CASE STUDY
FAMILY HOUSE, RUMBURK

Effectiveness of VENTBOX controlled ventilation for radon mitigation in a family house – Rumburk, Czech Republic

Rumburk in Northern Bohemia is an area with very high radon levels in the subsoil.

Introduction

Radon is a naturally occurring radioactive gas that, at higher concentrations, can pose serious health risks. In the Czech Republic, it is one of the main sources of radiation exposure in residential buildings. This study presents a case analysis of a family house in Rumburk, where, **in 2011**, a controlled ventilation system with a unique VENTBOX mode was installed to eliminate radon. The system remains fully operational to this day.

Objective

To demonstrate the effectiveness of pressurised ventilation with heat recovery and the specialised VENTBOX mode in reducing high radon volumetric activity concentrations (OAR) in living spaces.

Methodology

Initial state

- Prior to installation, the 1960s house, built on weathered, permeable granite, had minimal or no radon protection. Its average concentration reached 4,500 Bq/m³, with short-term peaks of 6,000 to 10,000 Bq/m³ in some rooms.

System installation

- Undercutting the house and subsoil ventilation were not feasible, so a pressurised ventilation technology was chosen. Helix 400 units (predecessors of VENTBOX 400 units) with heat recovery and a special radon elimination mode were installed in selected areas. After the system was commissioned, repeated measurements were conducted by a certified expert, with independent verification of the results carried out by the State Office for Radiation Protection (SÚRO).

Measuring location	Radon volumetric activity before HVAC installation (Bq/m³) protocol No. 242-040-2011/D	Radon volumetric activity after HVAC installation (Bq/m³) protocol No. 242-027-2012/OO	Radon volumetric activity after 14 years (Bq/m³)
Workshop 3 – 33.25 m²	7 120	77	41
Workshop 2 – 39.48 m²	5 080	111	74
Room – 18.09 m²	4 984	87	64
Hall – 2nd floor	4 697	86	51

Measurement results from the State Office for Radiation Protection (SÚRO) before, after, and 14 years after installation.

Family house in Rumburk

Results

- **Radon reduction:** Following installation, the OAR dropped below recommended safety limits.

- **Energy efficiency:** Thanks to heat recovery and controlled overpressure, indoor temperature remained stable, contributing to savings in heating energy.

Conclusion

The Rumburk case study demonstrates that the VENTBOX controlled ventilation system with its unique radon elimination mode is highly effective in reducing radon concentration in residential spaces—and remains fully functional even after 14 years. This approach not only mitigates health risks associated with radon but also maintains energy efficiency, making it a suitable solution for radon problems in apartments and other buildings. An additional benefit of the system is the regulation of CO_2 concentration, humidity, and volatile compounds.