# RADON PROTECTION


## RADON PROTECTION MEASURES

## RADON BARRIERCOAT

## CONCURE 20/20

BBA BRITISH BOARD OF AGRÉMENT
CERTIFICATE No 08/4534

1965

Sovereign

the gold standard in building products

# RADON PROTECTION

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## 1. What is Radon?

Radon is a colourless, odourless gas that is radioactive. It is formed where minute traces of uranium are present in rocks, soil and masonry and can move through cracks and fissures in the subsoil and so into the atmosphere or into spaces under and in dwellings.

Radon levels vary between different parts of the country, and even between neighbouring buildings. High Radon levels are not limited to areas of granite; all types of geology may be affected.

Radon contributes around 50% of the average background radiation dose received by the UK general public.

Test data has suggested that many members of the public living in regions of elevated natural radon levels are at increased risk from lung cancer.

The Health Protection Agency has advised that the level of 200 $Bq/m^2$ should be considered the Action Level.

In existing homes where the radon level is found to be close to or above this level the Health Protection Agency recommends that measures are introduced to reduce the Radon to well below this level.

For new build structures in areas of elevated radon potential, consideration must be given to installing radon protection at the construction stage.

BR211 * (2007) defines those areas where basic or full protection should be provided and also areas less at risk, but where an Assessment should be carried out.


BR211 * (ISBN 978-1-84806-013-5) is published by the Building Research Establishment (BRE) Tel. 01923 664000.


*BR376 for Scotland

Assistance, advice and individual Technical Specifications are available on request from our Technical Department.
Call: 0845 603 0722

## 2. Radon Protection

Full protection comprises of a ventilated radon sump below the floor of the building in conjunction with a radon proof membrane.



Sovereign Radon Barriercoat has been independently tested by Saarland University, Hamburg, and found to be a complete barrier to Radon. It has further been studied by the British Board of Agrément and awarded a BBA certificate, confirming its suitability for this use.

Incorporation of Radon reduction measures at the initial planning stage saves time and precludes the necessity to carry out a geological survey. This can save the construction contractors time and money, as the techniques employed are relatively inexpensive.

Sovereign Radon Barriercoat provides basic radon protection and a waterproof membrane complying with requirement C2 and C4 of Schedule 1 of the Building Regulations 2000 for England and Wales.

Sovereign Radon Barriercoat will also provide protection from methane and carbon dioxide and thus finds use in construction on brown-field sites.

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Sovereign Radon Barriercoat liquid applied membrane offers a simple method for many vapour proofing and water proofing applications.

## 3. Radon Barriercoat

**Advantages include:**

- Single pack system.
- Water based compounds that can be applied even to damp backgrounds.
- Non-toxic, non-hazardous, solvent and plasticiser free.
- Quick drying. Typically touch dry in 1 hour.
- Good bond to many substrates.
- Toughness, high flexibility, extensibility and good crack bridging properties.
- Low water vapour permeability.
- Alkali resistant, can be applied to alkaline surfaces.
- Non-staining and stain blocking.

When applied to the full footprint of a building Radon Barriercoat will act as both a Radon Barrier and Damp Proof Membrane. It also act as a barrier to $CO_2$, methane and other hydrocarbon gases.

Radon Barriercoat is applied in a minimum of two coats to achieve a total thickness of 1mm. The membrane is colour coded green to give simply visual identification of areas that are treated.

When applying the Radon Barriercoat it is essential that backgrounds be lightly dampened, but without surface water, to aid application and increase adhesion.

Radon Barriercoat is not a wearing surface, so must be protected from traffic at all times.

Where application of Radon Barriercoat is to be carried out on earth retaining structures then the building must first be protected against hydrostatic water pressure. This can be achieved by the application of the Sovereign Hey'di K11 tanking system. Full specifications are available both individually and jointly for Radon Barriercoat and Hey'di K11.

Sovereign Radon Barriercoat is used to provide Basic Radon Protection. For new build where Full Protection is required then a sump should be installed below the floor and vented to the outside.

