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Project Summary

Recommended Sub-slab Depressurization Systems Design Standard of the Florida Radon Research Program

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The Florida Radon Research Program (FRRP), sponsored by the U. S. Environmental Protection Agency and the Florida Department of Community Affairs, has developed a technical basis for the design of sub-slab depressurization systems for the control of radon infiltration into buildings. Results of the research conducted under the FRRP are presented in several technical reports. This report is the supporting document for the draft code relating to sub-slab depressurization. The design criteria are first presented, followed by details of the depressurization system.

This Project Summary was developed by EPA's Air and Energy Engineering Research Laboratory, Research Triangle Park, NC, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).

Introduction

Elevated indoor radon gas generally comes from radon gas that is formed from radium in the foundation soils under the structure. In structures built on a slab, one of the most effective ways to limit soil gas entry into the structure is to depressurize an area below the slab as with an exhaust fan. The radon thus removed from below the slab is exhausted into the ambient atmosphere. This portion of the standard sets forth the design criteria and the detailed specifications for equipment associated with sub-slab depressurization.

Soil Depressurization Systems

601.1 Design Criteria

Specifications are set forth for the following design criteria: pressure, fan, and seal.

601.2 Suction Fans

Each suction fan shall be rated for not less than 100 cfm air flow at 1 in.* water column. The soil depressurization system shall include a system failure alarm which shall be either a visual device, conveniently visible to the building occupants, or a device that produces a minimum 60 db audible signal, activated by the loss of pressure, or flow, in the vent pipe.

601.3 Vents

Vent piping material shall be of any type approved by locally adopted codes for plumbing vents. The piping shall have a minimum slope of 1/8-in./ft* and the vent pipes shall be terminated above the roof at least 10 ft from any operable openings or air intakes and directed away from any operable openings or air intakes. All exposed components of the soil depressurization system shall be labeled to prevent accidental damage or misuse.

601.4 Depressurization System Arrangement for Slabs on Sands or Granular Soils Without Continuous Ventilation Mat(s)

Depressurization systems in sands or other granular soils (certified as having an air permeability of greater than or equal to 10^{-12} m^2) at least 8 in. deep shall meet the

* 1 in. H_2O = 0.25 kPa; 1 in. = 2.54 cm; 1 ft = 0.30 m.

specifications set forth in this section. Suction points shall be equally distributed a maximum of 1300 feet²* per suction point, each suction point shall be located not less than 6 ft or more than 18 feet from the perimeter, and multiple suction points shall be located within 36 ft of each other. Suction pipe shall be a minimum of 2 in. in diameter and shall be carried full size through the roof. Suction point pits shall conform to one of the following designs: (a) a hemispherical pit at least 22 in. in diameter and 11 in. deep, with a cover of 1/2 in. minimum thickness pressure-treated plywood or other decay-resistant material, installed below the soil-gas barrier; or (b) a hemispherical pit at least 32 in. in diameter and 16 in. deep filled with 1 in. or larger washed gravel and covered by the soil-gas barrier; or (c) a manufactured ventilation mat having a minimum net suction area in contact with the soil of 5 ft², installed below the soil-gas barrier.

* 1 ft² = 0.09 m²; 1 cfm = 0.00047 m³/s.

601.5 Depressurization Systems in Sands or Granular Soils with Continuous Ventilation Mat(s)

Five arrangements are specified for the suction points. The suction pipe shall be a minimum of 3 in. diameter and shall be carried full size through the roof. Suction fans must be capable of developing minimum flows of at least 100 cfm* at 1 in. water column pressure. Depressurization systems in a minimum 6 in. deep layer of aggregate shall have suction points equally distributed at the rate of one centrally located suction point for every 2500 ft² of floor area. Specifications for the aggregate are given. Suction points shall be connected to the depressurization fan by a minimum 4 in. diameter riser and shall terminate in the gravel layer in a "tee" fitting or other approved means that provides for air flow from the gravel layer.

602. Membranes Without Slab Cover

Sub-membrane soil depressurization systems are essentially the same as sub-slab depressurization systems, but without the cover of a concrete slab. The membrane shall be protected from wind uplift in accordance with locally adopted codes. The membrane shall consist of an air-impermeable plastic membrane meeting four specified arrangements which are outlined. Sub-membrane suction systems covering a minimum 6 in. deep layer of aggregate having a 1 in. average diameter stone shall satisfy the requirements of Section 601.

Supporting information is given for each of the specifications.

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The complete report, entitled "Recommended Sub-slab Depressurization Systems Design Standard of the Florida Radon Research Program," (Order No. PB92-105626 AS; Cost: $17.00, subject to change) will be available only from:
National Technical Information Service
5285 Port Royal Road
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The EPA Project Officer can be contacted at:
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