

1 (Published in the Topeka Metro News June 21, 2006)

2  
3 ORDINANCE NO. 18657

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5 AN ORDINANCE introduced by Councilmembers Clark Duffy, John Nave, and Jeff  
6 Preisner amending City of Topeka Code § 26-325 to include as  
7 amended Appendix F, "Radon Control Methods" of the International  
8 Residential Code for One and Two Family Dwellings, 2003.

9  
10 BE IT ORDAINED BY THE COUNCIL OF THE CITY OF TOPEKA, KANSAS:

11 Section 1. City of Topeka Code § 26-325, Reserved is amended to read as  
12 follows:

13 **International Residential Code.**

14 Appendix F, "Radon Control Methods" is hereby adopted and amended, to read  
15 as follows:

16  
17 **NEW CONSTRUCTION RADON CONTROL METHODS**  
18 **FOR THE CITY OF TOPEKA**

19  
20 **SECTION AF101. SCOPE**

21  
22 **AF101.1 General.** This appendix contains requirements for new construction in  
23 jurisdictions where radon-resistant construction is required.

24 Inclusion of this appendix by jurisdictions shall be determined through the use of  
25 locally available data or determination of Zone 1 designation in Figure AF101.

26  
27 **SECTION AF102. DEFINITIONS**

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29 **AF102.1 General.** For the purpose of these requirements, the terms used shall be  
30 defined as follows:

31 SUB-SLAB DEPRESSURIZATION SYSTEM (Passive). A system designated to achieve  
32 lower sub-slab air pressure relative to indoor air pressure by use of a vent pipe routed  
33 through the conditioned space of a building and connecting the sub-slab area with

34 outdoor air, thereby relying on the convective flow of air upward in the vent to draw air  
35 from beneath the slab.

36 SUB-SLAB DEPRESSURIZATION SYSTEM (Active). A system designed to achieve  
37 lower sub-slab air pressure relative to indoor air pressure by use of a fan-powered vent  
38 drawing air from beneath the slab.

39 DRAIN TILE LOOP. A continuous length of drain tile or perforated pipe extending  
40 around all or part of the internal or external perimeter of a basement or crawl space  
41 footing.

42 RADON GAS. A naturally occurring, chemically inert, radioactive gas that is not  
43 detectable by human senses. As a gas, it can move readily through particles of soil and  
44 rock and can accumulate under the slabs and foundations of homes where it can easily  
45 enter into living space through construction cracks and openings.

46 SOIL-GAS-RETARDER. A continuous membrane of 6-mil (0.15mm) polyethylene or  
47 other equivalent material used to retard the flow of soil gases into a building.

48 SUB-MEMBRANE DEPRESSURIZATION SYSTEM. A system designed to achieve  
49 lower-sub-membrane air pressure relative to crawl space air pressure by use of a vent  
50 drawing air from beneath the soil-gas-retarder membrane.

### 51 **SECTION AF103. REQUIREMENTS**

52 **AF103.1 General.** The following construction techniques are intended to resist radon  
53 entry and prepare the building for post-construction radon mitigation, if necessary (see  
54 Figure AF102). These techniques are required in areas where designated by the  
55 jurisdiction.

56 **AF103.2 Subfloor preparation.** A layer of gas-permeable material shall be placed  
57 under all concrete slabs and other floor systems that directly contact the ground and are  
58 within the walls of the living spaces of the building, to facilitate future installation of a  
59 sub-slab depressurization system, if needed. The gas-permeable layer shall consist of  
60 one of the following:

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

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

67 3. A uniform layer of sand or native fill a minimum of 4 inches (102mm) thick,  
68 with a minimum 2 inch (51mm) diameter interior perimeter drain tile loop laid  
69 approximately 12 inches inside the internal perimeter of the foundation footing.

70 4. Other materials, systems or floor designs with demonstrated capability to  
71 permit depressurization across the entire sub-floor area.

72 **AF103.3 Soil-gas-retarder.** It is recommended, but not required, that a minimum 6-mil  
73 (0.15mm) [or 3-mil (0.075mm) cross-laminated] polyethylene or equivalent flexible  
74 sheeting material shall be placed on top of the gas-permeable layer prior to casting the  
75 slab or placing the floor assembly to serve as a soil-gas-retarder by bridging any cracks  
76 that develop in the slab or floor assembly and to prevent concrete from entering the void  
77 spaces in the aggregate base material. If utilized, the sheeting shall cover the entire  
78 floor area with separate sections of sheeting lapped at least 12 inches (305mm). The

79 sheeting shall fit closely around the pipe, wire or other penetrations of the material. All  
80 punctures or tears in the material shall be sealed or covered with additional sheeting.

