indoor radon concentrations in low-rise construction. RadonX pipe and fittings satisfy the general requirements of the National Building Code 2015 and non-combustible construction."

### NOTICE

RadonX is a combustible piping system and as such will be subjected to all conditions and limitations of the Building Code for above-ground use in Non-Combustible (commercial) buildings. For further information, contact IPEX.

## Limits of Use and Application

- (a) RadonX does not treat or cure lung cancer.

### ⚠ WARNING

RadonX is a PVC piping system to be used in soil gas depressurization systems to reduce indoor radon concentrations. Once the building is occupied, continued radon concentration measurements shall be performed. Consult the C-NRPP, National Radon Proficiency Program at c-nrpp.ca for details as to frequency and guidelines to follow. If measured radon gas concentrations exceed the Canadian guideline level, contact a mitigation professional certified by a C-NRPP.

- (b) All RadonX soil gas venting pipe and fittings must be carefully examined for possible damage prior to installation. Any damaged product must be replaced. No attempt at repairs are to be made at the job site.
- (c) Soil gas venting application will cause the piping system to expand and contract accordingly. Proper care must be taken to allow for this movement through walls, ceilings, and roof penetrations. The venting system must be supported in accordance with these instructions.
- (d) Use RadonX cement and System 636® primer to assemble RadonX soil gas venting systems.

### NOTICE

Follow IPEX solvent welding procedures as shown in this guide, and check for proper joint construction when joining pipe to fittings.

### ⚠ WARNING

DO NOT use RadonX in applications other than soil gas venting. These can result in unsafe conditions.

- (e) Venting should be as direct as possible with a minimum number of fittings.
- (f) Horizontal runs should be minimized.
- (g) All horizontal sections of the venting system must be installed with a slope not less than 1% down towards the riser in order to collect condensate and remove condensate generated inside the line. The removal of condensate will help reduce the possibility of ice buildup and blockage.
- (h) All framing requirements for floor and ceiling penetrations shall be in accordance with the local building code and/or the local regulatory authority. All penetrations of fire rated floors and walls in multi-unit residential shall be firestopped as described in the Firestop section of this guide.
- (i) Roof penetrations should be sealed with a plumbing roof boot or equivalent flashing as per the local building code, or as permitted by the local regulatory authority.
- (j) If spray foam insulation comes in contact with RadonX, it is recommended that foam be applied in a maximum layer thickness of 50mm (2 inches) until the required thickness of insulation is achieved.
- (k) Do not use or install perforated RadonX pipe above ground.
- (l) All RadonX piping system in unconditioned space shall be insulated as described in the Above Grade RadonX piping system installation section of this guide.
- (M) RadonX vent pipe system is not approved for use in air plenums or buildings classified as high-buildings.

### ⚠ WARNING

DO NOT mix pipe, fittings or joining methods from different manufacturers as they have different joint systems and adhesives. This can result in unsafe conditions and cause radon gas leak.



## Technical Specification Summary Sheet

**General** – RadonX<sup>TM</sup> soil gas venting, engineered by IPEX Inc., is a complete Schedule 40 PVC piping system that addresses the need for venting soil gases from low-rise dwellings. When installed properly, RadonX can help reduce indoor radon concentrations. RadonX offers a full range of vent pipes, gas collection pipes, fittings and solvent cement.

**Materials** – RadonX PVC pipes and fittings are manufactured from compounds that comply with the material requirements of CSA B181.2 "PVC Drain, Waste and Vent Pipe and Pipe Fittings".

**Compliance to Standards** – RadonX pipe and fittings comply to all material and testing requirements of CSA B181.2 and ASTM D2665. RadonX piping system complies to gas leakage, pull out, torque and combustibility test requirements of ULC S636.

RadonX vent pipe and fittings are listed by ULC to the standard CAN/ULC S102.2 and clearly marked with the certification logo indicating a Flame Spread Rating not exceeding 25.

**Code compatibility** – RadonX pipe and fittings satisfy the requirements of provincial and National Building Code 2015.

**Dimensions** – RadonX pipe and fittings are offered in 4" Schedule 40 size and meet the dimensional requirements of CSA B181.2 and ASTM D2665.

**Markings** – In accordance with CGSB/CAN 149.11 and CGSB/CAN 149.12, each length of RadonX pipe is tagged with a warning label. All RadonX fittings are tagged with a warning label against the risk of radon gas leak if system is not installed as per IPEX installation instructions. All RadonX pipe and fittings include identification markers to indicate size, material description, product application, complying standards, date of production and manufacturer's name or trademark. The pipe will consist of two yellow print-lines located 180 degrees apart. All warning labels are in yellow. All product markings are bilingual.

**Cements** – RadonX solvent cement meets the performance requirements of ASTM D2564. PVC cement is in yellow colour and should be only used with RadonX soil gas venting systems.

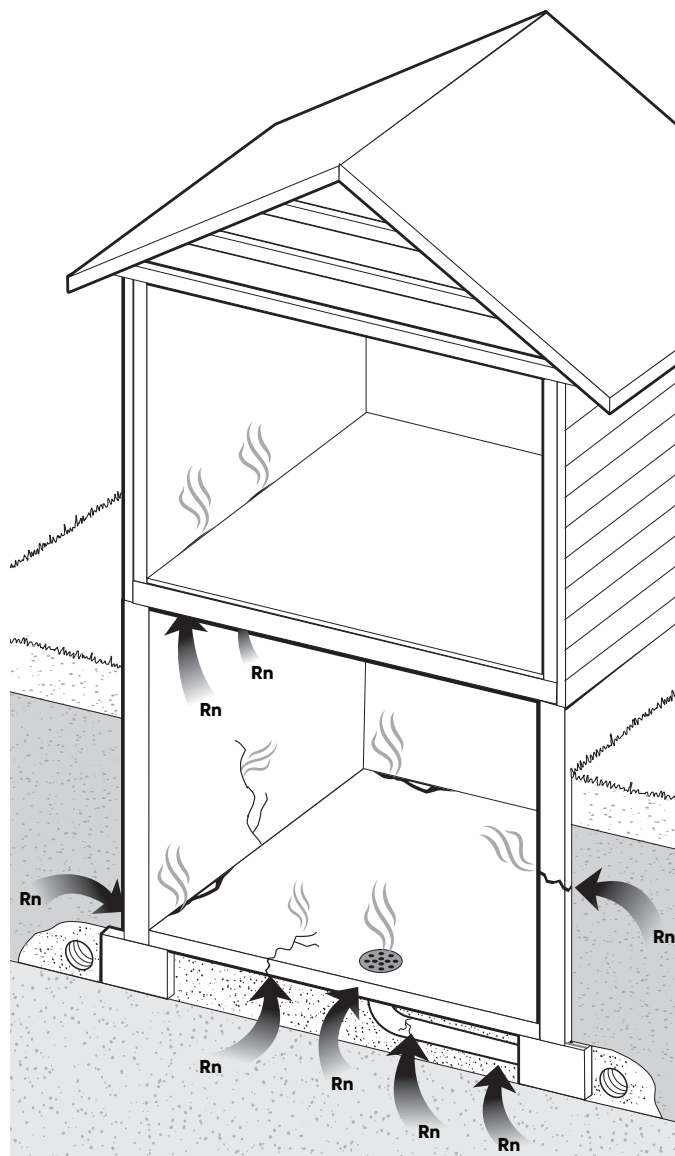
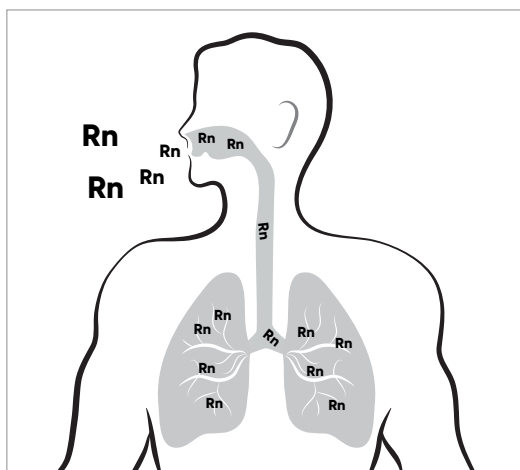
**Installation** – RadonX pipe and fittings are designed and tested as a system by IPEX Inc. Mixing of pipe, fittings or joining methods from different manufacturers is not allowed as they have different joint systems and adhesives. These can result in unsafe conditions and cause radon gas leaks. RadonX pipe and fittings must NOT be used for any applications other than soil gas venting.



## Soil Gas Venting Basics:

### What is Radon?

Radon is a colourless, odorless gas that occurs naturally from the decay of uranium, a natural radioactive material found in all soil and rock. As radon breaks down, it forms radioactive particles that can get lodged into our lungs as we breathe. The energy released by radon particles can damage lung cells creating lung cancer. Not everyone exposed to radon gas will develop lung cancer, and the time between exposure and the onset of the disease could take many years. This is why radon gas is known as a silent killer. According to Health Canada, Radon is the second leading cause of lung cancer after smoking. More than 3000 people die from radon-induced lung cancer every year. For more information on radon, visit [takeactiononradon.ca](http://takeactiononradon.ca).



Radon gas can accumulate to dangerous levels inside a home or building and become a risk to human health. It can enter the building through openings in contact with soil such as cracks in foundation walls/floor slabs and gaps around service pipes and floor sumps etc. Similar to other gases, it can diffuse through materials including concrete slabs.

## Does Radon Gas exist in all buildings?

Almost all buildings in Canada have some amount of radon gas. However, radon concentrations vary from province to province and from house to house as many factors affect the final indoor levels. Soil characteristics, construction type, foundation condition, and the use of exhaust fans, appliances and windows that affect the pressure difference between the soil and the house are the most critical factors. There are no guidelines which address building site characterization for radon risk. This is due to the fact that the level of radon in a completed home or building cannot be predicted prior to construction. Therefore, the only way to know for sure is via testing after construction. Radon concentrations can vary significantly from hour to hour and day to day, therefore long-term measurements are recommended while determining radon levels. Radon test kits can be purchased online at [takeactiononradon.ca](http://takeactiononradon.ca) or be found at many hardware and building supply stores across Canada. If the measured radon concentrations exceed the Canadian guideline level, Health Canada and National Building Code require that homeowners take action to reduce the levels. More information on the most current acceptable radon gas levels can be found at [canada.ca/en/health-canada/services/health-risks-safety/radiation](http://canada.ca/en/health-canada/services/health-risks-safety/radiation).

## How can Radon gas levels be reduced with RadonX soil gas venting?

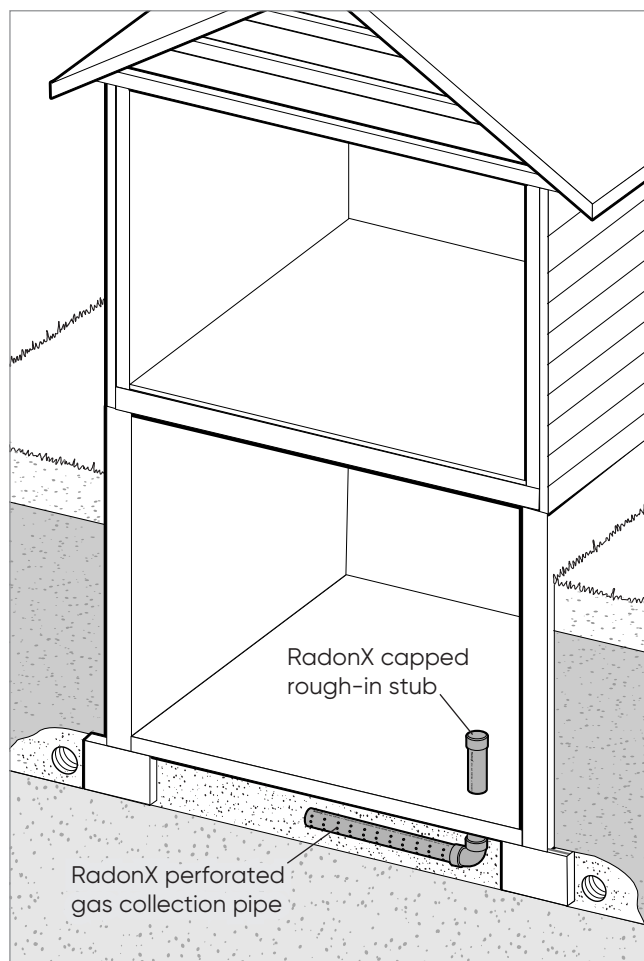
The most common and effective radon reduction method is called sub-slab depressurization. This involves installing a pipe through the foundation floor slab that draws the radon gas from below the home and releases it into the outdoors where it is quickly diluted.

