CI/SfB (L26) (A3j)

NSAI Agrément

IRISH AGRÉMENT BOARD
CERTIFICATE No. 00/0106

Raven Industries, PO Box 5107,
Sioux Falls, SD 57117-5107, USA.
T: 00 1 1 800 6353456
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Dura Skrim 15 WW
Radon Resisting Membranes

Membranes Resistantes au Radon (F)
Anti-Radon Membran (D)

NSAI Agrément (Irish Agrément Board) is designated by Government to carry out European Technical Assessments.

NSAI Agrément Certificates establish proof that the certified products are **'proper materials'** suitable for their intended use under Irish site conditions, and in accordance with the **Building Regulations 1997 to 2019**.

PRODUCT DESCRIPTION:
This Certificate relates to Dura Skrim 15 WW and Dura Skrim 15 WW Foil Radon Resisting Membranes used as part of radon/gas protection systems in buildings.

In the opinion of NSAI, the Dura Skrim radon resisting membranes, as described in this Certificate, complies with the requirements of the Building Regulations 1997 to 2019.

USE:
Radon (incl. Rn-222, Rn-220, RnD) is a naturally occurring radioactive gas which enters buildings from the underlying soil. The gas can accumulate within a building to such a concentration as to constitute a health hazard.

Radon is excluded from buildings using passive and active systems. The provision of a suitable protection system, designed and installed by competent personnel will substantially reduce the risk of a building having radon activity above a recommended target health level of 10-40 Bq/m^3 (USA).

Passive control systems consist of a radon resisting membrane extending across the whole of the building, including the floor and walls. These systems should also incorporate an underfloor ventilated sump or sumps (see Fig 5), which can be subsequently converted into an active control system by the use of suitable ventilation fans.

A radon resisting membrane when installed in accordance with this Certificate will also act as a damp proof membrane to protect the building against the ingress of moisture from the ground.

MANUFACTURE AND MARKETING:
The products are marketed by:

Tradecraft Building Products Ltd.,
Unit 2,
Tougher Business Park,
Newbridge Road,
Naas,
Co. Kildare,
Ireland.
T: 045 409050
F: 045 409051
E: sales@tradecraft.ie
W: www.tradecraft.ie

The products are manufactured by:

Raven Industries,
PO Box 5107,
Sioux Falls,
SD 57117-5107,
USA.

1.1 ASSESSMENT

In the opinion of NSAI Agrément, the Dura Skrim 15 WW Radon Resisting Membranes, if used in accordance with this Certificate can meet the requirements of the Building Regulations 1997 - 2014 as indicated in Section 1.2 of this Certificate.

1.2 BUILDING REGULATIONS 1997 to 2019

REQUIREMENT:

Part D – Materials and Workmanship

D3 – The Dura Skrim 15 WW Radon Resisting Membranes, as certified in this NSAI Agrément Certificate, are comprised of proper materials fit for their intended use (see Part 4 of this Certificate).

D1 – The Dura Skrim 15 WW Radon Resisting Membranes, as certified in this Certificate, meet the requirements for workmanship.

Part A – Structure

A1 – Loading

The Dura Skrim 15 WW Radon Resisting Membranes, installed in accordance with this Certificate, will not adversely affect the designed safety and deflection characteristics of a building.

Part B – Fire Safety

Part B Vol 2- Fire Safety

B3 & B8 – Internal Fire Spread (Structure)

The Dura Skrim 15 WW Radon Resisting Membranes, installed in accordance with this Certificate, will not adversely affect the control of fire and smoke within concealed spaces in the structure or fabric of a properly designed building.

Part C – Site Preparation and Resistance to Moisture

C3 – Dangerous Substances

The Dura Skrim 15 WW Radon Resisting Membranes, when used as an integral part of a radon protection system, will meet this requirement with respect to radon gas.

C4 – Resistance to Weather and Ground Moisture

The Dura Skrim 15 WW Radon Resisting Membranes, when used in accordance with Part 3 of this Certificate, will meet this requirement.

2.1 PRODUCT DESCRIPTION

This Certificate relates to the Dura Skrim 15 WW Radon Resisting Membranes, a four layer extrusion laminate consisting of two sheets of high strength polyethylene film laminated together with molten polyethylene, enclosing a layer of heavy polyester skrim reinforcement to enhance tear resistance. Dura Skrim 15 WW Foil Radon Resisting Membrane has an additional layer of aluminium foil between the top layer and the second layer.

It is essential that these products are laid in accordance with the recommendations of IS EN 1996-1-1[1] and BS 8102[2] and with this Certificate.

Accessories:
'Polyseal' radon resisting sealant tape (rubber resin adhesive bonding tape), butyl double sided tape, heavy duty polyethylene top-hat units for pipes penetrating the membrane and an approved adhesive bituminous gas resisting membrane (Bituthene).

