Get it done the right way:

Protection against radon: certified radiation shielding for old and new buildings

Focus solutions

remmers

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Radon – a natural radioactive gas

Radon is a radioactive gas that can accumulate unnoticed in houses.

It is the second most common cause of lung cancer after tobacco smoke, and well ahead of particulate matter, diesel engine exhaust fumes, asbestos and quartz dust. Radon and secondary products are absorbed through the air we breathe. In the lungs, radioactive decay leads to irradiation of the sensitive lung cells. In addition to the respective lifetime of the decay products bound to the smallest air particles and the dwell time in the respiratory tract, the radon concentration in the indoor air and the duration of contamination are the decisive factors when it comes to the risk of cancer. The location of the deposition and accumulation of decay products in the body plays a major role in determining whether and where lung cancer develops. Decades can pass before the disease actually makes itself known.

The website (1) of the Lung Information Service of the Helmholtz Centre in Munich describes the German Radon Study (2) and the pooled analysis of 13 case-control studies conducted in Europe (3). Below are a few extracts from the key findings:

German Radon Study

"The risk of lung cancer increased by ten per cent for every 100 becquerels (Bq) per cubic metre of air, which corresponds to a doubling at a radon concentration of 1,000 Bq/m³ [...]
For the highest radon category (140–3,000 Bq/m³, mean value 252 Bq/m³), the risk of lung cancer increased by 40 per cent compared to the reference category (0-50 Bq/m³, mean value 38 Bq/m3). This estimate is statistically significant."

Radon studies in Europe

"...the estimated increase in relative risk per 100 Bq/m³ rises to 16 per cent. The data clearly show that exposure to radon in homes represents an increased risk of lung cancer for the general population."

Sources:
(1) https://www.lungeninformationsdienst.de/praevention/schutz-vor-radon/wirkungen/index.html (accessed on 20/07/2019)
(2) Wichmann H. E. et al: Increased lung cancer risk due to residential radon in a pooled an extended analysis of studies in Germany. Health Phys. 2005 Jan; 88(1):71-9
(3) Darby S. et al: Radon in homes and risk of lung cancer: collaborative analysis of individual data from 13 European case-control studies. BMJ, doi:10.1136/bmj.38308.477650.63 (published 21 Dec. 2004)

Radon in living spaces

Radon can enter living spaces from various sources. These include the building foundation, building materials, the ambient air and water.

The decisive factor is how well a building is protected against radon in the area in contact with the ground (basement wall and basement floor). Radon works its way through cracks, crevices and the smallest openings in foundations and wall formers and also along cable and pipe penetrations; it diffuses through the building materials if there is insufficient protection.

The German radon guidebook from the Federal Office for Radiation Protection describes the entry of radon into buildings as follows (translated from the original German): “There is negative pressure in the buildings compared to their surroundings. This is caused by the temperature difference between indoor spaces and the outside air as well as air movements around the building. A low negative pressure in the building is sufficient to draw in the radon-containing air from the soil, from a radius of approx. 10 to 20 metres.” (1)

EVALUATING THE RISK

- ✓ Radiation in living spaces has been shown to increase the risk of lung cancer.
- ✓ The exposure, in other words the duration and level of radon exposure, determines the risk of developing lung cancer.
- ✓ The risk of lung cancer increases proportionally to radon exposure, i.e. doubling the radon concentration doubles the risk.
- ✓ So far, there is no indication of a threshold value below which radon would be harmless. Therefore, the radon concentration should be reduced to the greatest extent possible in all homes.

Source:
(1) German radon guidebook, Federal Office for Radiation Protection, p. 12 (2019)