### In new construction:

In new construction, there are three installation methods of soil gas vent piping: **Level-1** (radon rough-in), **Level-2** (full passive stack) and **Level-3** (active stack).

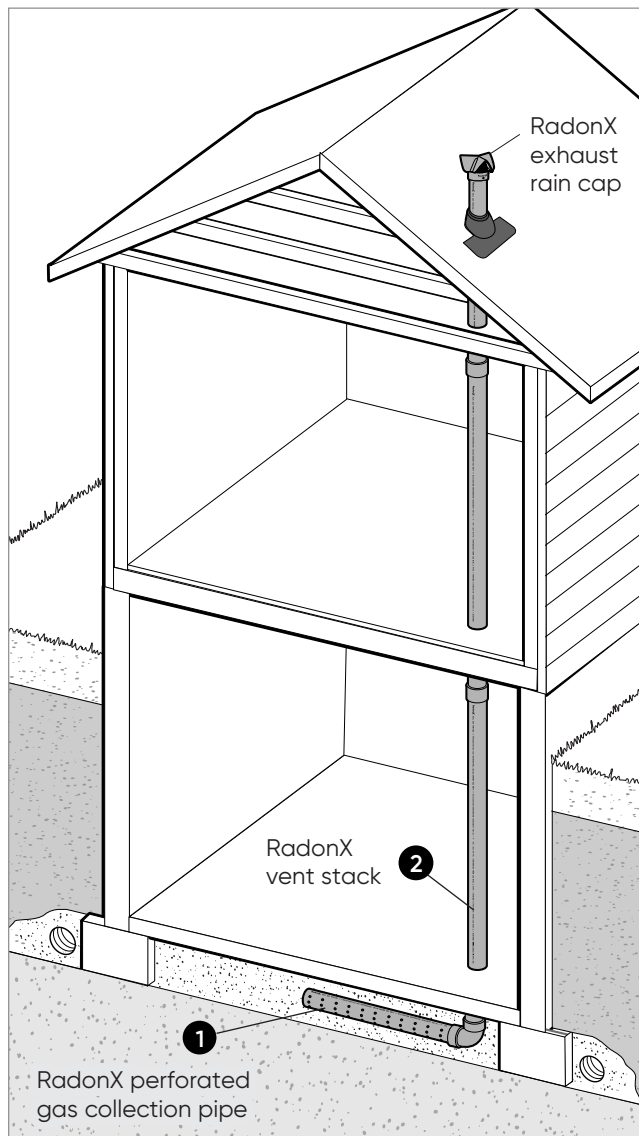
Figure 1:

**Level-1: Radon rough-In**



Level-1, capped rough-in stub is not a complete radon reduction system. It only allows the future addition of a full passive or active system if the home tests high for radon after occupancy.

Figure 2:  
**Level-2: Full passive stack**



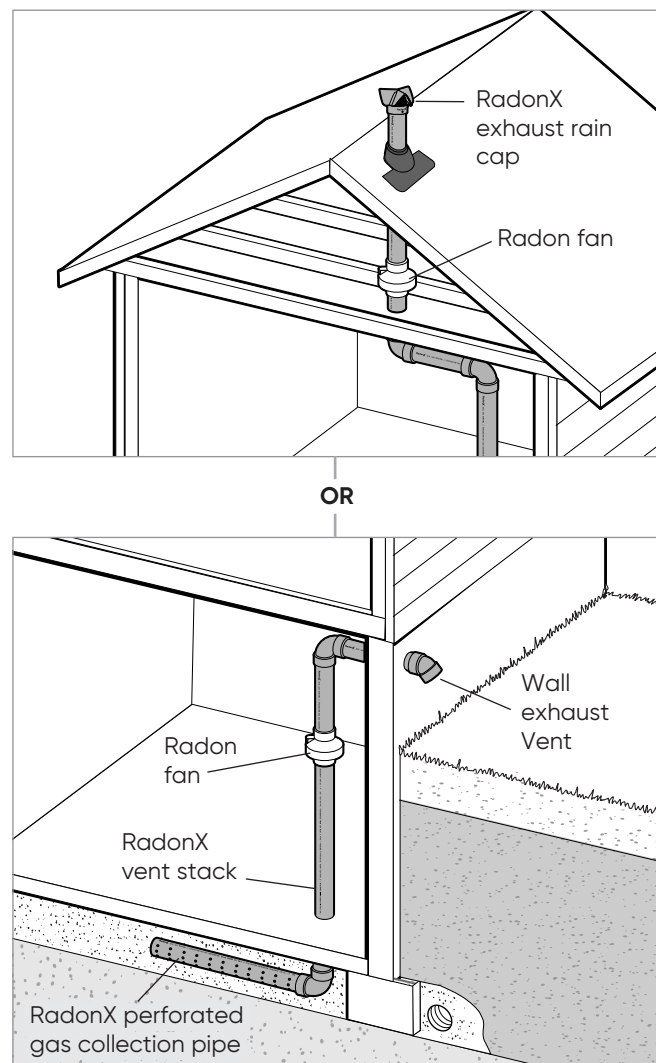
Indoor radon levels can be reduced by installing a full passive vent stack (Level-2) that consists of

- ① a perforated pipe below the foundation floor that collects radon gas; and
- ② a full vent stack that runs upwards throughout the inside of the building releasing the gas outside above the roof.

In the majority of cases, the combination of ① and ② is sufficient to lower radon levels to acceptable limits within the house. It is more practical and economical to install a passive stack during construction of a new building. In order to reduce the health risks of radon gas, IPEX recommends that all new low-rise buildings should have a full passive stack.

If radon levels are still above Health Canada's recommended concentrations with a passive stack, further reduction can be achieved by installing a radon fan (see Figure 3) to the vent stack converting the depressurization system into an active one (Level-3).

Figure 3:  
**Level-3: Active stack**

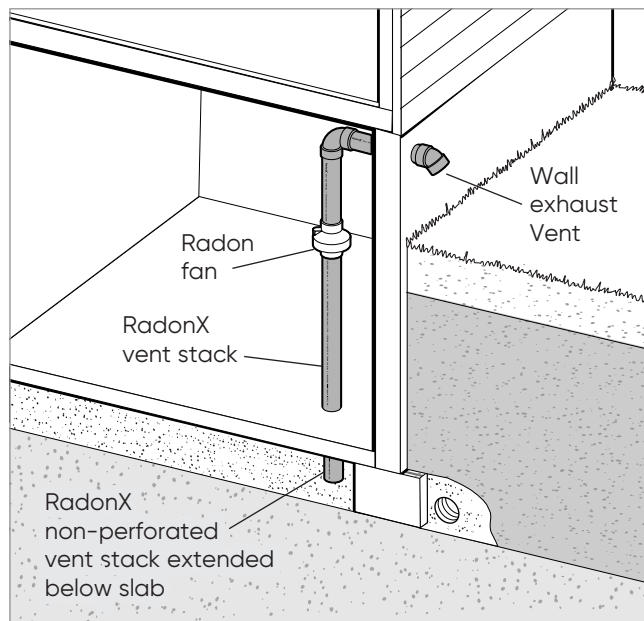


Many municipalities are being proactive in requiring a full vent stack (Level-2) for new buildings to protect against potentially harmful radon levels and have dedicated radon programs for new construction. As a minimum, it is very critical to install the sub-slab pipe and radon rough-in stub (Level-1) as per the National Building Code 2015 requirements in the event that future radon mitigation is required.

### In existing buildings:

Since it is not practical to install a sub-slab pipe and/or a full vertical stack after occupancy, the majority of retrofit applications for soil gas venting are completed with a radon fan where the piping system is terminated on a side wall (see Figure 4). These installations are critical as there are too many factors affecting the overall efficiency such as the suction point location in the basement, sealing of the cut openings and code approved terminations. IPEX recommends that all retrofit applications for existing buildings should be carried out by a professional who is certified under the Canadian National Radon Proficiency Program (C-NRPP). Please visit [c-nrpp.ca](http://c-nrpp.ca) for more information.

Figure 4:  
Typical full active soil depressurization system for existing buildings



## Section B: Technical Manual

### Material Description:

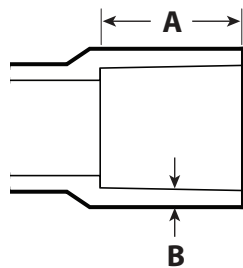
RadonX Soil Gas Venting (SGV) pipe and fittings are made of solid Polyvinyl chloride (PVC) to Schedule 40 thickness. PVC is the most frequently specified of all thermoplastic piping materials and has been used successfully since the 1940s in many pressure and non-pressure piping applications. PVC is characterized

by distinctive physical properties and is resistant to corrosion and chemical attack by acids, alkalis, salt solutions and many other chemicals.

### Product Key Dimensions and Weight:

The physical dimensions and tolerances of RadonX SGV pipe and fittings meet the requirements of CSA B181.2 and ASTM D2665. They are made to Schedule 40 thickness and available in 100mm (4 in.) nominal pipe size.

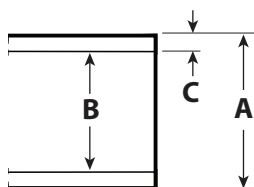
TABLE 1. RADONX SGV FITTINGS DIMENSIONS AND WEIGHT



Product Code	Product Description	Socket Type	Nominal Pipe Size (in.)	A Min. Socket Depth (in.)	B Min. Body Wall Thickness (in.)	Fitting Weight (lbs)
286084	Tee Wye	HxHxH	4	1.75	0.25	2.51
286124	90° Elbow	HxH				1.76
286244	45° Elbow	HxH				1.12
286254	22 ½° Elbow	HxH				0.64
286354	Coupling	HxH				0.73
286414	Cap	H				0.64
286715	Rain Cap	H		1.50	0.15	0.94

NOTE: Rain cap is not made to Schedule 40 thickness. It is a roof termination accessory that is mechanically fastened.

TABLE 2. RADONX SGV PIPE DIMENSIONS AND WEIGHT

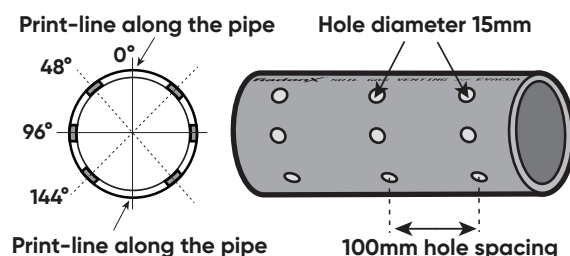


Product Code	Product Description	Application Type	Nominal Pipe Size (in.)	A Nominal Pipe Size (in.)	B Avg. Inside Diameter (in.)	C Min. Wall Thickness (in.)	Pipe Weight (lb/ft)
181008	Gas collection pipe	Perforated: Below ground	4	4.50	3.95	0.24	2.0
181004	Vent pipe	Non-perforated: Above ground	4	4.50	3.95	0.24	2.1

NOTE: RadonX gas collection pipe as well as vent pipe are coextruded and made in 10ft lengths without bell-ends.