81 **AF103.4 ENTRY ROUTES.** It is recommended, but not required, that potential radon  
82 entry routes be closed in accordance with Sections AF103.4.1 through AF103.4.10.  
83 Notwithstanding the foregoing, the covering of sump pits as described in Section  
84 AF103.4.4 is required.

85 **AF103.4.1 Floor openings.** Openings around bathtubs, showers, water closets, pipes,  
86 wires or other objects that penetrate basement or slab on grade concrete slabs shall be  
87 filled with polyurethane caulk or equivalent sealant applied in accordance with the  
88 manufacturer's recommendations.

89 **AF103.4.2 Concrete joints.** All control joints, isolation joints, construction joints and  
90 any other joints in concrete slabs or between slabs or foundation walls shall be sealed  
91 with a caulk or sealant. Gaps and joints shall be cleared of loose material and filled with  
92 polyurethane caulk or other elastomeric sealant applied in accordance with the  
93 manufacturer's recommendations.

94 **AF103.4.3 Condensate drains.** Condensate drains shall be trapped or routed through  
95 nonperforated pipe to daylight.

96 **AF103.4.4 Sumps.** Sump pits open to soil or serving as the termination point for sub-  
97 slab or exterior drain tile loops shall be covered with a gasketed or otherwise sealed lid.  
98 Sumps used as the suction point in a sub-slab depressurization system shall have a lid  
99 designed to accommodate the vent pipe. Sumps use as a floor drain shall have a lid  
100 equipped with a trapped inlet.

101 **AF103.4.5 Foundation walls.** Hollow block masonry foundation walls shall be  
102 constructed with either a continuous course of solid masonry, one course of masonry  
103 grouted solid, or a solid concrete beam at or above finished ground surface to prevent  
104 passage of air from the interior of the wall into the living space. Where a brick veneer or  
105 other masonry ledge is installed, the course immediately below that ledge shall be  
106 sealed. Joints, cracks or other openings around all penetrations of both exterior and  
107 interior surfaces of masonry block or wood foundation walls below the ground surface  
108 shall be filled with polyurethane caulk or equivalent sealant. Penetrations of concrete  
109 walls shall be filled.

110 **AF103.4.6 Dampproofing.** The exterior surfaces of portions of concrete and masonry  
111 block walls below the ground surface shall be dampproofed in accordance with Section  
112 R406 of this code.

113 **AF103.4.7 Air-handling units.** Air-handling units in crawl spaces shall be sealed to  
114 prevent air from being drawn into the unit.

115 Exception: Units with gasketed seams or units that are otherwise sealed by the  
116 manufacturer to prevent leakage.

117 **AF103.4.8 Ducts.** Ductwork passing through a crawl space or beneath a slab shall be  
118 of seamless material unless the air-handling system is designed to maintain continuous  
119 positive pressure within such ducting. Joints in such ductwork shall be sealed to prevent  
120 air leakage.

121 **AF103.4.9 Crawl space floors.** Openings around all penetrations through floors above  
122 crawl spaces shall be caulked or otherwise filled to prevent air leakage.

123 **AF103.4.10 Crawl space access.** Access doors and other openings or penetrations  
124 between basements and adjoining crawl spaces shall be closed, gasketed or otherwise  
125 filled to prevent air leakage.

126 **AF103.5 Passive sub-membrane depressurization system.** In buildings with crawl  
127 space foundations, the following components of a passive sub-membrane  
128 depressurization system shall be installed during construction.

129 Exception: Buildings in which an approved mechanical crawl space ventilation  
130 system or other equivalent system is installed.

131 **AF103.5.1 Ventilation.** Crawl spaces shall be provided with vents to the exterior of the  
132 building. The minimum net area of ventilation openings shall comply with Section  
133 R408.1 of this code.