Radon-proof waterproofing

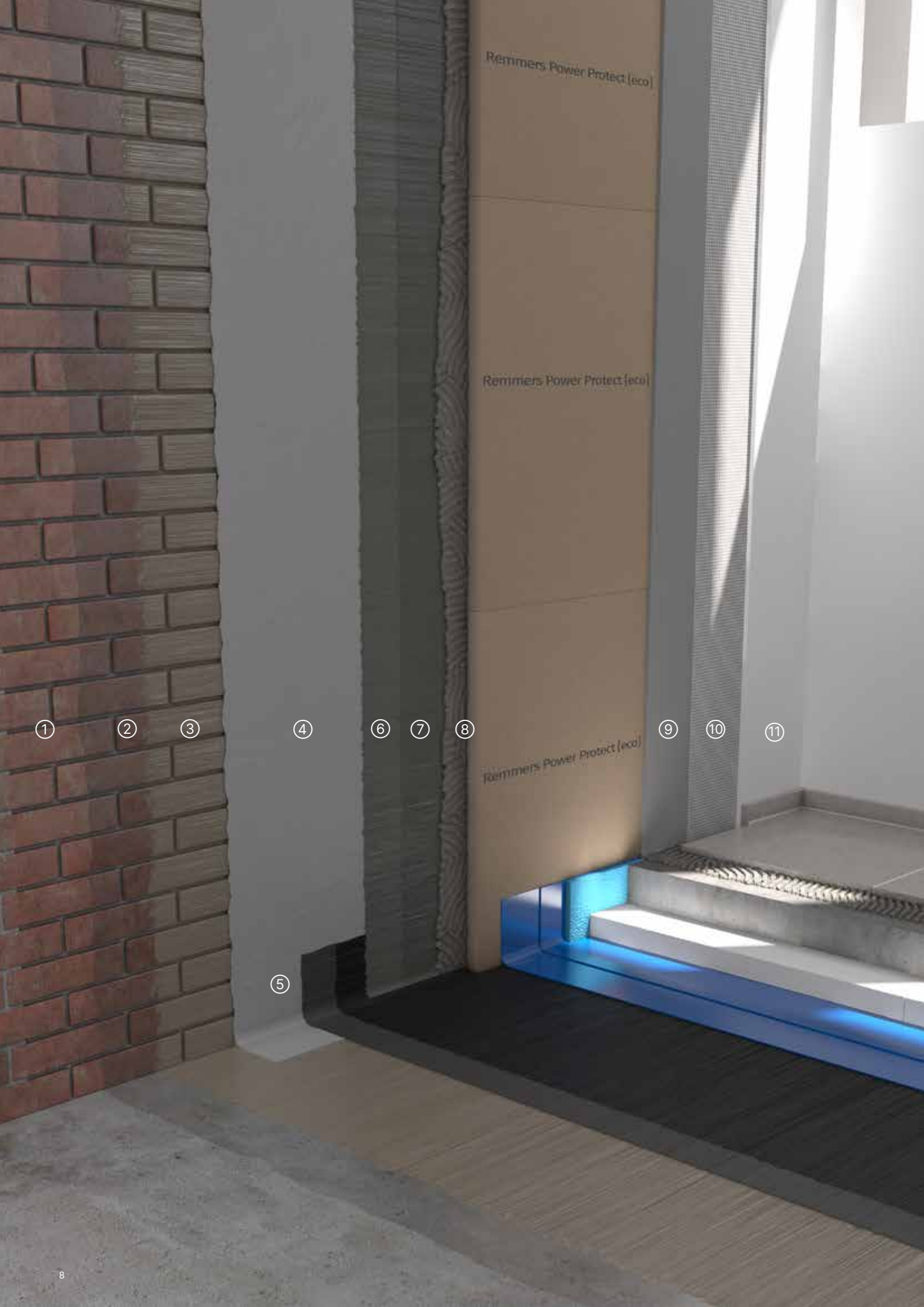
Our products fulfil the requirements of the German Radiation Protection Act and European Directive 2013/59/EURATOM.

With the introduction of the Radiation Protection Act of 31 December 2018, specifications for protection against radon in living and working spaces as well as for occupational and medical radiation protection were defined in accordance with the requirements of the European Directive 2013/59/EURATOM. By 2020, all German states had to identify and report areas with high radon occurrence. In these radon precautionary areas, different regulations for protection against radon then apply. We offer several waterproofing products with certified imperviousness to radon. All products have been tested, certified and their effectiveness proven in years of practical use.

About our waterproofing products
The gas permeability of a waterproofing material depends on both its material composition and the properties of the penetrating gas. Noble gases such as radon diffuse particularly well through porous materials as single atoms. In particular, the half-life (the period of time after which half of the amount of the isotope originally present has decayed through radioactive decay) of radon must be taken into account (3.82 days). Radioactive decay starts to take place within the building components if the time it takes for the radon atoms to diffuse through the material amounts to several half-lives. The decay products that form are then no longer gaseous and are bound in the building material, so they do not get into the indoor air and are therefore harmless to humans. Radon-proof materials must have a material thickness at least three times the diffusion length of radon (1).