RadonX gas collection pipe has a unique perforation pattern featuring 6 evenly cut holes with a diameter of 15mm every 100mm of pipe (see Figure 5). Compared to non-perforated or standard perforated sewer pipe, the perforation pattern in RadonX gas collection pipe has been proven to increase the airflow in the vent stack resulting in more soil gas movement in the sub-slab area as per research testing conducted at the National Research Council of Canada (NRC).

Figure 5:  
RadonX Gas Collection Pipe – Perforation Details



## Visual Identification:

There are some differences in appearance between RadonX and other standard drainage and plumbing products. RadonX gas collection and vent pipes are grey in colour and have a continuous dual (180 degree apart) print-line that is yellow in colour for ease of identification. As part of the marking requirements of CAN/CGSB 149.11 and CAN/CGSB 149.12, RadonX pipes are tagged with a yellow warning label every 1.8m (6ft). In addition, all RadonX fittings are tagged with a yellow warning label highlighting the risk of a radon gas leak if the system is not installed as per IPEX installation instructions. The images below show the position of the warning labels and close-up information printed on the labels. All product markings are bilingual.

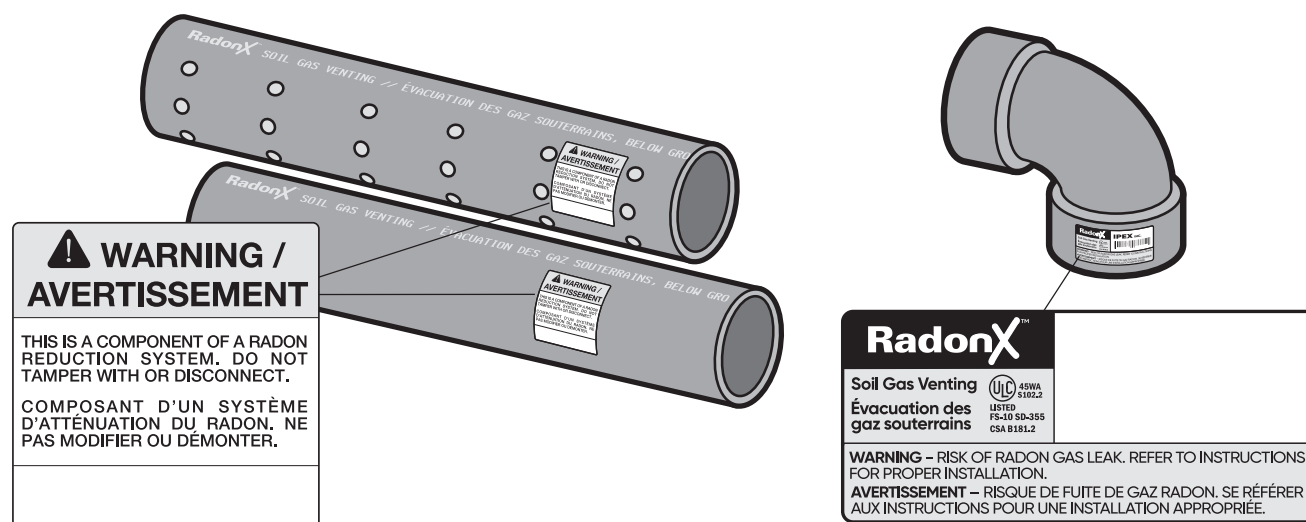


Figure 6:  
RadonX Product Colour Identification

Description	Colour
Pipe and fittings	Grey
Pipe print-line (dual)	Yellow
Pipe labels	Yellow
Fitting labels	Yellow
Solvent Cement	Yellow

## Radon Gas Diffusion Properties of RadonX:

Radon diffusion through pipe material can demonstrate how likely radon gas can diffuse through the wall of the pipe and into the buildings. This could be even more critical in basements where radon enriched gas is trapped in capped rough-in pipe stubs installed for longer durations (Level-1, see Figure 1, in the section "Soil Gas Venting Basics" of this manual). The likelihood of this occurring would depend on radon diffusion coefficient and thickness of the pipe material. The radon diffusion coefficient  $D$  ( $m^2/s$ ) is a material property that would vary in every PVC formulation. The higher the radon diffusion coefficient, the more radon that would diffuse into the surroundings. Radon resistance (defined by Jiranek and Svoboda, 2017) is a more accurate way of evaluating the effectiveness of a material in

reducing or preventing radon entry, especially for materials of varying thicknesses. Based on the test results performed by the National Research Council of Canada (NRC), for Schedule 40 thickness, the 4" RadonX pipe material has a radon resistance value of  $6.46 \times 10^9$  (s/m). This level is considered by NRC to be suitable for venting soil gas containing radon with negligible risk of radon diffusing through the wall of the piping system.

TABLE 3. RADON GAS DIFFUSION PROPERTIES OF RADONX PIPE

Description	Value
Radon diffusion coefficient - $D$ ( $m^2/s$ )	$6.02 \times 10^{-12}$
Radon resistance - $R_{Rn}$ (s/m)	$6.46 \times 10^9$

## Thermal Conductivity and Condensation Potential:

The coefficient of thermal conductivity of RadonX material is 1.2 BTU·in/(ft<sup>2</sup>·hr·°F). The high thermal resistance and Schedule 40 thickness of RadonX greatly reduce the potential of condensation (also known as pipe sweating) forming on the surface of the pipe.

However, condensation could still form under certain conditions. To calculate condensation potential, the following parameters must be known: soil gas temperature, indoor air temperature, design relative humidity and insulation thickness (if any). Using these input variables, both the pipe surface temperature and the Dew Point temperature can be calculated. Should the pipe surface temperature exceed the Dew Point temperature, condensation will not occur. For reference

purposes, see below tables of pipe surface temperatures for RadonX for a given set of relative humidities, soil gas temperature, ambient air temperature and the resulting Dew Point temperature. Should the pipe surface temperature be at or below the Dew Point temperature, condensation will occur.

Based on these tables, in order to reduce surface condensation, IPEX recommends homeowners to control relative humidity levels indoors.

## Temperature Considerations:

The temperature of soil gas inside a piping system typically changes between 10–20°C (50–68°F) throughout the year depending on the season and dwelling location. For continuous flow non-pressure applications, RadonX pipe and fittings can be safely used up to 60°C (140°F).

TABLE 4. CONDENSATION POTENTIAL OF 4" SCHEDULE 40 RADONX PIPE

Soil Gas Temperature (°C)	10											
Relative Humidity	50%			60%			70%			80%		
Indoor Air Temperature (°C)	18.3	21.1	23.9	18.3	21.1	23.9	18.3	21.1	23.9	18.3	21.1	23.9
Condensation Forming (Y/N)	N	N	N	N	N	N	N	Y	Y	Y	Y	Y

Soil Gas Temperature (°C)	15											
Relative Humidity	50%			60%			70%			80%		
Indoor Air Temperature (°C)	18.3	21.1	23.9	18.3	21.1	23.9	18.3	21.1	23.9	18.3	21.1	23.9
Condensation Forming (Y/N)	N	N	N	N	N	N	N	N	N	N	Y	Y

Soil Gas Temperature (°C)	20											
Relative Humidity	50%			60%			70%			80%		
Indoor Air Temperature (°C)	18.3	21.1	23.9	18.3	21.1	23.9	18.3	21.1	23.9	18.3	21.1	23.9
Condensation Forming (Y/N)	N	N	N	N	N	N	N	N	N	N	N	N



## Thermal Expansion:

As with all construction materials, RadonX piping undergoes expansion and contraction when subjected to changes in temperature. It is worthy to note that RadonX, due to the inherent properties of PVC, would have a much lower (40%) rate of expansion-contraction than commonly used plastic ABS DWV pipe.

The tables below show expansion values applicable to RadonX. The linear expansion is shown for numerous temperature changes ( $\Delta T$ ) versus various straight-length runs of pipe. In a typical 12m (40ft) RadonX installation, considering a maximum  $\Delta T$  of 10°C (20°F) in soil gas, the linear expansion ( $\Delta L$ ) due to thermal expansion and contraction would be 6.5mm (0.29in).

TABLE 5. RADONX LINEAR EXPANSION ( $\Delta L$ ) IN INCHES

Temp. Change ( $\Delta T^{\circ}F$ )	Length of Run in feet				
	10	20	30	40	50
10	0.04	0.07	0.11	0.14	0.18
20	0.07	0.14	0.22	0.29	0.36
30	0.11	0.22	0.32	0.43	0.54
40	0.14	0.29	0.43	0.58	0.72
50	0.18	0.36	0.54	0.72	0.90
60	0.22	0.43	0.65	0.86	1.08
70	0.25	0.50	0.76	1.01	1.26
80	0.29	0.58	0.86	1.15	1.44

TABLE 6. RADONX LINEAR EXPANSION ( $\Delta L$ ) IN MM

Temp. Change ( $\Delta T^{\circ}C$ )	Length of Run in meters				
	3	6	9	12	15
5	0.8	1.6	2.4	3.2	4.1
10	1.6	3.2	4.9	6.5	8.1
15	2.4	4.9	7.3	9.7	12.2
20	3.2	6.5	9.7	13.0	16.2
25	4.1	8.1	12.2	16.2	20.3
30	4.9	9.7	14.6	19.4	24.3
35	5.7	11.3	17.0	22.7	28.4
40	6.5	13.0	19.4	25.9	32.4

## Impact Strength and Pipe Stiffness:

The impact strength of a material is a measure of its ability to absorb impact energy without failure. Pipe that is resistant to impact is not easily damaged or broken, trimming material costs at the jobsite. The CSA B181.2 standard requires 4" Schedule40 PVC pipe to withstand the following minimum impacts: 240 Joules at 23°C and 135 Joules at 0°C.

RadonX gas collection and vent pipes meet the minimum CSA requirement for pipe stiffness of 1700 kPa, which helps it to resist soil loads and other external stresses.

## Flame Spread and Smoke Developed Classification:

RadonX vent pipe and fittings achieve a Flame Spread Rating of not greater than 25 and meet the general requirements of non-combustible construction. ITS (Warnock Hersey) conducted the testing in accordance with CAN/ULC S102.2 test standard. The following table summarizes the results of these tests.

Component	Flame Spread Rating	Smoke-Developed Classification
RadonX™		
Vent pipe	10	>50
Fittings	15	>50

## Compliance to Standards:

While there is no dedicated piping standard for the application of soil gas venting, RadonX is tested to and complies with the following standards:

	Standards	RadonX™
Tolerances and dimensions	CSA B181.2; ASTM D2665	✓
All material and testing requirements	CSA B181.2; ASTM D2665	✓
Gas venting system performance tests -Gas leakage -Pull-out -Torque -Combustibility	ULC S636	✓
Cement	ASTM D2564	✓
Product Markings	CGSB/CAN 149.11; CGSB/CAN 149.12	✓
Flame Spread Rating not exceeding 25	CAN/ULC S102.2	✓



## Section C: Installation Methods Guide

### General:

- A. Examine all components for possible damage prior to installation.
- B. Proper joint assembly is essential for a safe installation. Follow these instructions exactly as written. Check the integrity of joints to be leak proof upon completion of assembly.
- C. This venting system must be free to expand and contract. This venting system must be supported in accordance with these instructions.
- D. Check for proper joint construction when joining pipe to fittings.
- E. Check for unrestricted vent movement through walls, ceilings, and roof penetrations.

- F. DO NOT use RadonX in other piping applications such as drain, waste and vent (DWV) and flue gas venting (FGV).
- G. PRODUCT INSTALLATION AND SOLVENT WELD TRAINING IS RECOMMENDED.

