



DAFA Radon System™ - seals against radon gases



Useful radon facts

Radon = radioactive gas

Radon is a naturally occurring radioactive gas in the soil, and the largest source of radioactivity in indoor air. You cannot see, smell, hear or taste radon. The need to effectively reduce the content of radon in indoor air should be seen in light of the fact that there is currently no documented lower limit for the health risk radon represents. One should always strive to achieve the lowest possible radon content in indoor air. It is therefore recommended that construction solutions be chosen that prevent radon from entering the building.



The Danish building regulations require that residential buildings take in outdoor air at a rate of at least 0.3 l/s per m² of heated floor space in living areas and in the home as a whole. This is approximately equivalent to replacing the air 0.5 times per hour. If outdoor air is added at a rate that meets the building regulation requirement, this will help dilute the indoor air radon content. Adding outdoor air helps ensure a good indoor climate.

It is recommended that building technical solutions be based on a combination of three focus areas:

- Sealing structures facing the ground, possibly combined with a radon barrier plane under the building
- Reduction of the air pressure on the outer side of structures facing the ground
- Ventilation of the building using outdoor air.



DAFA Radon System™

Radon is widespread in Denmark

Radon is prevalent in many areas of Denmark. However, the concentration of radon gases can vary greatly from site to site. The content of radon in indoor air is primarily determined by four parameters:

- The content of radon in soil air and permeability factors in the soil
- Air permeability in structures facing the ground
- Air pressure and temperature differences across floor structures and basement walls
- Air replacement using outdoor air

Radon in Danish homes

The map shows how many per cent of each region is estimated to have a radon concentration exceeding 200 Bg/m³. The regions are divided into five classes with corresponding

% above 200 Bq/m²		Class
	10 - 30%	4
	3 - 10%	3
	1 - 3%	2
	0.3 - 1%	1
	0 - 0.3%	0

The Danish National Institute of Radiation Hygiene, January 2001. The main survey report can be viewed and downloaded at www.radon.dk.

Based on the radon survey conducted by the Danish National Institute of Radiation Hygiene, Risø National Laboratory, and the Geological Survey of Denmark and Greenland. Financed by the Danish Ministry of Health.



Radon gas can vary over distances of a few meters



Radon levels in the soil can vary geographically depending on the composition of the subsoil. Radon levels can vary within the same municipality and even between two neighboring houses, because the buildings' structures, condition, and ventilation vary.



The building envelope facing the

Where radon gas enters homes

Experience from existing buildings shows that the most common causes of elevated radon levels in indoor air are:



Insufficiently airtight floor slabs, which allow ingress of soil air containing radon.



Insufficient sealing of joints between building components facing the ground, such as the joints between wall foundations and floor slabs.



Leaks around installations that penetrate the sealed plane facing the ground, such as for cables, water, and energy supply. This applies to both light and heavy construction.



Insufficient connection of the sealed plane to other building components.

Existing buildings

Radon protection in existing buildings differs from radon protection for new buildings. For example, in the vast majority of existing buildings it will not be possible to establish a radon barrier plane under the building.

Various methods

Radon protection must also be matched to existing materials and structures.

Indoor air radon content can be reduced using the following principles:

Ventilation - Sealing - Radon suction

If there are unsealed installations linked to the ground, such as floor drains, sewers, and waste pipes, the radon content in indoor air can be reduced by sealing these.

Individual adaptation

The scope of the measures and the need to combine measures depend on the measured radon content in indoor air. If the radon content is low, a single measure may be enough, but it may be necessary to combine several measures if the radon content in the building is high. The choice of measures also depends on what can be implemented practically in the given building.



A combination of three steps ensures a low radon content in indoor air:
Seal structures facing the ground Reduce air pressure on the outer side of structures facing the ground
Ventilate the building, using outdoor air to dilute radon content in indoor air

New construction

Radon in indoor air can be limited primarily by preventing ingress of soil air, but also by ventilating the building. Ingress of soil air can be prevented by making structures facing the ground airtight or establishing radon suction under them. However, the effect of radon suction depends on how airtight the structures facing the ground are.