2.2 MANUFACTURE

Dura Skrim 15 WW Radon Resisting Membranes are manufactured by an extrusion process.

2.2.1 Product Quality Control

Quality control checks are carried out on the raw material, during production and on the final product. Quality control on the final product includes checks on density, melt flow indices, thickness, roll width, dart impact strength, bond and peel test, weight and dimensions.

2.3 DELIVERY, STORAGE AND MARKING

Rolls are supplied individually or on pallets, in wrappers bearing the manufacturer's name and product description, NSAI Agrément identification mark, NSAI Agrément Certificate number and essential instructions for storage and installation.

2.4 INSTALLATION

2.4.1 General

Guidance on the design of radon protection systems for new and existing buildings is given in the DHPLG document *Radon in Buildings*.

This Certificate does not contain a full set of installation instructions, but an overview of the procedures involved. For a full list of these instructions, refer to the Certificate holder's manuals. Should a conflict arise between this Certificate and the Certificate holder's manuals, this Certificate shall take precedence.

2.4.2 New Work

The Dura Skrim 15 WW Radon Resisting Membranes can be used in most common ground floor constructions. They are installed in a similar way to damp proof membranes **but with much greater attention to detailing and workmanship**. The radon membranes will also perform the same function as DPCs and membranes (see Figs 1 to 13 for construction detailing).

To be fully effective, radon resisting membranes must bridge cavities in walls and in doing so should form a cavity tray. Where necessary narrow strips of membrane can be used to seal walls and cavities. All designed cavities must be properly closed.

Avoid creating slip planes in masonry walls – do not set a dpc in contact with a barrier (see the recommendations in IS EN 1996-1-1[1]).

Consideration must be given to the positioning of a radon resisting membrane in relation to thermal insulation. The recommendations contained in IS EN 1996-1-1[1] should be followed.

Physical Properties	Result	
Colour	White	
Thickness	0.37mm	
Tensile Strength	MD 26.8MPa CD 19.9MPa	
Elongation	MD 1024% CD 957%	
Nail Tear Resistance	MD 147N CD 170N	
Low Temperature Flexibility	No cracking at -40°C	
Moisture Vapour Transmission Rate	0.21g/m^2/day	
Radon Permeability - 15 WW - 15 WW Foil	 4.23x10^{-12}m^2/s 0.58x10^{-12}m^2/s	
	Width	**Length**
Roll Size	5.48m	18.25m
	9.15m	16.45m

Table 1: Technical Data

The integrity of radon resisting membranes must be maintained during installation. Dura Skrim 15 WW Radon Resisting Membranes are resistant to puncturing and tearing, but where damage occurs this must be repaired by covering with a second layer of membrane sealed to the original using 'Polyseal' tape.

Installation of Dura Skrim 15 WW Radon Resisting Membranes must be in accordance with the recommendations of IS 1996-1-1[1], BS 8102[2], and the requirements of this Certificate. Additional guidance on the use of damp proof membrane materials is given in BS 8000-4[3].

A surface blinding of soft sand (50mm min. thickness) or geo-textile should be used to prevent puncture of the membrane during installation. A further protection over the membrane is afforded by using high density insulation (25 kg/m^3).

Factory sealed membrane sheets must be clean and free from dirt and grease before application, and in view of the difficulty of achieving gas tight seals under wet or dirty site conditions it is recommended that special care is taken with this aspect of the installation. However, Dura Skrim 15 WW Radon Resisting Membranes are factory sealed by a fusion process where possible. This reduces the use of sealing tapes to a minimum during site installation.

2.4.3 System Installation Procedures

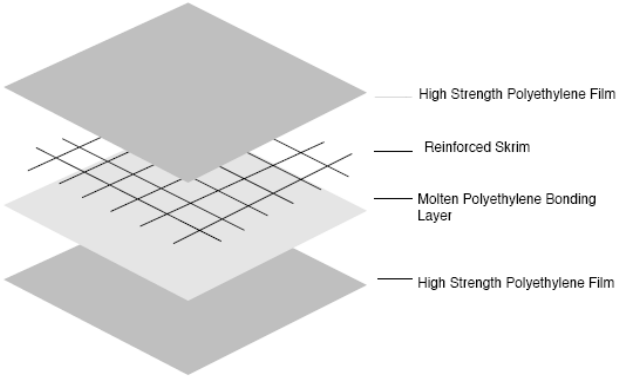
Dura Skrim 15 WW Radon Resisting Membranes are normally supplied to site factory sealed or sealed on site using a fusion process which gives mechanical properties equivalent to the parent membrane. However, when this is not possible unroll one width of membrane after determining the most effective method of covering the area. Apply the 38mm Polyseal sealant tape about 50mm from the edge, leaving the backing paper on. Lay the next width of membrane overlapping the first by 150mm. Remove the backing paper from the Polyseal sealant tape in a warm place until required, and if necessary apply a little hot air, taking care never to use a naked flame. Alternative tape joints are shown in Fig 1C.