Radon Barriercoat can be applied in many types of construction such as building off a slab or strip foundations where block and beam floors are utilised then contact Sovereign Technical Department.

This picture shows an earth retaining wall that has first been treated with the Hey'di K11 tanking system. Radon Barriercoat was then applied to the wall and across the floor where internal walls are to be constructed. The walls are built off the Radon Barriercoat and the final stage is then to coat across the floor joining the coating with areas already treated to create a continuous barrier. The floor is then overlaid with Sovereign Floor Levelling Compound or screed. This method ensures that the Radon Barriercoat is not subject to foot traffic during the building process.

Here, where the floor slab has been poured and the brickwork built up to DPC level, the Radon Barriercoat is applied up the side of the internal face of the masonry and lapped over the top. Radon Barriercoat also acts as a DPM, therefore there is no requirement for a plastic membrane. Once the building is complete the remainder of the floor is coated and Sovereign Floor Levelling Compound is applied.

**Design Details**

**Construction built of a solid floor slab/raft.**

Radon Barriercoat is applied directly to the structural floor slab. Apply to the perimeters, in a sufficiently wide strip to take the width of the walls. Build directly off the coating. Apply coating to entire floor area once construction work is complete and finish with the final floor e.g. Sovereign Floor Levelling Compound, screed or tiles for example.

**Partially built to DPC level**

Sovereign Radon Barriercoat applied over the brickwork and down into the cavity. Alternatively a weak mix can be used to fill the cavity and this coated over. The use and design of cavity trays and weep holes should be considered according to current building regulations.

**Existing build**

Apply Radon Barriercoat over the floor and up walls. Cavities must be vented to allow the escape of Radon gas.

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**Dealing with internal angles.**

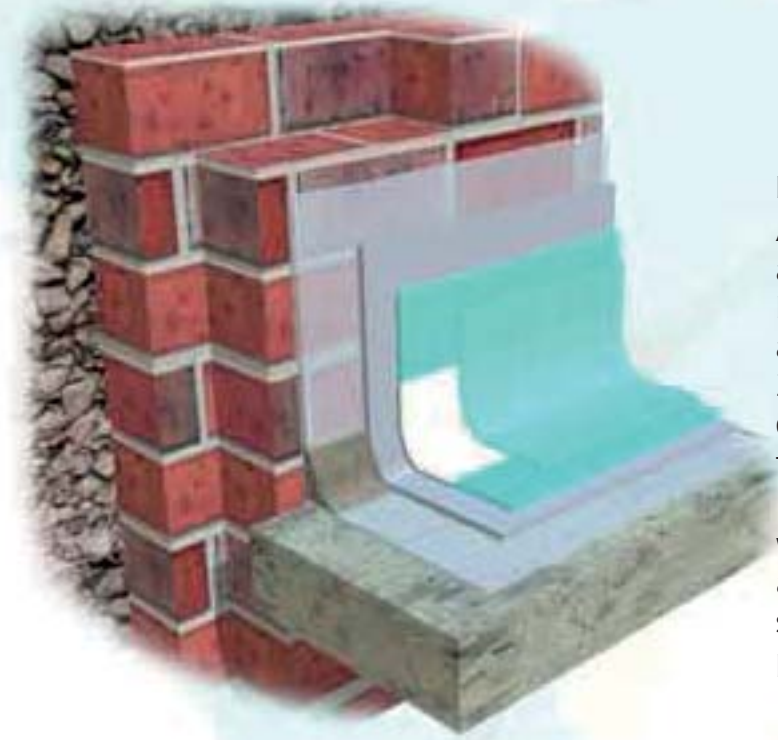
Apply a heavy coat of Radon Barriercoat into the corner and immediately bed Sovereign Flexi-Tape into the wet compound. Brushing the back of the tape with Radon Barriercoat makes this process easier and improves the bond, as does cutting the tape into short (1 - 2m) lengths and creating an overlap of 5cm at each meeting point.