### ⚠ WARNING

RadonX pipe, fittings and cements are designed and tested as a system and must be installed as such. Only products approved by IPEX as part of the RadonX soil gas venting system must be used. DO NOT mix pipe, fittings or joining methods from different manufacturers. This can result in unsafe conditions and cause radon gas leak.

## Below Grade (Sub-slab) RadonX Piping System Installation:

### In New Construction:

A soil gas collection system shall be provided under all concrete slabs within the building footprint. Soil gas collection system consists of a gas permeable layer, which is clean coarse gravel and a RadonX perforated soil gas collection pipe.

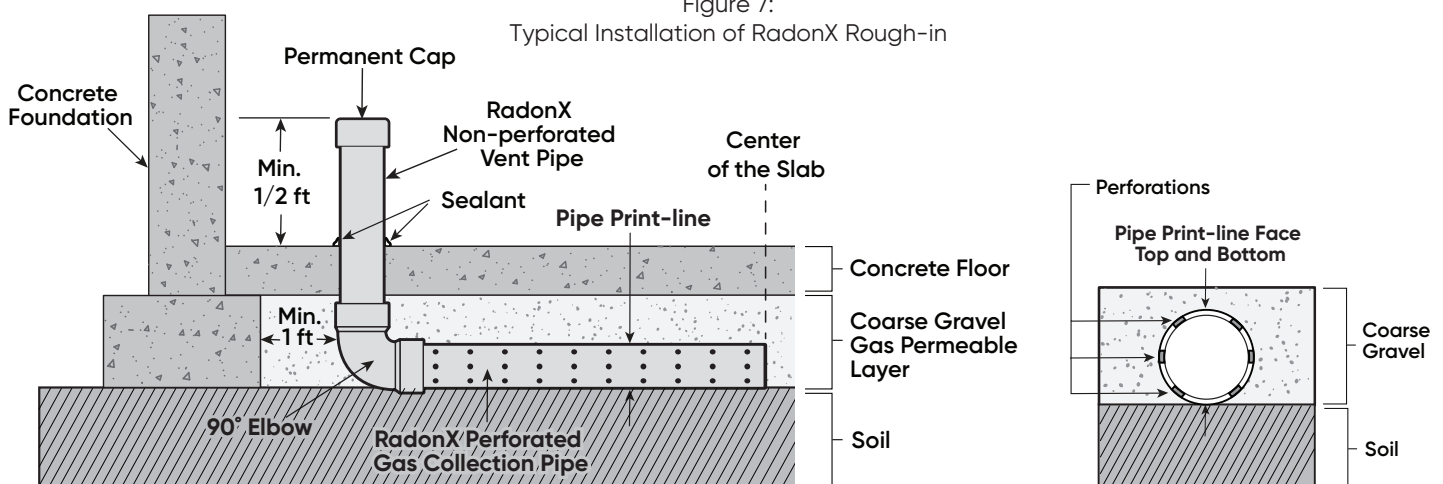
### NOTICE

An efficient gas permeable layer permits radon reduction system to withdraw soil gas from the entire sub-slab area. Typical void ratios in the gas permeable layer are in the range of 35-40% as per ASTM E1465.

- (a) RadonX perforated soil gas collection pipe shall extend into the gas-permeable layer (see Figure 7) and be located near or be oriented in the direction of the centre of dwelling with the print-line displaying on top. Other sub-slab gas collection pipe configurations and recommendations are shown in the section "Alternative Sub-slab Design Considerations" of this installation guide.
- (b) Clean granular material must be used as gas permeable layer on the undisturbed soil to a depth not less than 100mm (4") and aggregate must contain no more than 10% of material that will pass a 4mm (5/32") sieve. The final depth of the gas permeable layer should be determined as per the local building code.

Figure 7:

Typical Installation of RadonX Rough-in



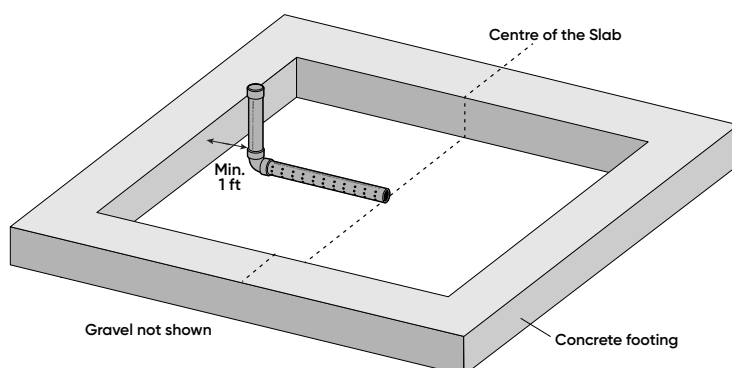
- (c) For every 46m<sup>2</sup> of the building footprint, a minimum of 3m (10ft) of RadonX perforated gas collection pipe shall be used in the sub-slab area.

### **⚠ CAUTION**

RadonX perforated soil gas collection pipe must only be used in below ground installations. DO NOT use perforated pipe for above ground installations.

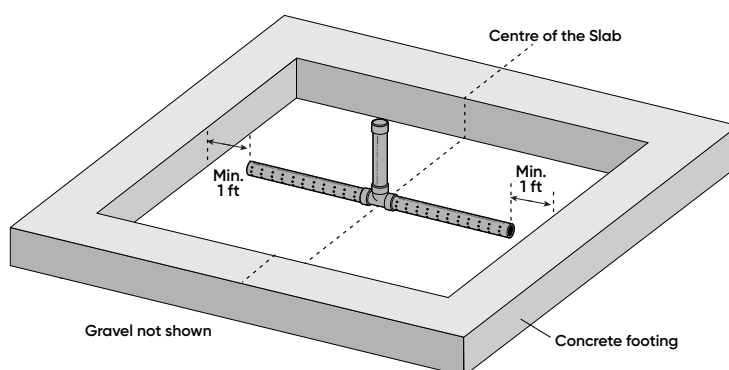
- (d) Each dwelling shall be provided with a separate riser and soil gas collection system.
- (e) RadonX perforated gas collection pipe must be placed on soil with the print-line displaying on top.
- (f) All RadonX pipe installed below ground must have at least 1% slope towards the end of the pipe so that any unwanted condensation can drain properly without any pooling.
- (g) Horizontal runs of utility pipe and conduit within the gas permeable layer shall not interfere with RadonX perforated gas collection pipe and should preferably be installed lower than the RadonX perforated gas collection pipe.
- (h) Perimeter drainage pipe around the footings must be installed lower than the RadonX perforated gas collection pipe.
- (i) RadonX perforated gas collection pipe shall not be obstructed below slab (e.g. strip footings). If continuous obstruction(s) exists, install piping through footing to ensure communication between two sub-slab areas (see Figure 12).
- (j) RadonX perforated gas collection pipe shall be connected to the riser with a RadonX 90° elbow.
- (k) The 90° RadonX elbow shall be installed at least 30cm (1ft) away from the concrete footings (see Figure 8).

**Figure 8:**  
RadonX sub-slab piping when the riser is not at the centre



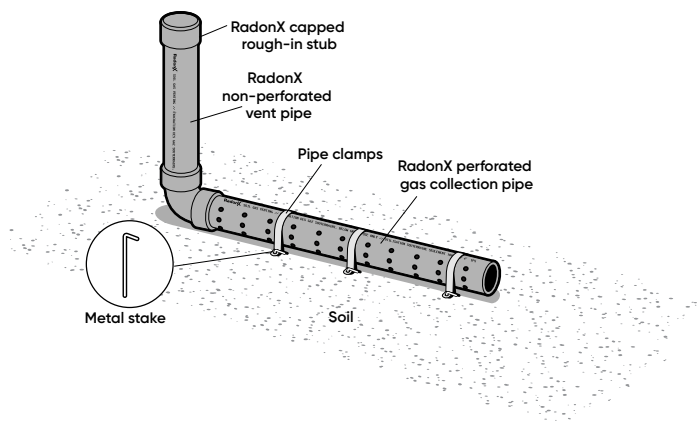
- (l) The riser acting as a suction point shall be made of non-perforated RadonX vent pipe and shall not be less than 15cm (1/2 ft) above the finished floor slab (see Figure 7).
- (m) If the riser is not located close to the concrete footing, instead of using a 90° elbow, a RadonX tee-wye fitting can be installed to connect two perforated gas collection pipes within one sub-slab area (see Figure 9).

**Figure 9:**  
Acceptable RadonX sub-slab piping when the riser is at the centre



- (n) A RadonX permanent cap shall be solvent welded onto the riser before pouring concrete.
- (o) The RadonX pipe joints on the concrete floor shall be sealed using a compatible sealant as required by the local building code.
- (p) To avoid leaning of riser during concrete pour, use 4" pipe clamps with two holes (Product codes: 077822 or 077264).
- (q) Using standard metal stakes on each hole, position clamps on a level dirt surface to secure RadonX perforated soil gas collection pipe onto ground (see Figure 10), as required. Clamps must be placed carefully not to interfere with perforations.

**Figure 10:**  
Typical pipe clamp installation



## Alternative Sub-slab Design Considerations:

Extending RadonX perforated gas collection pipe beyond 3m (10ft) of length in the sub-slab area could improve the effectiveness of soil gas venting. Increased airflow in the RadonX vent stack, a more evenly distributed sub-slab suction and reduced risk of clogging during service are some of the benefits. The extension of RadonX perforated gas collection pipe below ground could be more critical to create a better stack effect in soil gas piping systems. Therefore, IPEX recommends installing a pipe loop design around the perimeter of the footings (see Figure 11).

If a building's sub-slab area is divided by a strip footing, one riser could be used to possibly interconnect the two gas permeable layers (see Figure 12).