Combining several solutions

The most reliable solution is a combination of sealing structures facing the ground and air pressure reduction on the outer side of these structures. In some cases, passive suction or an air pressure balancing channel to outside air may be sufficient. If the air collected from radon suction is conveyed to the roof, passive suction is created. The air pressure in the soil air under the building is reduced slightly, thereby reducing the pressure difference across the floor structure. The more stringent requirements regarding radon content in indoor air in the Danish building regulations mean that the ingress of soil air must be more effectively prevented. Sealing structures facing the ground and reducing the air pressure on the outer side of them can restrict soil air ingress. It is therefore recommended that both solutions be deployed. In combination with ventilation, these will ensure a low radon content in indoor air.

Be prepared

To ease practical implementation at the building site, you should decide during the planning phase where the sealed plane is, and how the seal at transitions will be transferred between building components. This must be stated clearly in the project documentation.

Simple and robust solutions should be prioritized when planning access routes for the building's technical installations and choosing where to locate the sealed plane in the building. For example, the radon barrier should be an integral part of the building envelope's sealed plane facing the soil.

DAFA Radon System™

A complete system - includi

DAFA Radon System is a safe and effective system for sealing out radon. The system is based on thought-out and user-friendly products that are easy to install.



The components of DAFA Radon System, which combine polymer technology and radon sealing techniques, allow building designers to choose the optimal solution for sealing on the ground floor, floors, and foundations. The system prevents radon gasses from entering buildings and can be used in most types of heated residential and office buildings etc.



The products in the system are durable and proven, and fulfil the applicable requirements throughout the Nordic region. The Norwegian SINTEF Certification institute has tested and approved the products in the system. This is your guarantee that DAFA Radon System meets the radon protection requirements.

DAFA Wall Membrane (DPC)

DAFA Wall Membrane is a key element of the system. It is a specially developed membrane for protecting against radon and moisture in foundations and floor structures.

It is easy to use and trim, making it simple to work with. DAFA Wall Membrane comes in 25 m rolls and is available in 10 different widths. It is a very versatile product.



ng accessories

DAFA Wall Membrane (DPC) and DAFA Radon Barrier are the main products in the system. The system also comprises a number of supplementary accessories that make it quick, safe, and easy to install lasting radon protection.



DAFA Radon Barrier

- is a membrane that ensures an efficient, airtight radon and moisture-resistant seal.



DAFA UV Radon Cable Collar 195

- is a patented solution which ensures a complete seal around penetrations for electrical boxes or cables through radon barriers.



DAFA UV tape

- is a single-sided high-strength and highly adhesive tape ideal for use outdoors in the building envelope.



DAFA Butyl Tape

 for affixing radon barrier and sealing it against most building materials.



DAFA Radon Corner

- is designed to ensure fast and efficient radon, air, and moisture sealing in 90-degree foundation corners, which are normally difficult to seal.



DAFA UV Radon Pipe Collar

- is a patented, airtight solution for sealing around pipe penetrations through the radon barrier.



DAFA Radon sump

- serves as a collection point for radon gas before it is vented away. Is used where suction is required under the floor.



DAFA Radon Sealing Compound

- is a liquid, self-levelling sealing compound that effectively seals out radon, air, and moisture around installation penetrations, building columns, and irregular profiles of any shape and diameter.



DAFA Radon Flexible Molding

- is a flexible PE foam strip that can be adapted to any penetration involving multiple pipes and cables.



DAFA Multi Sealing[™]

- is used to seal in places where the radon barrier is penetrated by building elements. It is a very flexible material that can be used for uneven and round edges.



DAFA Butyl 200 joint filler

- is a non-setting joint filler used to seal overlapping joints in radon protection membranes and similar applications.

- and much more...

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Descriptions and personal advice

DAFA offers advice and guidance in connection with planning and designing your new construction or renovation project.

This advice covers individual guidance, and materials in the form of descriptions and installation instructions.

At dafa-build.com, you can find texts you may wish to use.

Training for professionals

You can call in DAFA's expert staff for a short seminar at your premises, the construction site, the workshop or your local dealer. The seminar will go through the construction applications using DAFA Radon System, involving theory, regulations, practical exercises and demonstrations.

Website with complete information

You can always find the latest information about the systems, products, their applications and how to install them on DAFA's website.

www.dafa-build.com/en/radon



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