**Cracks.**

Open up any cracks with an angle grinder to at least 25mm. Fill the resulting void with a 3:1 sand : cement mix. This should be gauged with Sovereign SBR : water 1:3. Allow a minimum of 24 hours to cure before applying Radon Barriercoat over the crack and embed Sovereign Flexi-Tape into the coating whilst it is wet.

**Movement joints**

Movement joints can be filled with a suitable sealant such as Sovereign Polysulphide, which must be allowed to fully cure. The joint can then be over coated with Radon Barriercoat which should have the Sovereign Flexi-Tape bedded into the first coat.



**Earth retaining walls.**

Apply one coat of Sovereign Hey'di K11 down the wall and across the floor. At the wall and floor joint use Sovereign Hey'di Barrier Mortar to produce a 25mm angled fillet. Apply a second coat of Sovereign Hey'di K11to the wall and overlap 200 mm onto the floor. Allow the Sovereign Hey'di K11 to cure for at least 24 hours. The walls and floor can now be treated with Radon Barriercoat as normal.

In all instances it is the users responsibility to ensure that walls and floors are clean, sound, structurally stable and are able to withstand the forces present in an earth retaining structure that is potentially subject to hydrostatic water pressure.

## 4. Application

**Preparation**

The background surface should be smooth or have a light even texture. Any masonry should be flush pointed and defects in existing surfaces made good.

The surface needs to be clean, sound and free of dust, loose material and surface water. Radon Barriercoat should not be applied in wet conditions or where these conditions are likely to occur before the membrane has dried. The membrane should not be applied when the temperature of the background, or the air temperature, is below 7°C.

Pre-wet concrete or masonry backgrounds so that these are damp but free from any water glistening on the surface, to aid the wetting out of the background.

Because of the wide variety of background types and site conditions **it is always advisable to check adhesion to the background by testing on a sample area before starting any job.**

**Apply Barriercoat (First coat)**

The membrane may be applied by brush, roller or airless spray. If necessary the compound can be diluted with up to 10% water. However, care should be taken to ensure that the correct dry coat thickness is applied.

It is vitally important that the overall thickness achieved is 1mm. This equates to a coverage of 2kg per m2. Sufficient material should be purchased for the area to be treated and the coating applied until the entire product has been used up.

**Apply Barriercoat (Second coat)**

The thickness of the dried membrane per coat depends on the method of application. If two coats are being applied the coats must be applied at right angles to each other.

Before applying the second coat it is necessary to let the first coat become touch dry. The time required to reach this touch dry condition will vary according to site conditions but will typically be in the order of 1 hour.

**Awkward areas**

At high stress points such as wall / floor and wall / wall joints, fabric reinforcement is required. This is achieved by incorporating Sovereign Flexi-Tape into the corners. The fabric is rolled into the wet first coat, and then coated with additional membrane after allowing the first coat to dry to a tacky condition.

Where service pipes are required to pass through the coating then fabric collars are available and used in a similar way to the Sovereign Flexi-Tape. The collars are available in sizes suitable for standard water inlet and waste water outlets. Once the coating on the fabric collar is dried we would recommend that a fillet of Sovereign Prostick 2000 be applied around the pipe to ensure a complete airtight seal is formed.

Where large diameter pipes are encountered e.g. soil pipes, then the following method should be used.

Where there is a large gap between the masonry and pipe this should be filled with Sovereign Expanding Foam, which is left to cure for 24 hours. Any excess foam should be cut off flush with the surrounding masonry. Form a fillet around the base of the pipe with Sovereign Prostick 2000. Apply two coats of Sovereign Radon Barriercoat over the Prostick.

If the gap between the background and pipe is very tight then a collar of Prostick should be formed around the base of the pipe. Two coats of Radon Barriercoat can then be applied over the masonry, Prostick and lapped 150 - 300mm up the pipe.