Figure 11:  
Alternative RadonX gas collection pipe loop in the sub-slab area

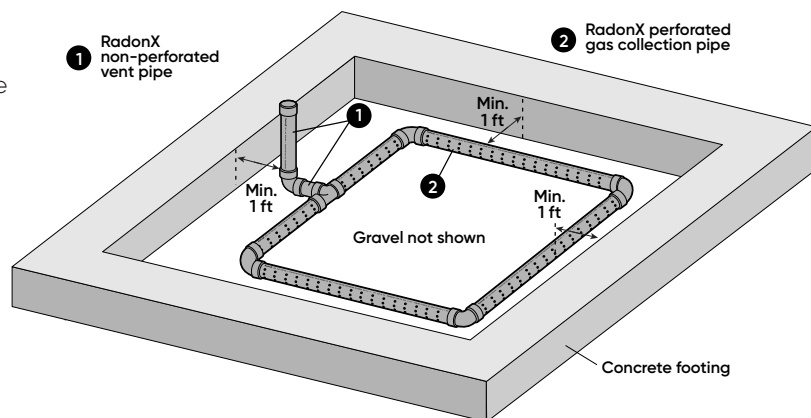
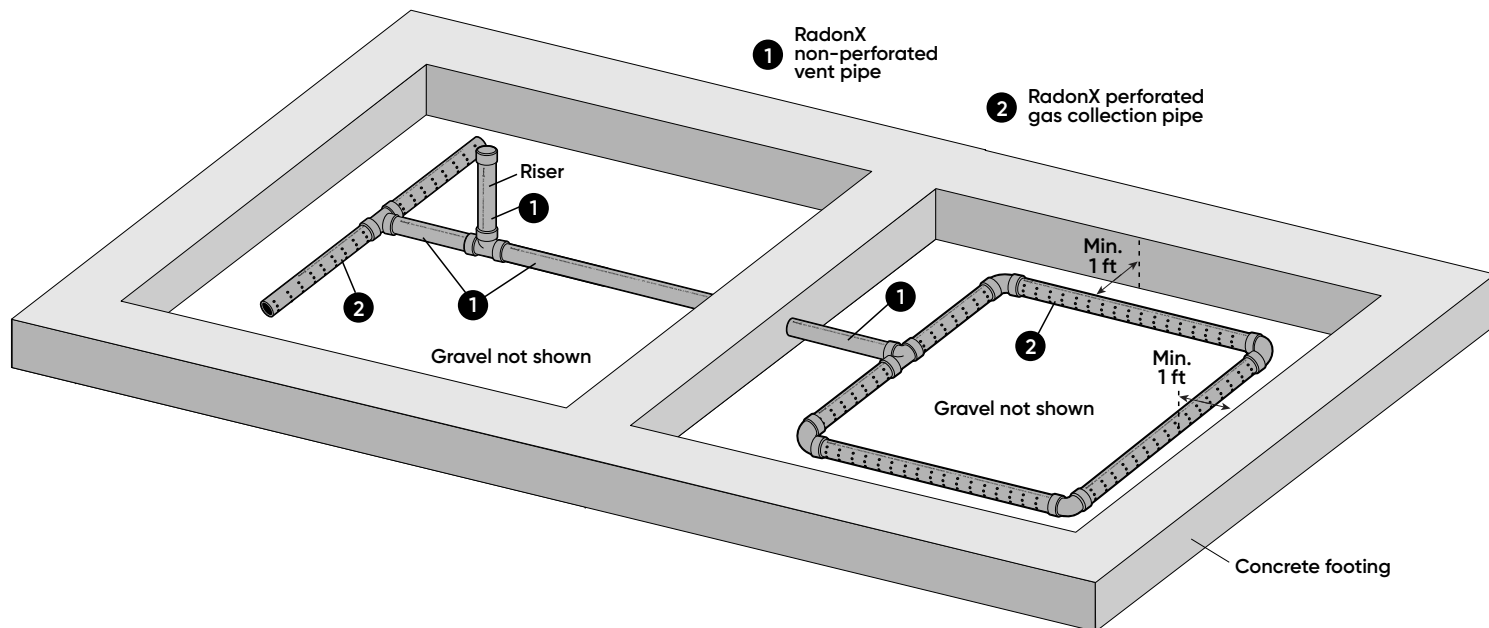


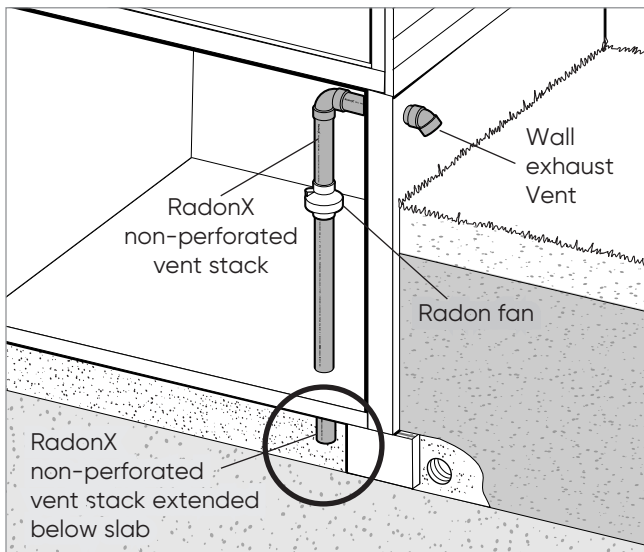
Figure 12:  
Connecting two gas permeable layers



## In Existing Construction:

It is not practical to install a complete RadonX soil gas venting system that includes a sub-slab pipe and/or a full vertical stack after occupancy. Therefore, the majority of the retrofit applications for soil gas venting can be completed with a RadonX non-perforated vent pipe and a radon fan where the piping system is terminated on a side wall. In this scenario, the existing concrete floor should be drilled in order to penetrate the RadonX vent pipe 5cm (2") below the slab (see Figure 4 from the previous section that is also reproduced below).

**Figure 4:**  
Typical full active soil depressurization system for existing buildings



Drilling of the subfloor must be done very carefully considering other utility pipe and radiant heating systems. In addition, a "pressure field extension test" (e.g. communication test) should be performed to determine the number of suction points, location of suction points and the fan size needed for an effective system. Therefore, IPEX recommends that all retrofit applications for existing buildings should be carried out by a professional who is certified under the Canadian National Radon Proficiency Program (C-NRPP). Please visit [c-nrpp.ca](http://c-nrpp.ca) for more information.

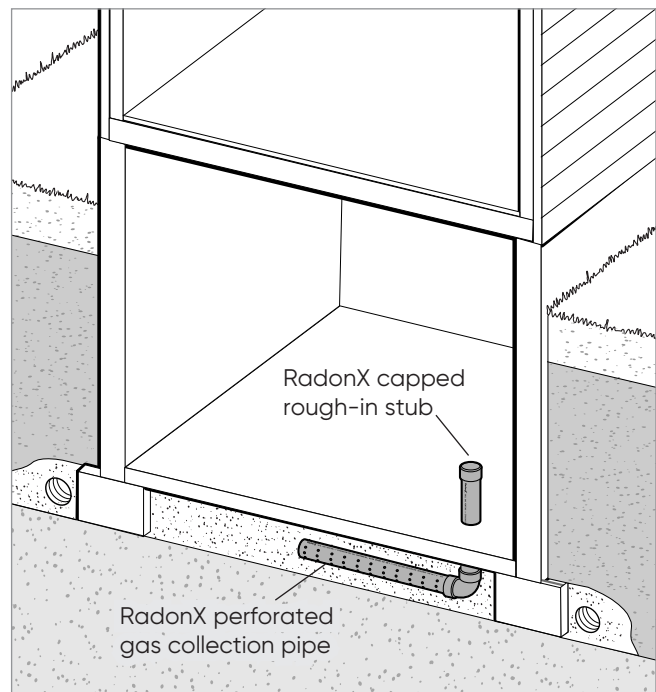
## NOTICE

Due to the complexity of retrofit piping installations for soil gas venting, all retrofit RadonX piping installations in existing buildings should be carried out by a professional who is certified under the Canadian National Radon Proficiency Program (C-NRPP).

## Above Grade RadonX Piping System Installation:

- RadonX capped rough-in (Level-1), as seen in Figure 1 from the previous section that is also reproduced below, shall be extended vertically and terminated outdoors depending on the level of mitigation (Level-2 or Level-3).
- Wherever possible, RadonX vent pipe shall be installed in vertical direction. If necessary, horizontal offsets in the vertical stack can be made with RadonX 22 ½° elbow fittings.
- Horizontal runs and use of 90° elbow fittings shall be minimized.
- All horizontal runs must have at least a 1% slope towards the end of the pipe so that any unwanted condensation can drain properly without any pooling.
- The portion of the RadonX vent stack that is passing through habitable space shall be located within walls that are completely surrounded by conditioned space.
- The portion of the RadonX vent stack that is passing through unconditioned space (e.g. attics) shall be insulated as per CAN/CGSB 149.11 Section 7.2.2.4 to maintain the stack effect and to minimize condensation.

**Figure 1:**  
Capped rough-in stub for future mitigation (Level-1)



## Support and Restraint Spacing:

- (a) RadonX piping systems must be supported horizontally at a maximum of every 5 feet.
- (b) Supports to be used on RadonX pipe shall be suitable for use on plastic pipe and shall not be tightly clamped onto the pipe to allow for possible expansion contraction movement. Pipe clamps, hangers, metal strapping or equivalent shall not have sharp edges or fulcrum points, which might damage the pipe over time.
- (c) Strapping shall meet the following requirements:  
1/2" strapping - 22 gauge steel  
3/4" strapping - 28 gauge steel

Strapping or equivalent shall be fixed to supporting structure (e.g. floor joists or cross members) using typical framing nails or screws.

- (d) Changes in direction (e.g. 90° elbows) should be supported as close as practical to the RadonX fitting to avoid introducing excessive torsional stresses into the system. This is especially important for vertical 90° bends. If support is being applied to the fitting, then the fitting must be free to move during expansion and contraction of the venting system.
- (e) In order to adequately support the weight of the RadonX vertical vent pipe, a pipe anchor or support shall be installed at the first floor penetration and every second floor thereafter with a RadonX coupling installed immediately above it. Securely fasten pipe anchors or supports to the building structure. Pipe anchors or supports used for this purpose shall be suitable for use with plastic pipe. These anchors or supports shall be snugly fastened to the vent in order to support the weight of the vent, but shall not be allowed to deform or damage the vent.
- (f) Anchors or supports supporting the weight of the RadonX vertical vent shall be in addition to the required pipe straps referred to in (a), (b) and (c) above which are intended only to maintain the position of the vertical vent while allowing for expansion and contraction. Make certain that allowance for expansion and contraction is provided in all venting installations.

## Expansion and Contraction:

To accommodate expansion/contraction movement and stresses that may occur, the following guidelines are recommended during installation:

- (a) Leave adequate clearance between any RadonX elbows and walls or the underside of floor boards or joists.
- (b) Use loose fitting clamps and hangers to allow free pipe movement if required.
- (c) For critical areas such as near the radon fan, two 45° RadonX elbows may be used in lieu of one 90° RadonX elbow for more structural flexibility.

## Fire Stop:

Should RadonX pass through a fire rated floor or wall, the penetration shall be firestopped with a device or system that provides a rating equivalent to the hour rating of the floor or wall.

## RadonX Termination Options:

All RadonX soil gas vent stacks shall terminate outdoors. As shown in Figure 2 reproduced below, RadonX full passive stack (Level-2) shall be routed vertically through the roof. For Level-3 installation (see Figure 3 reproduced below), the RadonX vent pipe can also be routed through a side wall as an alternative option.

	Termination Options Allowed	Illustration
Level 2 - Full Passive Vertical Stack (without a fan)	Roof	Figure 2
Level 3 - Active Soil Gas Depressurization System (with a fan)	Sidewall or Roof	Figure 3

Figure 2:

Full passive depressurization system also known as full passive stack (Level-2)