Tested, certified and permanently radon-proof!
Tests carried out by the expert for radon, Dr. Kemski in Bonn, certify the radon impermeability of the following Remmers products: MB 2K, MB 1K rapid, MB 1K S, MB 2K [eco], BIT 1K [basic], BIT 2K [basic], BIT K2

Source:
(1) German radon guidebook, Federal Office for Radiation Protection, p. 29 (2019)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Radon protection in existing buildings with MB 2K

If it is not technically possible to waterproof a building from the outside, or the cost is not justifiable, then interior waterproofing comes into play. The reasons for choosing interior waterproofing can include surrounding buildings, supply lines that would be difficult to disconnect, or potential impairment of the building's structural stability.

Interior waterproofing is normally carried out with rigid, mineral waterproofing slurries.
However, these products cannot permanently close dynamic cracks – nor are they impervious to radon.

For this reason, we recommend an easy-to-use combination that offers a smart technical solution: This combination consists of the crack-bridging interior waterproofing product MB 2K – with tested imperviousness to radon – and the Power Protect [eco] system, an ecologically and economically sustainable refurbishment and insulation system that has been awarded the German 'Blue Angel' eco-label.
Installation couldn't be easier. The environmentally friendly panels, which are mainly composed of heat-insulating mineral perlite and recycled cellulose, can simply be adhesively bonded onto MB 2K by floating. That's it!

① **Preliminary work**
Remove old plaster and coatings to 80 cm above the damaged region and chase out damaged joints to a depth of 2 cm.

② **Primer**
Apply an even layer of Kiesol (1:1 with water) over the prepared substrate. Pre-wet highly absorbent substrates with water.

③ **Bonding layer**
Within the reaction time of Kiesol, use a slurry brush to apply the bonding layer of WP Sulfatex.

④ **Levelling**
Use WP DS Levell to seal uneven areas while the material is still wet.

⑤ **Fillet**
Use a curved trowel to create a fillet of WP DS Levell while the material is still wet.

⑥ **First waterproofing layer**
Use a slurry brush to apply the first waterproofing layer of MB 2K to a thickness of 2 mm over the levelling layer.

⑦ **Second waterproofing layer**
Apply the second layer of MB 2K to a thickness of 2 mm over the first layer once it cannot be damaged.

⑧ **Affixing Power Protect [eco] panels**
Create an adhesive bed of PP Fix over the entire surface area of the dry waterproofing layer by floating. Position the Power Protect panels on the wall, press on and align. Avoid creating cross joints.

⑨ **First filler layer of PP Fill**
Using a toothed trowel, apply the filling and reinforcement mortar PP Fill onto the front side of the panel to a layer thickness of 3 mm.

⑩ **Reinforcement with Tex 4/100**
Using a smoothing trowel, embed the reinforcement fabric Tex 4/100 into the mortar in vertical strips free of pleats (allow individual strips to overlap by at least 10 cm).

⑪ **Second filler layer of PP Fill**
Apply a second layer of the filling and reinforcement mortar PP Fill to a thickness of approx. 2 mm over the reinforcement layer once it has set sufficiently.
To create a fine, closed surface ready for painting, smooth off PP Fill with the smoothing trowel and rub if necessary once stiffened.

We get it done so that you can get things done

Whatever you have in mind: We at Remmers do everything to personally support you, your work, your project, your idea, your vision, to reach your goal.

We never stand still and we always go one step further for you.
We drive tomorrow's products and services forward. And strive for sustainable development. Because we know from over 70 years of experience: Progress comes from getting things done, success comes from getting things done, the future comes from getting things done.

What can we get done for you? Don't hesitate to get in touch.

"Never stop starting and never start stopping."

Guiding principle of Bernhard Remmers, founder

Remmers is one of the leading specialists for construction chemicals, wood paints and coatings, and industrial coatings. Founded in 1949 by Bernhard Remmers, we are an independent and owner-managed family business to this day. Our head office is located in the German town of Löningen in the Lower Saxony region – this is where we have our roots. At the same time, we have an international presence with 18 subsidiaries.

Exceptional range of products and services

Tailored solutions

Production in Germany

≈ 1600

Highly qualified specialists Europe-wide

All the extras that we get done for you

- **Personal service on site**
- **Digital services**
- **Delivery within 24 hours in Germany**
- **Remmers International Guarantee**
- **Competence Centres, Training and Service Centre**
- **Bernhard Remmers Academy**
- **Remmers Professional Planning**
- **Bernhard Remmers Institute for Analytics**

We get it done!

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We are there for you with a fast and personal response.

Find your local contact

Find out what we can get done for you:

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Colour variations are possible.
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