

5. Radon in the Interior of Buildings

Radon

- **Radon** is a ubiquitous natural radioactive gas. **Radon is formed by the decay of uranium**, which is present in various quantities in all Earth's crust materials.
- **Radon is an inert gas**. Its **daughter products** are harmful to health. They are inhaled along with carrier solid and liquid aerosols into the lungs where they settle down. Alpha radiation **irradiated pulmonary epithelium**, there is a potential risk of developing **lung cancer**. This irradiation is considered one of the causes of lung cancer.
- In general, **the higher the concentration and the longer the exposure, the higher the risk.**

Radon

- **Physical properties of radon:**

- Boiling point -62 °C
- Melting point -71 °C
- Evaporation heat 16,40 kJ/mol
- Melting heat 2,89 kJ/mol
- Evaporation entropy 77,02 J/deg.mol
- Melting entropy 14,35 J/deg.mol
- Critical temperature +104,3 °C
- Critical pressure 6 322,7 kPa
- Critical density $1,2 \cdot 10^3$ kg/m

Radon Sources

- The most important source of radon in buildings is the **subsoil**.
- Radon penetrates into the interiors of buildings through the foundation structure - **leaks in floors or walls of the basement, floors without adequate insulation, shafts, ducts or wells**.
- Inalienable possibility of penetration of radon in the indoor environment is **diffusion through the contact surface substructure and subsoil**.
- **Built-in materials or water** can also be a source of radon.

Radon in the Indoor Environment

- Decree no. 422/2016 on Radiation Protection and Security of a Radioactive Source sets a reference level for natural irradiation inside a building with a living room.
- **The reference level for the volume activity of radon is set at 300 Bq/m³.**
- **The average value of radon in buildings in the Czech Republic is 118 Bq/m³.**

Anti-radon Measures

- Safety of Radionuclide Source, appropriate building modifications should be made, depending on the amount of exceedance. The necessary background for the projection of these adjustments is so-called **radon diagnostics**, which is a whole set of measurements designed to identify sources and radon entry paths into the house.
- Basic intervention at the source is done by **selecting a suitable place of construction, choosing the suitable building material and choosing to prevent the penetration of radon into buildings.**
- As a protection of new and modernized structures against the effects of radon can be used **gas-tight foil under the baseplate** with the dimension of the radon risk area and the use of certified building materials