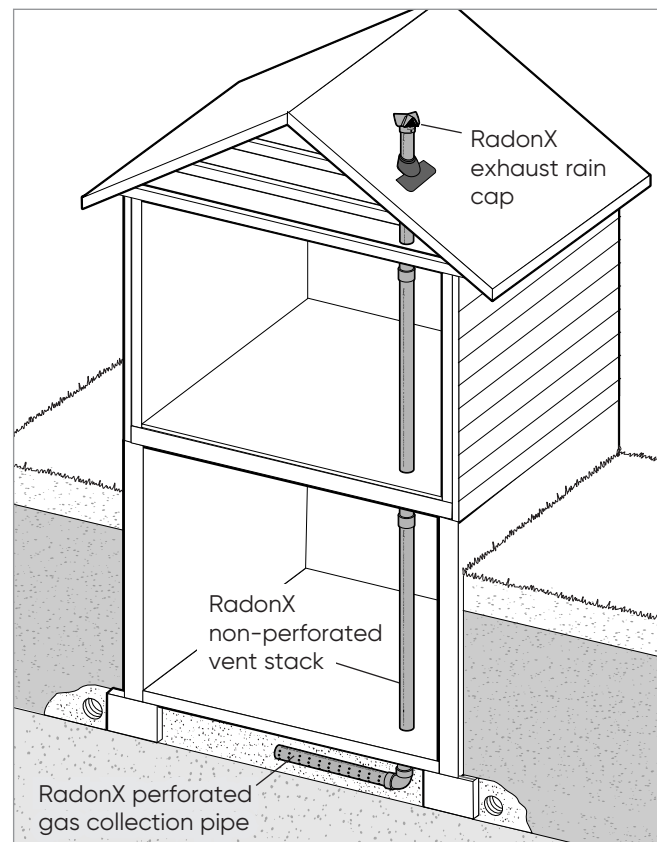
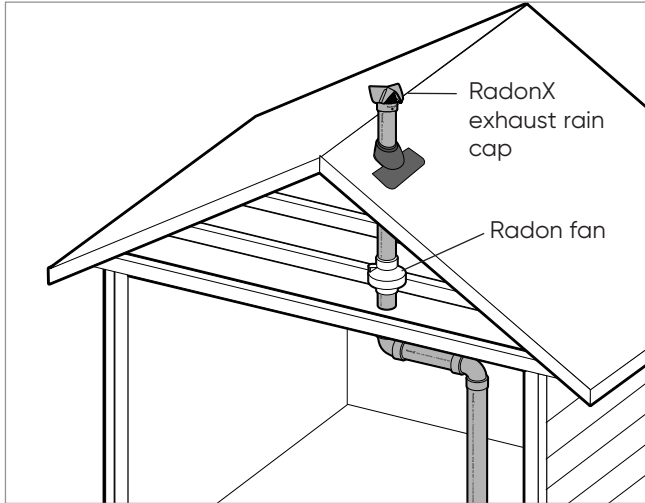
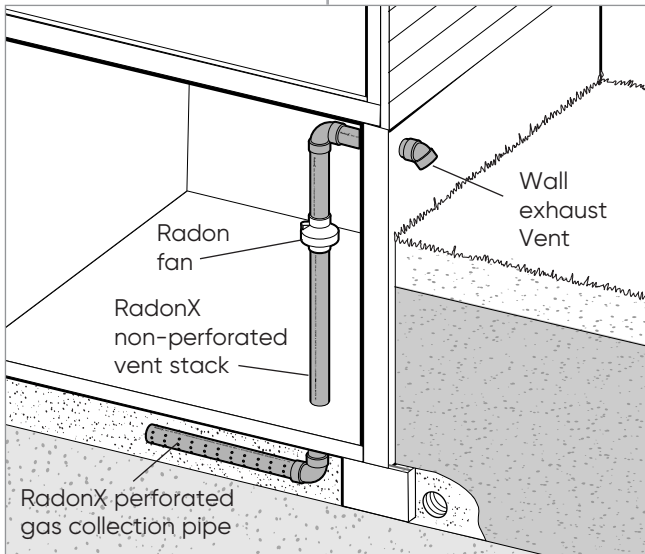


Figure 3:  
Full active depressurization system with a radon fan also known as full active stack (Level-3)



OR



Installation and location of termination must be in accordance with local building code requirements. The following recommendations are not to supersede local building code requirements.

## Roof Termination Option:

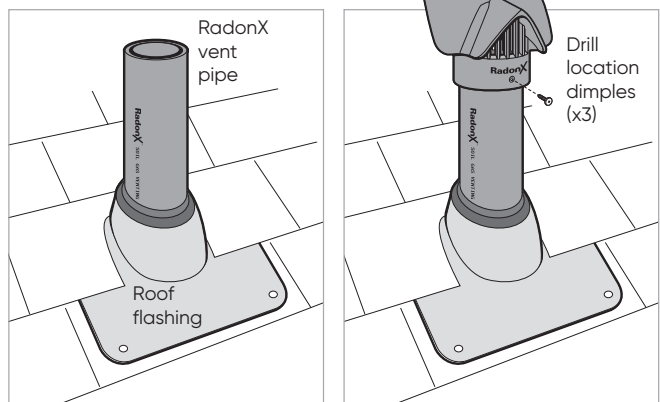
- (a) RadonX vent stack must be directed vertically above the roof.
- (b) Mechanically fasten RadonX rain cap to protect the vent stack from unwanted debris and rodents as per instructions below.

### **⚠ WARNING**

Unlike DWV systems, the majority of soil gas systems are not connected to any drainage systems. It is critical to protect RadonX piping system from debris, small animals and rain as any blockages could significantly lower the performance of the vent stack.

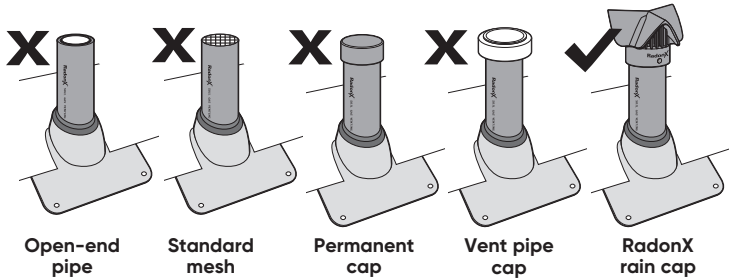
- (c) First dry fit RadonX rain cap onto the vent pipe. Locate the three drill location dimples on the outside of the rain cap. At these locations, drill through the cap and the vent pipe with standard stainless steel screws (see Figure 13). DO NOT solvent weld the Rain Cap.

Figure 13.  
Rain Cap Installation

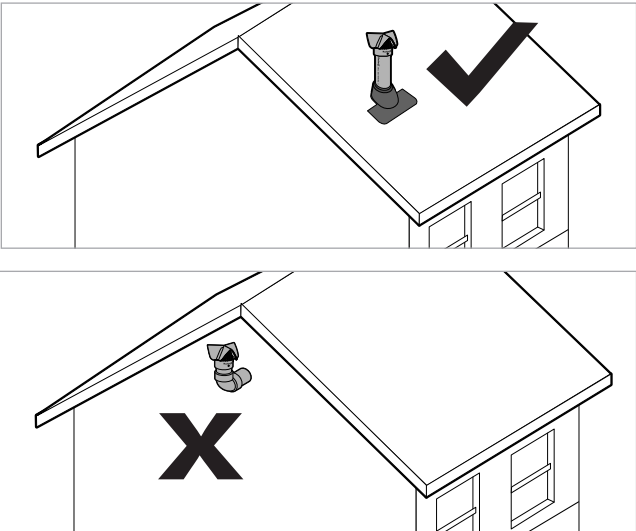




(d) DO NOT leave RadonX vent pipe open. DO NOT install any other vent termination fittings, permanent caps or protective mesh screens on RadonX vent pipe aside RadonX rain cap.

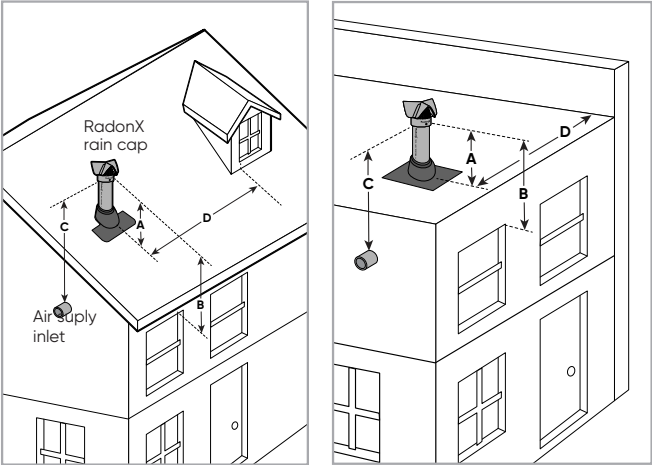


- (e) Roof penetration and flashing shall be done as per local building code requirements.
- (f) RadonX vent pipe in unconditioned spaces such as attics shall be insulated as per local building code requirements.
- (g) The RadonX vertical vent stack should be installed through the highest roofline (flat or pitched) where possible.
- (h) The RadonX vertical vent stack should not be installed under any structure (i.e. trees) that would block soil gas discharge or in roof valleys or other locations where snow and ice are likely to accumulate.
- (i) The RadonX vertical vent stack shall be installed in such a position to prevent ice accumulation or hazardous falling of ice onto walkways or the accumulation of frost onto adjacent properties or surface. IPEX does not recommend gable end installation of vent stack.



(j) The termination of the vent stack above the rooftop shall conform to Figure 14.

Figure 14.  
Conceptual Illustration of Pitched and Flat Roof Terminations with Minimum Separation Distances

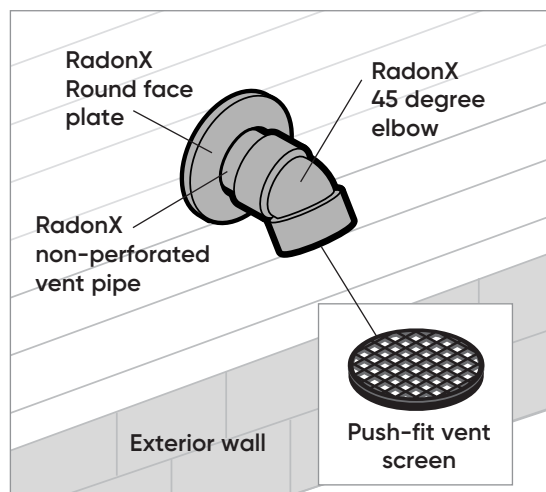


	Minimum distance (in ft)	Minimum distance (in m)
A: Vertical clearance above the roof at the point of penetration	0.5	0.15
B: Vertical clearance above windows and doors	2.0	0.6
C: Vertical clearance above any air supply inlet (air intake)	3.0	0.9
D: Horizontal clearance from windows, doors, air supply inlets or vertical wall that extends above the roof penetrated	10.0	3.0

## Sidewall Termination Option:

- (a) Sidewall termination options are only allowed in active depressurization system installation (Level-3) in which a radon fan is continuously operating.
- (b) For wall penetrations, the RadonX vent pipe should be horizontally straight out with a minimum length of 50mm (2") and a maximum length of 150mm (6") protruding beyond the vertical plane of the RadonX vertical vent stack.
- (c) The opening around the penetration into the wall structure shall be insulated as per the requirements of the local building code
- (d) Horizontal RadonX vent stack should be terminated with a solvent welded 45° RadonX elbow (see Figure 15). In these type of installations, the open hub of the RadonX elbow shall face the ground. A push-fit vent screen must be installed at the end of the hub to protect the vent stack from debris and rodents. Round faceplate should be installed around the vent pipe to protect the opening.

Figure 15.  
Typical Sidewall Termination for Active Depressurization Systems



- (e) The horizontal section of the pipe should be at a minimum slope of 1% towards the end of the pipe so that any unwanted condensation can drain properly without any pooling.
- (f) The sidewall termination shall be located where the discharge will not directly strike surfaces on the property or adjacent properties and shall conform to clearance distances shown in Table 8.

TABLE 8. CLEARANCE DISTANCES FOR SIDEWALL TERMINATIONS

	Minimum distance (in ft)	Minimum distance (in m)
Clearance to an operable window	6.5	2.0
Clearance to a door	3.3	1.0
Clearance to building corners	1.0	0.3
Clearance to a non-mechanical air supply inlets (air intakes)	1.0	0.3
Clearance to a mechanical air supply inlets (air intakes)	6.5	2.0
Clearance above grade or anticipated average snowfall line*	1.0	0.3
Clearance above paved sidewalk or paved driveway located on public property	6.5	2.0

\* Confirm average snowfall line and minimum clearance for termination with local building code.

- (g) If spray foam insulation comes in contact with RadonX, it is recommended that foam be applied in a maximum layer thickness of 50mm (2") until the required thickness of insulation is achieved.
- (h) Local building authorities may require other dimensional requirements for side-wall termination clearances. In this case, these recommendations shall supersede those described herein.

## Handling and Storage of RadonX Pipe and Fittings:

RadonX pipe and fittings are made of strong but lightweight PVC material, and as such, are easily handled. Care should however be taken in handling and storage to prevent damage to pipe and fittings.

- (a) RadonX pipe should be given adequate support at all times. It should not be stacked in large piles, especially in warm temperature conditions, as bottom pipe may become distorted and joining will become difficult.
- (b) For long-term storage, pipe racks should be used, providing continuous support along the length. If this is not possible, timber supports of at least 3" bearing width, at spacings not greater than 3ft



centres, should be placed beneath the piping. If the stacks are rectangular, twice the spacing at the sides is required. Pipe should not be stored more than seven layers high in racks. If different classes of pipe are kept in the same rack, pipe with the thickest walls should always be at the bottom. There shall be NO sharp corners on metal racks.