134 **AF103.5.2 Soil-gas-retarder.** The soil in crawl spaces shall be covered with a  
135 continuous layer of minimum 6-mil (0.15mm) polyethylene soil-gas-retarder. The ground  
136 cover shall be lapped a minimum of 12 inches (305mm) at joints and shall extend to all  
137 information walls enclosing the crawl space area. It is recommended that acoustical  
138 sealant, butyl rubber, or butyl acrylic caulks be used to provide adhesion to the  
139 polyethylene sheeting. Polyurethane caulk will also provide some adhesion to the  
140 polyethylene sheeting. Seams between adjoining sheets of sheeting are usually sealed  
141 by applying a continuous bead of sealant between the sheeting in the 12-inch strip  
142 where the sheets overlap. Plastic should be secured to the wall at 6 to 12 inches above  
143 the crawlspace floor with a ½ inch wide bead of acoustical sealant or butyl caulk along  
144 the wall. For a more durable connection mechanical fasteners, such as strapping,  
145 should be considered, to hold the plastic to the wall.

146 **AF103.5.3 Vent pipe.** A plumbing tee (2 inch minimum diameter) or other approved  
147 connection shall be inserted horizontally beneath the sheeting and connected to a 3- or  
148 4-inch diameter (76mm or 102mm) fitting with a vertical vent pipe installed through the  
149 sheeting. The vent pipe shall be extended up through the building floors, terminate at  
150 least 12 inches (305mm) above the roof in a location at least 10 feet (3048mm) away  
151 from any window or other opening into the conditioned spaces of the building that is less  
152 than 2 feet (610mm) below the exhaust point, and 10 feet (3048mm) away from any  
153 window or other opening into the conditioned spaces of the building that is less than 2  
154 feet (610mm) below the exhaust point, and 10 feet (3048mm) from any window or other  
155 adjoining or adjacent buildings.

156 **AF103.6 Passive sub-slab depressurization system.** In basement or slab-on-grade  
157 buildings, the following components of a passive sub-slab depressurization system shall  
158 be installed during construction.

159 **AF103.6.1 Vent pipe.** A minimum 3-inch-diameter (76mm), ABS, PVC or equivalent  
160 gas-tight pipe shall be embedded vertically into a “T” fitting (2 inch minimum diameter)  
161 or equivalent method to be used to ensure that the pipe opening remains within the sub-  
162 slab permeable material. Alternatively, the 3-inch (76mm) pipe shall be inserted directly  
163 into an interior perimeter drain tile loop or through a sealed sump cover where the sump  
164 is exposed to the sub-slab aggregate or connected to it through a drainage system.

165 The pipe shall be extended up through the building floors, terminate at least 12  
166 inches (305mm) above the surface of the roof in a location at least 10 feet (3048mm)  
167 away from any window or other opening into the conditioned spaces of the building that

168 is less than 2 feet (610mm) below the exhaust point, and 10 feet (3048mm) from any  
169 window or other opening in adjoining or adjacent buildings.

170 **AF103.6.2 Multiple vent pipes.** In buildings where interior footings or other barriers  
171 separate the sub-slab aggregate or other gas-permeable material, each area shall be  
172 fitted with an individual vent pipe. Vent pipes shall connect to a single vent that  
173 terminates above the roof or each individual vent pipe shall terminate separately above  
174 the roof.

175 **AF103.7 Vent Pipe drainage.** All components of the radon vent pipe system shall be  
176 installed to provide positive drainage to the ground beneath the slab or soil-gas-  
177 retarder.

178 **AF103.8 Vent pipe accessibility.** Radon vent pipes shall be accessible for future fan  
179 installation through an attic or other area outside the habitable space.

180 Exception: The radon vent pipe need not be accessible in an attic space where  
181 an approved roof-top electrical supply is provided for future use.

182 **AF103.9 Vent pipe identification.** All exposed and visible interior radon vent pipes  
183 shall be identified with at least one label on each floor and in accessible attics. The label  
184 shall read: "Radon Reduction System."

185 **AF103.10 Combination foundations.** Combination basement/crawl space or slab-on-  
186 grade/crawl space foundations shall have separate radon vent pipes installed in each  
187 type of roof or shall be connected to a single vent that terminates above the roof.

188 **AF103.11 Building depressurization.** Joints in air ducts and plenums in unconditioned  
189 spaces shall meet the requirements of Section M1601. Thermal envelope air infiltration

190 requirements shall comply with the energy conservation provisions in Chapter 11.

191 Firestopping shall meet the requirements contained in Section R602.8.

192 **AF103.12 Power source.** To provide for future installation of an active sub-membrane  
193 or sub-slab depressurization system, an electrical circuit terminated in an approved box  
194 shall be installed during construction in the attic or other anticipated locations of vent  
195 pipe fans.