Where service ducts or pipes penetrate the membrane, gas tight joints are effected using Polyseal sealant tape and Top-Hat units with Polyseal sealant tape strips (see Fig 2).

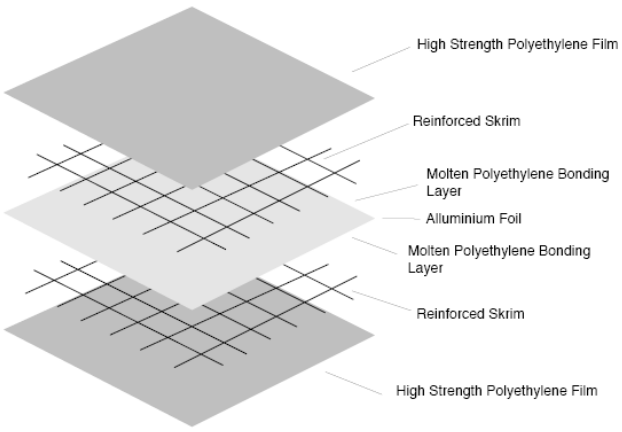
Also care should be taken to ensure that all corner joints at rising walls are fully sealed using the appropriate membrane and Polyseal tape.

Pipes, steel stanchions, concrete columns and other building elements penetrating the membrane can be sealed using the approved adhesive gas resisting membrane with an overlap of 150mm on each surface and rolled firmly (see Fig 3). Steel, concrete and masonry surfaces should be primed, in accordance with the primer manufacturer's instructions, prior to the adhesive membrane being laid. This method can also be adopted to seal pipe collars.

A membrane must be covered by a screed, high density insulation or other protective layer as soon as possible after installation. Care should be taken to ensure that the membrane is not stretched or displaced when placing the concrete or screed. Great care should be taken to avoid creating areas of unsupported membrane during screeding operations, for example at internal angles.



Dura Skrim 15 WW Membrane



Dura Skrim 15 WW Foil Membrane

Fig 1A: Factory sealed fusion weld joint and wrap around radon protection detail on rising wall at external door opening

Fig 1C: Detail showing butyl double sides tape and Polyseal tape

Fig1B: Close up view of factory sealed fusion joint

Fig 2: Figure showing Top-Hat with Polyseal strips

Fig 3: Detail showing structural steel stanchion with penetration seal

Fig 4: Dura Skrim 15 WW Radon Resisting Membrane with Top Hat seals on service ducts

Fig 5: Section through a sub-floor showing the installation of a radon collection sump with proprietary white vent pipe system