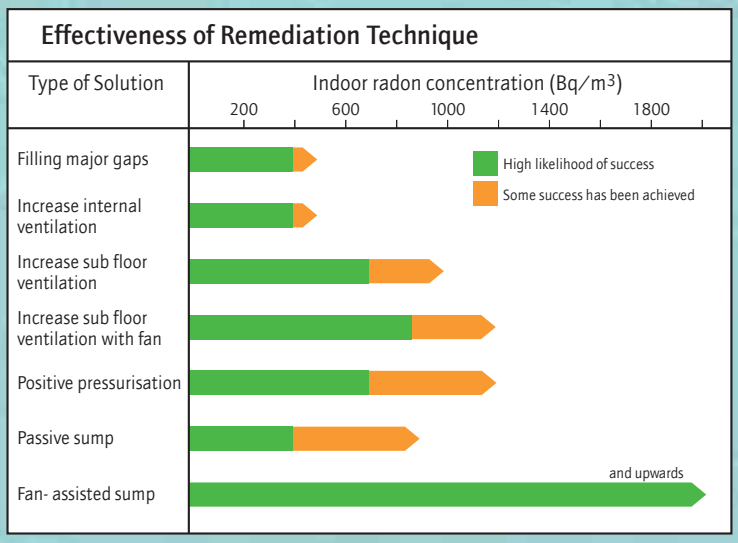
Wherever large service entries occur it is always beneficial to cut and shape the Flexi-Tape to fit and bed in to the Radon Barriercoat, as well as forming a Prostick fillet.

## 5. Finishing

When used to protect walls then we would recommend that the surface be finished with Sovereign Renderlite Renovating Plaster and floors finished with Sovereign Floor Levelling Compound or screed.

## 6. Sovereign Concure 20/20

Radon remediation measures are sometimes required in existing building where the level of Radon has been measured and found to be above the action level. Various methods of remediation exist that have varying degrees of success, and are suitable only for certain levels of measured Radon contamination.




By far the most successful method for reducing Radon levels in existing buildings without major disruption to the householder is the use of Positive Pressure Systems. These work by fitting a fan unit in the loft space that blows a slow, steady stream of fresh air into the building. The fresh air that is forced into the dwelling causes a small increase in internal pressure of the house. This in turn forces Radon out of the building through microscopic voids that are present in all types of construction.

The Sovereign Positive Pressure System is known as the Concure 20/20 system. This has the added benefit of also eliminating condensation in properties and generally increasing the quality of air in the home. As well as reducing Radon and eliminating condensation the Concure 20/20 reduces odours from cooking, smoking and pets and assists in preventing infestation of mites, as these require high levels of humidity to survive. The Sovereign Concure 20/20 system is easily installed in the loft by a qualified electrician. The unit is supplied with a discreet, adjustable diffuser unit.

Householders may worry that the unit will blow cold air into the house, however this is not a problem with the Sovereign unit. The air in the loft is always warmer than external air temperature due to a phenomenon known as solar gain. In fact fitting a Concure 20/20 can reduce energy bills, as the warmest part of the house is generally the air at the top of a landing. This air is recirculated around the house giving a more even temperature allowing thermostats to be turned down.

Also, unique to the Sovereign Concure 20/20 is an integrated, microprocessor controlled pulse heater. The brain inside the unit constantly measures the temperature of the air being pumped into the building. When the air temperature falls below 10°C the heater gently increases the air temperature to 10°C but no higher. As soon as the air temperature reaches this point the heater automatically cuts off. This ensures that the heater only runs when required, saving money and ensuring that no cold draughts are introduced.

The Sovereign Concure 20/20 can be easily adjusted to deal with different sized properties. There are four settings; with the highest setting the unit is capable of reducing and eliminating Radon in a four bedroom detached house.

The Concure unit comes complete with a 5 year parts and labour guarantee and requires only the outer dust filter to be replaced after 5 years.

**Sovereign Chemicals Limited**
Park Road
Barrow-In-Furness
Cumbria LA14 4EQ
Tel: 01229 870800 Fax: 01229 870850
e-mail: sales@sovchem.co.uk
web site: www.sovchem.co.uk