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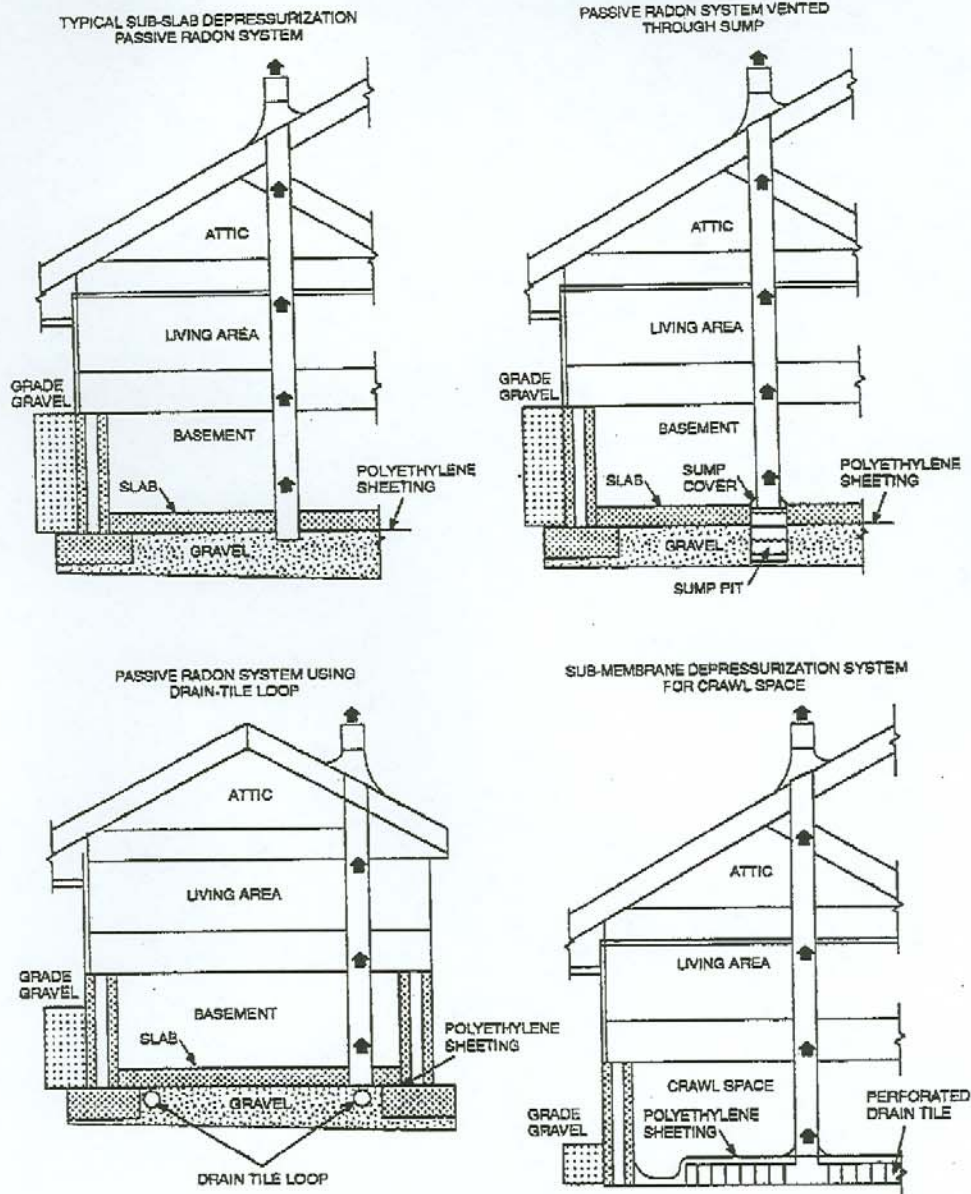


FIGURE AF102  
RADON-RESISTANT CONSTRUCTION DETAILS FOR FOUR FOUNDATION TYPES

199            Section 2    This ordinance shall take effect and be in force from and after its  
200 passage, approval and publication in the official City newspaper.

201            PASSED AND APPROVED by the City Council June 13, 2006.

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William W. Bunten, Mayor

ATTEST:

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Iris E. Walker, City Clerk