- (c) For temporary storage in the field when racks are not provided, care should be taken that the ground is level and free of sharp objects (i.e. loose stones, etc.). Pipe should be stacked to reduce movement, but should not exceed three to four layers high.
- (d) Since the soundness of any joint depends on the condition of the pipe end, care should be taken in transit, handling and storage to avoid damage to these ends. The impact resistance and flexibility of RadonX piping are reduced as temperatures approach 0°C (32°F) and below. Care should be taken when unloading and handling pipe in cold weather. Dropping pipe from a truck or forklift may cause damage. Methods and techniques normally used in warm weather may not be acceptable at the lower temperature range.

### NOTICE

The impact resistance and flexibility of RadonX piping are reduced as temperatures approach 0°C (32°F) and below.

- (e) When loading pipe onto vehicles, care should be taken to avoid contact with any sharp corners (i.e. angle irons, nail heads, etc.), as the pipe may be damaged.
- (f) While in transit, pipe should be well secured and supported over the entire length and should never project unsecured from the back of a trailer.
- (g) Prolonged outdoor exposure of RadonX pipe to the direct rays of the sun will not damage the pipe. However, some mild discolouration may take place in the form of a milky film on the exposed surfaces. This change in colour merely indicates that there has been a harmless chemical transformation at the surface of the pipe. A small reduction in impact strength could occur at the discoloured surfaces but they are of a very small order and are not enough to cause problems in field installation.
- (h) Protection – Covering: RadonX PVC pipes are packaged in crates and wrapped in protective plastic film, which protects from UV and keeps the pipe clean. Discolouration of exposed pipe can be

avoided by shading it from the direct rays of the sun. This can be accomplished by covering the stockpile or the crated pipe with a light coloured opaque material such as canvas. If the pipe is covered, always allow for the circulation of air through the pipe to avoid heat buildup in hot summer weather. Make sure that the pipe is not stored close to sources of heat such as boilers, steam lines, engine exhaust outlets, etc.

- (i) RadonX soil gas venting systems should not be painted. However if painted, only latex/waterbase paint shall be used and all product markings on both pipe and fittings must be either visible or accessible for visual inspection. For example, apply masking tape over product markings prior to painting. The ability to pull-back on the masking tape will allow for future inspection.

## Handling and Storage of RadonX Cement:

- (a) Store RadonX cement in the shade between 4°C (40°F) and 43°C (110°F) or as specified on the label.
- (b) Keep away from heat, spark, open flame and other sources of ignition such as electronic vapor cigarettes.
- (c) Secure container lid tightly when not in use to prevent escape of solvent vapours. If the unopened container is subjected to freezing, it may become extremely thick or gelled. This cement can be placed in a warm area, where after a period of time, it will return to its original, usable condition. But such is not the case when gelatin has taken place because of actual solvent loss—for example, when the container was left open too long during use or not properly sealed after use. Cement in this condition should not be used and should be properly discarded.
- (d) IPEX RadonX solvent cement is formulated to be used “as received” in original containers. Adding thinners or primers to change viscosity is strictly prohibited. If the cement is found to be jelly-like and not free flowing, it should not be used.

## Solvent Welding:

### **WARNING**

Installation of RadonX for the application of soil gas venting requires a certain degree of skill to avoid joint failures which could cause leak of radon gas. On-site training is available from IPEX for proper solvent welding procedures as well as other important installation points. Contact IPEX for details.

- (a) Do not use solvents or cements other than what is required by this guide
- (b) For assembly of RadonX PVC piping systems, installers should use RadonX PVC (yellow) cement
- (c) Before the use of cement and or primer, shake the can thoroughly to ensure complete mixture of container content
- (d) Dry fit all joints prior to solvent welding to confirm proper interference fit
- (e) Discard fitting joints without proper interference fit
- (f) DO NOT solvent weld joints that are too loose or too tight
- (g) DO NOT solvent weld joints without first beveling pipe ends
- (h) Assembly of pipe and fittings must be made while the surfaces are still wet and cement is still fluid
- (i) For installations below 0°C, the use of primer is required (Refer to this section's Solvent Welding Basics, guidelines below). Where primer is required, use System 636 brand primer (purple)
- (j) Cement and primers shall be used before expiry date or within 3 years of the production date stamped on the bottom of the can.
- (k) Follow all RadonX installation instructions

### **WARNING**

**DANGER:** Highly flammable liquid and vapor may form explosive peroxide. Carefully follow guidelines below.

## Safety Precautions:

RadonX solvent cements and System 636 primers are flammable and shall not be used or stored near heat, spark, open flames and other sources of ignition. Vapors may ignite explosively. Keep containers closed when not in use and covered as much as possible when in use.

Use in well-ventilated area. Keep away from heat, sparks, open flames, hot surfaces, and other ignition sources. Take action to prevent static discharges. Use explosion proof equipment. Use non-sparking tools. **If confined or partially enclosed, use forced ventilation or NIOSH-approved respirator.** Avoid breathing vapors.

If airborne concentrations exceed those limits, use of NIOSH-approved organic vapor cartridge with full-face piece is recommended. The effectiveness of an air purifying respirator is limited. Use it only for a single, short term exposure. For emergency and other conditions where short-term exposure guidelines may be exceeded, use an approved positive pressure self-contained breathing apparatus. Do not smoke, eat or drink while using these products. Avoid contact with skin, eyes and clothing. Wash clothing if contaminated before re-use. May cause eye injury. Protective equipment such as gloves, goggles and an impervious apron shall be used. **KEEP OUT OF REACH OF CHILDREN.** Carefully read the instructions on the cement and primer can label, precautions as well as the instructions in this guide, and the MSDS sheets found at [ipexna.com](http://ipexna.com).

## First Aid:

**Inhalation:** If feeling illness from inhalation, person should be moved to a source of fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

**Eye Contact:** Remove contact lenses if present, flush eyes with plenty of water for 15 minutes and get medical attention.

**Skin Contact:** Wash skin with plenty of soap and water for at least 15 minutes. If irritation develops, get medical attention.

**Ingestion:** If swallowed, consume 1 to 2 glasses of water or milk, DO NOT INDUCE VOMITING. Get medical attention.

## Use Caution with Welding Torches:

At construction sites where RadonX is being installed or has recently been solvent welded, extreme caution should be taken when using welding torches or other equipment where sparks may be involved. Flammable vapors from welded joints sometimes linger within or around a piping system for some time.

Special care must be taken when using a welding torch around RadonX piping systems in areas with little or no air circulation. In all cases, solvent vapors must be removed by air circulation, purging, or other means prior to the use of welding torches, or other spark or flame generating equipment or procedures. This includes electronic sources of ignition such as electronic vapor cigarettes.

## Cement Shelf Life:

Cement and primers shall be used before expiry date or within 3 years of the production date stamped on the bottom of the can.

## Estimated Quantity of Solvent Cement:

Below is the estimated average number of joints that can be made with IPEX RadonX Cement.

TABLE 10. AVERAGE NUMBER OF JOINTS/QT. OF IPEX RADONX CEMENT\*

Pipe Diameter (inches)	4"
Number of Joints	30
*These figures are estimates based on our laboratory tests. Due to the many variables in the field, these figures should be used as a general guide only.	

For the same number of joints where primer is used, one pint of primer will be required for each quart of cement used.

## Cold Weather Solvent Welding – Below 10°C (50°F):

- Prefabricate as much of the system as possible in a heated area.
- Store RadonX solvent cement and System 636 primer in a warm location above 4°C (40°F) when not in use and make certain cement remains fluid.

- Take special care to remove moisture including snow and ice from the surfaces being joined including pipe ends and fitting sockets.
- Ensure that the pipe, fittings and accessories are at the same temperature prior to solvent welding.
- Ensure the surfaces are softened before joining. Check for proper softening of surfaces and correct amount of cement on a sample pipe. Surfaces are sufficiently softened when scraping a blade on the treated part results in the effortless removal of a thin layer of the base material.
- Colder weather requires longer set and cure times. Refer to the RadonX Solvent Weld Cure Times section of this guide for required cure schedules before moving joints. A heating blanket may be used to speed up the cure times.

## Hot Weather Solvent Welding – Above 30°C (86°F):

- Store RadonX solvent cement and System 636 primer in a cool or shaded area prior to use.
- Store pipe and fittings in a shaded area prior to solvent welding.
- Cool surfaces to be joined with a clean, damp rag. Be sure the surface is dry prior to solvent welding.
- Consider solvent welding joints in the cooler morning hours.
- Make sure both surfaces to be joined are still wet with solvent cement when joining them together.
- Vigorously stir or shake the RadonX solvent cement before use.

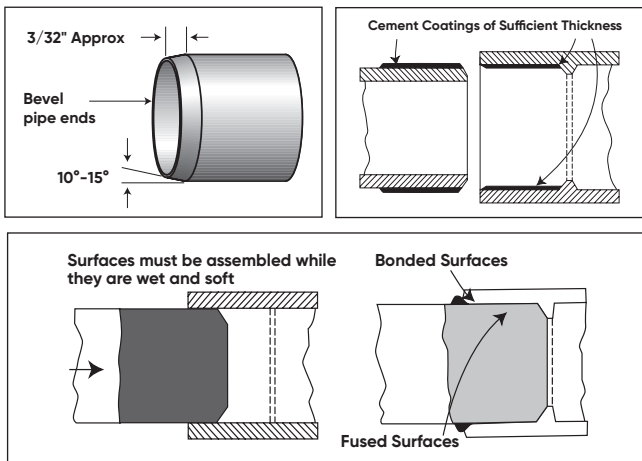
As the solvent dissipates, the solvent cement layer and the dissolved surfaces will dry and harden with a corresponding increase in joint strength. Joint strength continues to develop as the solvent cement dries.

### **⚠ WARNING**

DO NOT use excessive amounts of primer or solvent cement. Too much primer or solvent cement can lead to puddling in the pipe and fittings which can result in product failures and property damage. Always follow the instructions provided with each can of RadonX solvent cement.

## Surface Interaction in Solvent Welded Joint:

Sufficient cement must be applied to fill the gap in the loose part of the joint. Besides filling the gap, adequate solvent cement layers will penetrate the surfaces and must remain wet until the joint is assembled. If the solvent cement coatings on the pipe and fittings are wet and fluid when assembly takes place, they will tend to flow together and become one solvent cement layer. Also, if the solvent cement is wet, the surfaces beneath them will still be soft, and these dissolved surfaces in the tight part of the joint will fuse together.



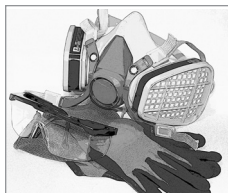
## Solvent Welding Basics:

### ⚠ CAUTION

Use proper Personal Protective Equipment (PPE) for the job: respirator, safety glasses, gloves and protective clothing.

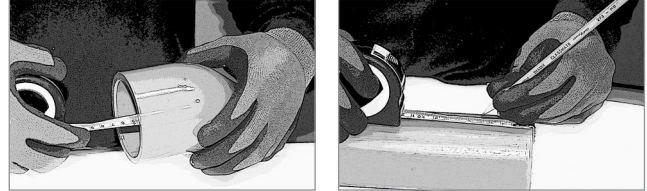
### 1) ASSEMBLE

Before beginning, assemble proper materials for the job: (RadonX cement and System 636 primer (if required), appropriate applicator for the size of pipe and fittings to be assembled, tape measure, contrasting colour marker and Reed DEB4 beveling tool).