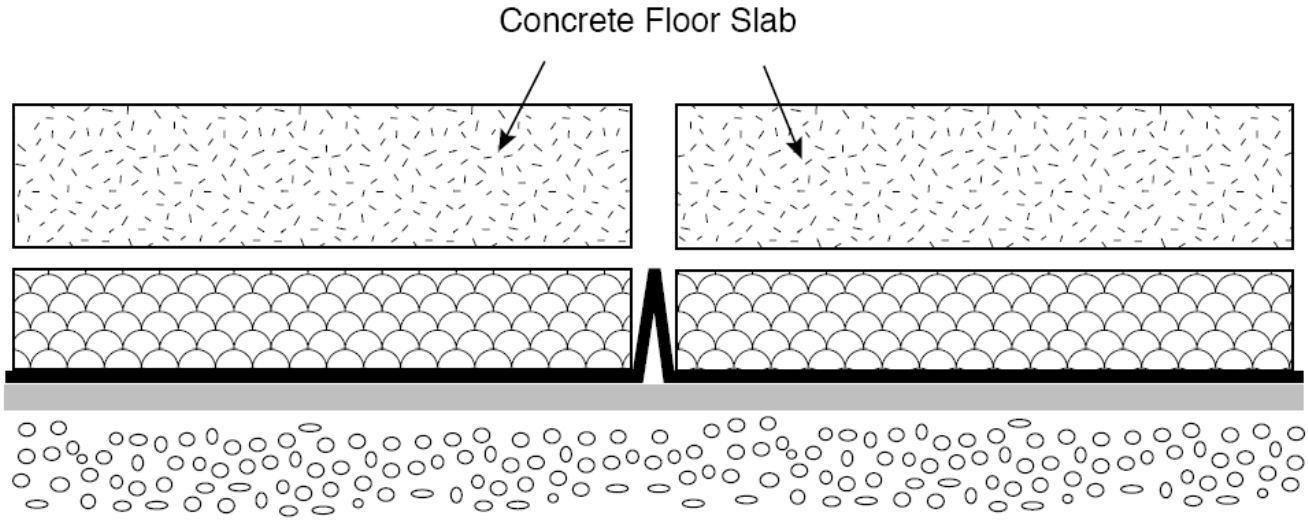


Fig 6: Detail of Movement Joint in Floor Slab

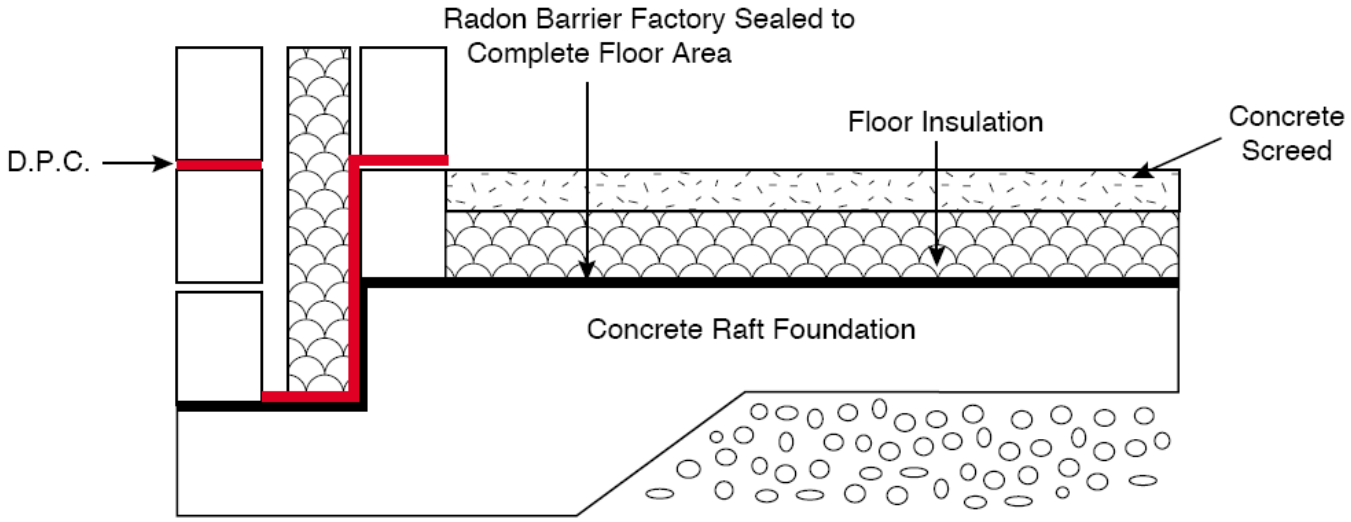


Fig 7: Detail showing raft foundation

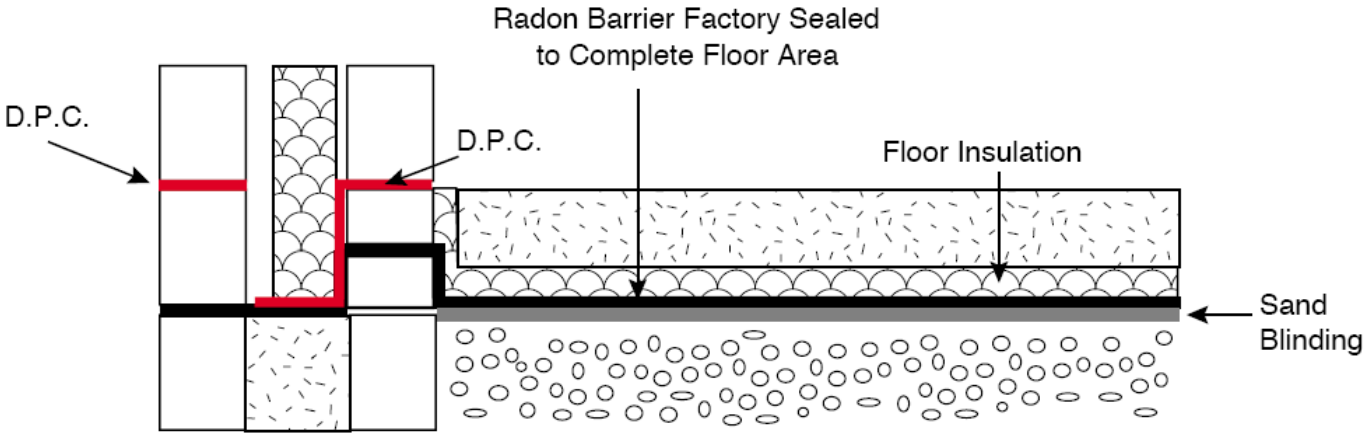


Fig 8: Detail showing 300mm masonry cavity wall

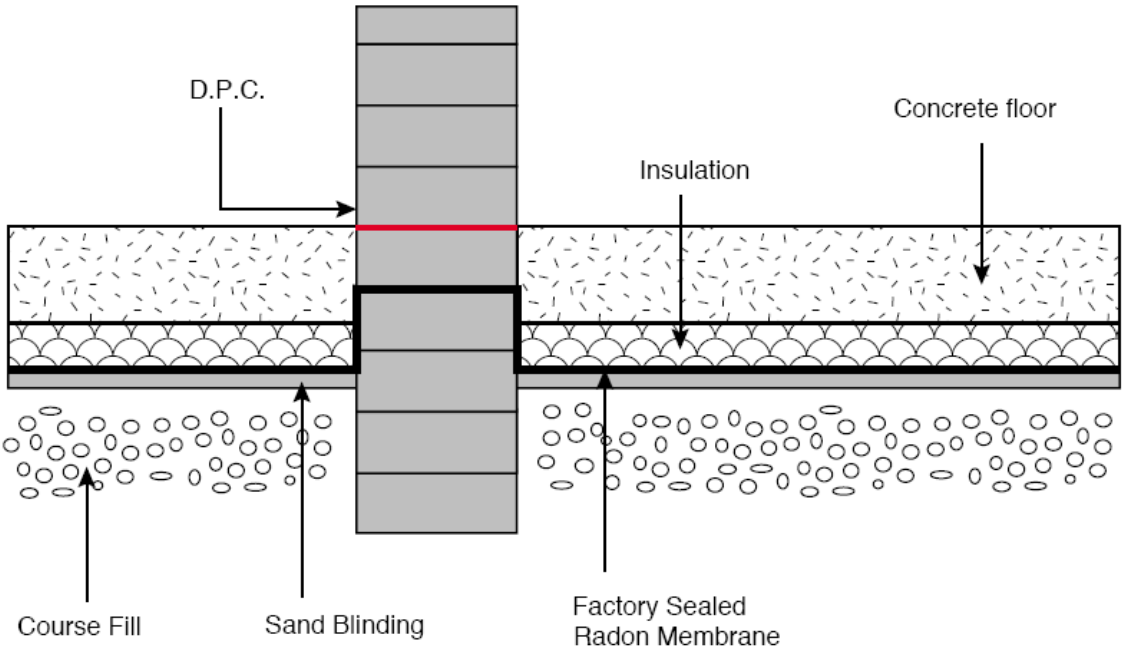


Fig 9: Detail showing party wall

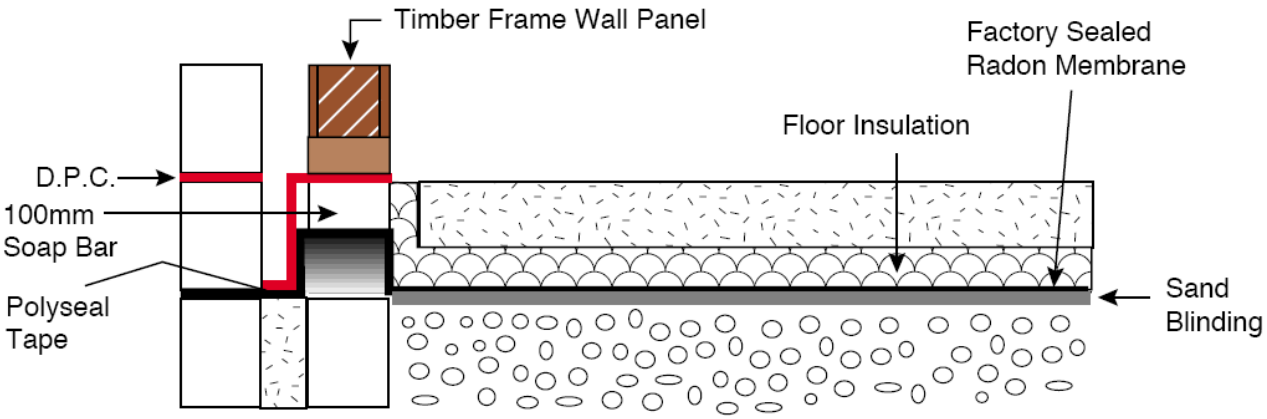


Fig 10: Detail showing radon protection for timber frame construction

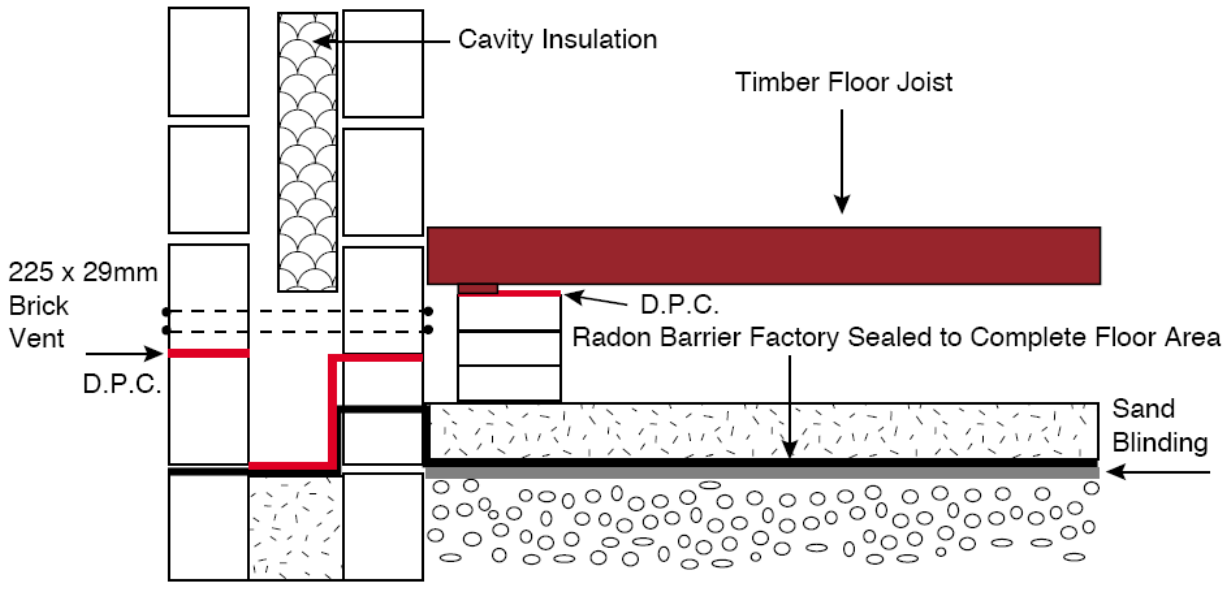


Fig 11: Detail showing radon protection for suspended timber floor

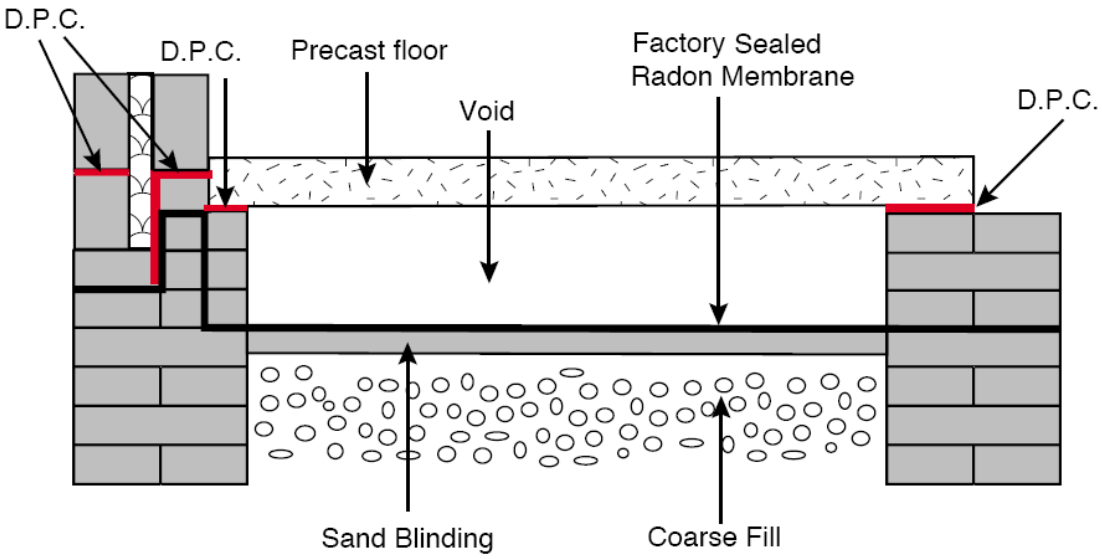


Fig 12: Detail showing radon protection for suspended concrete floor

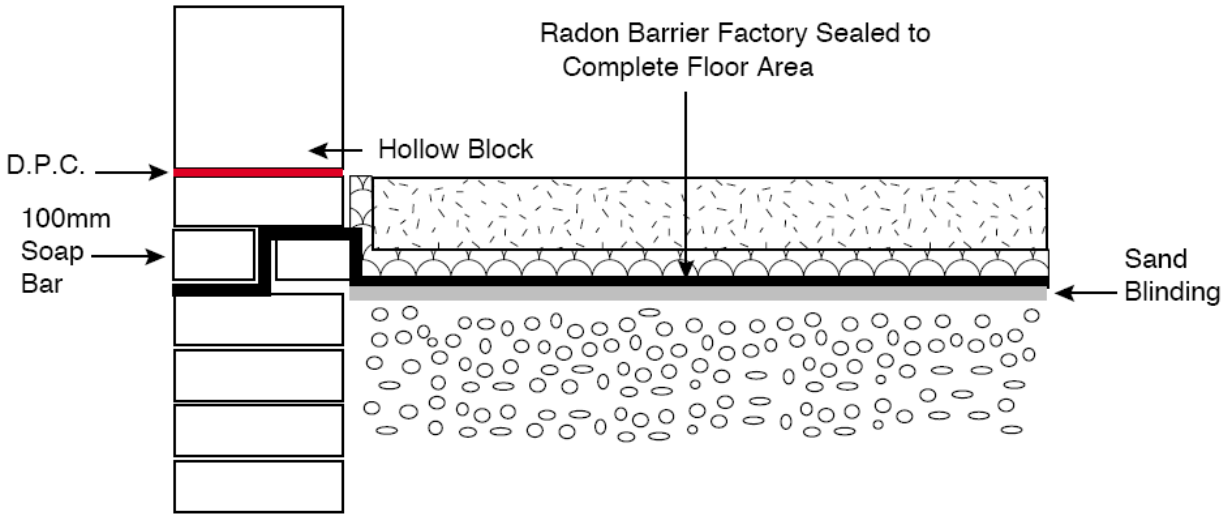


Fig 13: Detail showing hollow block wall

CONSTRUCTION DETAILING – PROVISION FOR SETTLEMENT

Situation A:
If it can be predicted with certainty that there will be no actual/real relative or differential settlement during the entire cycle of a building, the Dura Skrim 15 WW Radon Resisting Membranes may be installed as shown:

Situation B:
If it can be predicted with certainty that the actual/real relative or differential settlement during the entire life cycle of a building will not exceed 8mm, the Dura Skrim 15 WW Radon Resisting Membranes may be installed with a 150mm upstand as shown:

Situation C:
If it cannot be predicted with certainty what the actual/real relative or differential settlement will be during the entire life cycle of a building, the Dura Skrim 15 WW Radon Resisting Membranes should be installed with folds as shown:

Note:
Where movement is predictable and where the solutions referred to above cannot be applied Dura Skrim 15 WW should be used in place of Dura Skrim 15 WW Foil.

3.1 GENERAL

The Dura Skrim 15 WW Radon Resisting Membranes are suitable for use in concrete floors not subject to hydrostatic pressure, in accordance with the relevant clauses of IS EN 1996-1-1[1] and BS 8102[2].

The membranes can be installed either between a blinded hardcore bed and the base concrete, or between the base concrete and screed.

Resistance to water and water vapour

The membranes and the methods of jointing provide an effective barrier to the passage of radon gas, liquid water and water vapour from the ground.

Resistance to tear

The products have a high resistance to tear (see Table 1). Care should be taken during installation, particularly when handling building materials and equipment over the surface and when placing concrete or screeds, since the membranes can be punctured by sharp objects. High density insulation (25kg/m^3) is an effective protection after laying.

Site conditions

The system may be installed in all conditions normal to ground floor slab construction. Where there is a risk of ground becoming waterlogged, sub-soil drainage must be provided in accordance with IS EN 1996-1-1[1] and BS 8102[2].

Underfloor heating

When used in accordance with the conditions set out in this Certificate, there will be no adverse effect on the membranes from underfloor heating under normal conditions. The manufacturer's advice should also be sought for project specific details.

3.2 CONSTRUCTION DETAILING

To reduce radon gas migration into buildings the following guidelines should be followed:

- Design for controlled movement of construction (see IS EN 1996-1-1[1]);
- Ensure that all designed cavities are effectively closed to interior spaces;
- Design for grouping of services with effective gas seal of ground slab openings and penetrations.

To aid radon gas dispersal and prevent build-up:

- Avoid downstand beams and limit number of rising walls beneath ground slabs which provided confined spaces for radon gas accumulation;
- Maximise underfloor ventilation, where practicable, and in a manner compatible with the energy conservation performance of the building;
- Design interior spaces for maximum ventilation, in a manner compatible with the energy conservation performance of the building.

3.3 CONSTRUCTION SETTLEMENT

Consideration should be given to differential and/or relative settlement of ground floor construction during the full life cycle of the building.

Where special installation detailing is introduced, i.e. folding of a radon resisting membrane at critical construction points, an elongation capability for the membrane itself may not be required. Where high concentrations of radon are likely and where a building is properly designed, detailed and constructed to take account of settlement, the installation of the Dura Skrim 15 WW Radon Resisting Membranes represents an effective measure against radon health hazards.

It is important to note that following any elongation in a membrane, a reduction in its radon gas resistance performance will occur.

4.1 TESTS / ASSESSMENTS

Various technical investigations were carried out on the Dura Skrim 15 WW Radon Resisting Membranes.

Typical results are shown in Table 1.

4.2 DURABILITY

When installed in accordance with this Certificate and subject to normal conditions of use, the membranes will provide an effective barrier which will be substantially impervious to the transmission of radon gas, liquid water and water vapour for the life of the building. Long periods of exposure to UV light can reduce the effectiveness of a membrane. However, during storage, and when installed in accordance with this Certificate, the membranes will be protected from such exposure.

It is important to note that alterations to the building structure subsequent to the installation of a radon protection system must take into account the integrity of the radon resisting membranes.

4.3 REUSE AND RECYCLABILITY

The membranes contain polymer materials which can be recycled.

4.4 OTHER INVESTIGATIONS

(i) Existing data on product properties in relation to fire, toxicity and environmental impact were assessed. When stored with normal care on site prior to installation these membranes do not present a significant fire or health hazard.

(ii) The manufacturing process was examined including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

4.5 CE MARKING

While CE marking is not applicable for radon membranes, where the product is used solely as a DPM, the manufacturer has taken responsibility of CE marking the Dura Skrim 15 WW Radon Resisting Membranes in accordance with harmonised European Standard IS EN 13967[4]. Reference should be made to the latest version of the manufacturer's DoP for current information on any essential characteristics declared by the manufacturer.

5.1 National Standards Authority of Ireland ("NSAI") following consultation with NSAI Agrément has assessed the performance and method of installation of the product/process and the quality of the materials used in its manufacture and certifies the product/process to be fit for the use for which it is certified provided that it is manufactured, installed, used and maintained in accordance with the descriptions and specifications set out in this Certificate and in accordance with the manufacturer's instructions and usual trade practice. This Certificate shall remain valid for five years from date of issue so long as:

(a) the specification of the product is unchanged.

(b) the Building Regulations 1997 to 2019 and any other regulation or standard applicable to the product/process, its use or installation remains unchanged.

(c) the product continues to be assessed for the quality of its manufacture and marking by NSAI.

(d) no new information becomes available which in the opinion of the NSAI, would preclude the granting of the Certificate.

(e) the product or process continues to be manufactured, installed, used and maintained in accordance with the description, specifications and safety recommendations set out in this certificate.

(f) the registration and/or surveillance fees due to NSAI Agrément are paid.

5.2 The NSAI Agrément mark and certification number may only be used on or in relation to product/processes in respect of which a valid Certificate exists. If the Certificate becomes invalid the Certificate holder must not use the NSAI Agrément mark and certification number and must remove them from the products already marked.

5.3 In granting Certification, the NSAI makes no representation as to;

(a) the absence or presence of patent rights subsisting in the product/process; or

(b) the legal right of the Certificate holder to market, install or maintain the product/process; or

(c) whether individual products have been manufactured or installed by the Certificate holder in accordance with the descriptions and specifications set out in this Certificate.

5.4 This Certificate does not comprise installation instructions and does not replace the manufacturer's directions or any professional or trade advice relating to use and installation which may be appropriate.

5.5 Any recommendations contained in this Certificate relating to the safe use of the certified product/process are preconditions to the validity of the Certificate. However the NSAI does not certify that the manufacture or installation of the certified product or process in accordance with the descriptions and specifications set out in this Certificate will satisfy the requirements of the Safety, Health and Welfare at Work Act, or of any other current or future common law duty of care owed by the manufacturer or by the Certificate holder.

5.6 The NSAI is not responsible to any person or body for loss or damage including personal injury arising as a direct or indirect result of the use of this product or process.

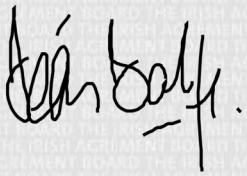
5.7 Where reference is made in this Certificate to any Act of the Oireachtas, Regulation made thereunder, Statutory Instrument, Code of Practice, National Standards, manufacturer's instructions, or similar publication, it shall be construed as reference to such publication in the form in which it is in force at the date of this Certification.

NSAI Agrément

This Certificate No. **00/0106** is accordingly granted by the NSAI to **Raven Industries** on behalf of NSAI Agrément.

Date of Issue: **February 2000**

Signed



Seán Balfe
Director of NSAI Agrément

Revisions:
May 2010: Update to 2009 Building Regulations, update marketing details,
13th April 2016: References to Building Regulations and standards updated.
06th January 2022: References to Building Regulations updated, bibliography added.

Readers may check that the status of this Certificate has not changed by contacting NSAI Agrément, NSAI, 1 Swift Square, Northwood, Santry, Dublin 9, Ireland. Telephone: (01) 807 3800. Fax: (01) 807 3842. www.nsai.ie

NSAI Agrément

Bibliography

[1] IS EN 1996-1-1:2005 + A1:2012 *Eurocode 6*: *Design of masonry structures – Part 1-1: General rules for reinforced and unreinforced masonry structures (including Irish National Annex).*

[2] BS 8102:2009 *Code of practice for protection of below ground structures against water from the ground.*

[3] BS 8000-4:1989 *Workmanship on building sites – Code of practice for waterproofing.*

[4] IS EN 13967:2012 *Flexible sheets for waterproofing – Plastic and rubber damp proof sheets including plastic and rubber basement tanking sheet – Definitions and characteristics.*