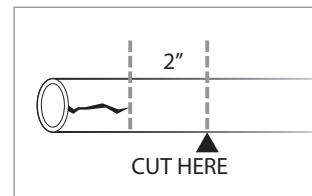
### 2) MARKING THE CUT

Measure the fitting socket depth and mark the outside of the pipe with this dimension followed by a second mark 1 inch further back. The first line will provide a guide for ensuring enough solvent cement is applied on the pipe. Maintaining a 1 inch distance to the second line once the pipe is inserted into the fitting socket will indicate full and proper insertion of the pipe inside the fitting socket.



### 3) CUTTING THE PIPE

It is important to cut the pipe squarely. A square cut provides the surface of the pipe with the maximum bonding area. Pipe can be easily cut with a wheel-type plastic tubing cutter, chop saw or fine toothed saw. Do not use reciprocating saws. Tools used to cut pipe must be designed for PVC piping and must be in good condition in accordance with the tool manufacturer's recommendations. If there is any indication of pipe damage or evidence of pipe end cracking, cut off at least 2 inches beyond any visible crack. Use of ratchet cutters is not recommended as they may split the pipe if not properly used and maintained.

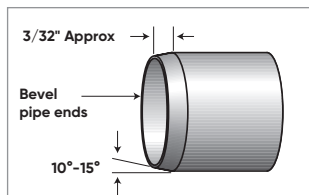
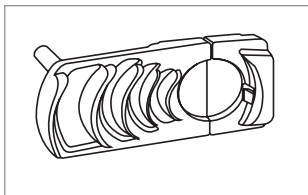


### NOTICE

Chop saws will produce shavings inside the pipe which must be removed. Failure to do so may compromise the performance of the venting system.

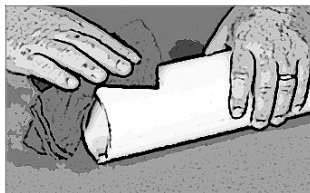
### 4) PREPARING PIPE ENDS

After cutting, always remove all burrs and filings from both the inside and outside of the pipe and bevel the pipe end using a Reed DEB4 beveling tool. Remove burrs and filings from the inside of the pipe using a knife edge or file. Failure to remove burrs can scrape channels into pre-softened surfaces, create obstructions inside surface walls, or inadvertently plow cement out of the joint during assembly.



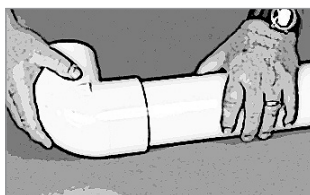
## 5) CLEANING

Using a clean dry cloth, wipe any dirt and moisture from the fitting socket and the pipe end. Moisture will increase cure times and dirt and grease can prevent adhesion.



## 6) DRY FITTING

Before applying primer or solvent cement, test all connections (pipe, fittings and accessories) to confirm a proper interference fit exists. Dry-fit contact between properly beveled pipe and fitting sockets is essential in making a good joint. The beveled pipe should easily enter the fitting socket and make contact with the inner fitting socket wall before bottoming out in a dry fit. A proper interference fit is present when the beveled pipe can only be inserted 1/3 to 2/3 of the way into the fitting socket.

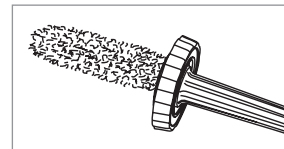


## ⚠ CAUTION

**DO NOT SOLVENT WELD PIPE, FITTINGS OR ACCESSORIES THAT FIT LOOSELY TOGETHER OR WHERE PIPE BOTTOMS OUT IN A DRY FIT.** Proper joint strength cannot be developed. Do not solvent weld pipe, fittings or accessories if a beveled pipe cannot easily be inserted at least 1/3 of the way into the fitting socket. This may cause excessive stresses during assembly leading to joint failure.

## 7) APPLICATOR SIZE

Use the proper size cement and primer applicator for the size of pipe or fittings being joined. As a general guide, the cement applicator size should be approximately 1/2 of the pipe diameter. It is important that a satisfactory size applicator be used to help ensure that sufficient layers of cement are applied. The cement applicator for 4" RadonX pipe and fittings should be 2" in size.



## Priming Guidelines:

### NOTICE

It is mandatory to use a primer for installation temperatures at or below 0°C (32°F). Use System 636 primer (purple) with RadonX.

8) Using the correct applicator (as outlined in step #7), aggressively work the primer into fitting socket, keeping the surface and applicator wet until the surface has been softened.

9) Aggressively work the primer onto the end of the pipe to a point 1/2" beyond the depth of the fitting socket.

10) A second application of primer in the fitting socket is required.

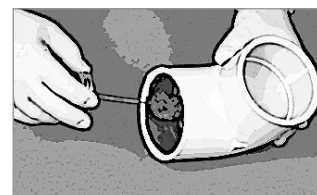
11) IMMEDIATELY AND WHILE THE SURFACES ARE STILL WET, APPLY THE APPROPRIATE RADONX CEMENT USING THE SOLVENT WELDING GUIDELINES THAT FOLLOW.

## Solvent Welding Guidelines:

12) Vigorously shake the RadonX cement can before using. If the cement is jelled, replace with a new can.

13) Using the proper size applicator for the pipe size as outlined in #7, aggressively work a full even layer of cement on to the pipe end equal to the depth of the fitting socket - do not brush it out to a thin paint type layer, as it will dry too quickly.

14) Aggressively work a medium layer of cement into the fitting socket. Avoid puddling cement in the socket by holding the fitting on an angle.

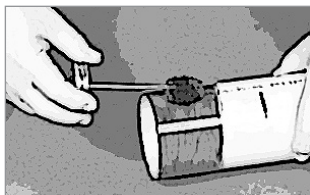




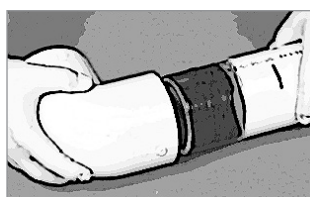
## NOTICE

Excessive cement may cause the fitting to weaken due to softening by the trapped solvents.

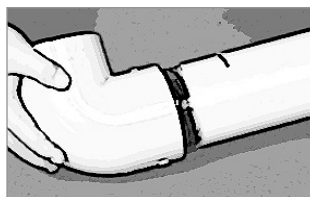
15) Apply a second full, even layer of cement on the pipe. Apply enough solvent cement to completely fill all the gaps between the pipe and fitting at socket entrance.



16) Without delay, while the solvent cement is still wet, assemble the pipe and fitting.

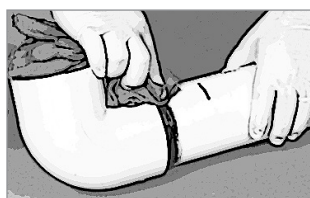


17) Hold the pipe and fitting together for approximately 30 seconds to resist pushout due to tapered sockets. Higher potential for pushout exists in colder weather installations.



If pushout does occur, the joint will need to be replaced.

18) A ring or bead of solvent cement must be formed around the entire socket fitting entrance. With a clean, dry cloth, remove the excess solvent cement from the pipe and fitting socket entrance. This will allow the solvent to evaporate from within the joint and prevent weakening of the pipe.



19) Handle newly assembled joints gently until initial set has taken place. Follow IPEX set and cure times outlined in Table 9 before handling or testing the pipe system.

## Solvent Weld Set and Cure Times:

Set and Cure times for joint sizes of 4" (100mm) are shown in Table 9.

TABLE 9. AVERAGE SET AND JOINT CURE TIMES FOR RADONX CEMENT

Temperature Range		Average Initial Set Schedule*	Average Joint Cure Schedule*
°C (Celsius)	°F (Fahrenheit)		
15 to 40	60 - 105	30 min	1.5 hr
5 to 15	40 - 60	2 hr	4 hr
-16 to 4	3 - 40	12 hr	72 hr

Notes\*

1. Initial set schedule is the necessary time to allow before the joint can be carefully handled.
2. Joint cure schedule is the necessary time before commissioning RadonX piping for soil gas venting.
3. In damp or humid conditions above 60% relative humidity allow at least 50% more set time.
4. These figures are estimates based on testing done under laboratory conditions. Field working conditions can vary significantly. This chart should be used as a general reference only.

## ⚠ WARNING

During the curing of the solvent welded joints, vapors may accumulate inside the piping system, especially should one end of the line be capped. Nearby sparks from welders or torches may inadvertently ignite these vapors and create a hazardous incident. Attention must be given to removing all vapors using air-blowers or water flushing prior to capping one end of an empty piping system.

## RadonX Vent Connections to Radon Fan:

Please refer to the manual from the radon fan manufacturer for instructions to connect RadonX vent pipe. DO NOT use solvent weld or screws to join RadonX vent pipe to the fan.

### **⚠ WARNING**

DO NOT use solvent weld or screws to join RadonX vent pipe to the radon fan. Follow fan manufacturer's installation instructions.

## Testing of Radon Concentrations:

Once the building is occupied, continued radon concentration measurements shall be performed. Consult the C-NRPP, National Radon Proficiency Program at [c-nrpp.ca](http://c-nrpp.ca) for details as to frequency and guidelines to follow. Always refer to the latest edition of acceptable indoor radon gas levels in local building code or Health Canada Guidelines. For more information, visit [canada.ca/en/health-canada/services/health-risks-safety/radiation/radon.html](http://canada.ca/en/health-canada/services/health-risks-safety/radiation/radon.html).

If the measured radon gas concentrations exceed the Canadian guideline level, contact a mitigation professional who is certified by C-NRPP.

## Testing Soil Gas Vent Piping:

When a RadonX piping system is installed according to all instructions and guidelines in this installation manual, IPEX does not recommend further testing of the piping system for leaks.

### **⚠ WARNING**

DO NOT mix pipe, fittings or joining methods from different Manufacturers as they have different joint systems and adhesives. This can result in unsafe conditions and cause radon gas leak.

### **⚠ WARNING**

DO NOT use RadonX in applications other than soil gas venting. These can result in unsafe conditions.

### **⚠ WARNING**

NEVER use compressed air or gas in RadonX pipe and fittings

NEVER test PVC pipe and fittings with compressed air or gas, or air-over-water boosters.

**Use of compressed air or gas in RadonX pipe and fittings can result in explosive failures and cause severe injury or death.**



## System Repair:

Inspect pipe for any damage such as cracking and deep gouges. Locate the end of any pipe cracks and be sure to cut at least 2" beyond the crack line to ensure it is removed. Carefully inspect any fittings for damage and remove and replace them accordingly.

Repairs can be made by solvent welding new sections of pipe and fittings. Follow all the solvent welding instruction within this guide. However, installation conditions during a repair vary greatly when compared to a new installation. Repairs or cut-ins to an existing system are typically done in confined spaces, on closed end piping systems, and often have more humidity present.

All of these factors can inhibit the evaporation of the solvent leading to increased set and cure times. As such, IPEX recommends that the standard set and cure times be increased by at least 50% for repairs or cut-ins. Refer to set and cure tables in this guide.

### **⚠ CAUTION**

When modifying or repairing aged PVC pipe, use only wheel cutters or fine tooth saws that are new and sharp. DO NOT use ratchet style cutters.

## Maintenance:

- Inspect all exposed pipe for damage at least twice a year.
- Inspect all exposed pipe for pipe sweating at least twice a year. If pipe sweating is a problem, lower indoor humidity levels.
- Inspect termination assemblies (roof or sidewall) for any blockages at least twice a year.

## Training:

IPEX recommends that installers attend formal training on RadonX to ensure proper installation methods are utilized at all times.

## Section D: General Terms and Conditions of Sale

### General:

All sales are governed by IPEX Inc.'s General Terms and Conditions of Sale, which can be found at:  
[ipexna.com/general-terms-and-conditions-of-sale-ipex-inc/](http://ipexna.com/general-terms-and-conditions-of-sale-ipex-inc/)



## NOTES

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## NOTES

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## NOTES

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