IRISH AGRÉMENT BOARD

BUILDING PRODUCT CERTIFICATION

CERTIFICATE No. 00/0106

Cl/SfB

L26 (A3j)

Raven Industries
PO Box 5107, Sioux Falls, SD 57117-5107,USA
Tel: 1 800 6353456 Fax: 1 800 605/331-0333
International Code: 00-1

DURA SKRIM 15 WW RADON RESISTING MEMBRANES

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

The Irish Agrément Board is designated by Government to issue European Technical Approvals.

Irish Agrément Board 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.

The Irish Agrément Board operates in association with the National Standards Authority of Ireland (NSAI) as the National Member of UEAtc.

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.

MARKETING AND MANUFACTURE

The products are marketed by:

Tradecraft

Unit 5 Baldonnell Business Park, Baldonnell, Co. Dublin
Tel: +353(1)4586233/4 Fax: +353(1)4586235
E-mail: sales@tradecraft.ie Web: www.tradecraft.ie

The products are manufactured by:

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

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.

PART 1 CERTIFICATION

1.1 ASSESSMENT
In the opinion of the Irish Agrément Board (IAB), Dura Skrim 15 WW Radon Resisting Membranes are satisfactory for the purposes defined above, and meet the requirements of the Building Regulations 1997 as indicated in Section 1.2 of this Certificate.

1.2 BUILDING REGULATIONS 1997

REQUIREMENTS

Dl & D2 - Materials and Workmanship

D2 Dura Skrim 15 WW Radon Resisting Membranes, as certified in this Irish Agrément Board Certificate, are manufactured from materials which are proper materials fit for their intended use. (See Part 4 of this Irish Agrément Board Certificate)

D1 Dura Skrim 15 WW Radon Resisting Membranes used in accordance with this Irish Agrément Board Certificate, meet the requirements for workmanship.

A1 - Loading
Dura Skrim 15 WW Radon Resisting Membranes installed in accordance with this Irish Agrément Board Certificate will not adversely affect the designed safety and deflection characteristics of a building.

B3 (3) - internal Fire Spread
Dura Skrim 15 WW Radon Resisting Membranes, installed in accordance with this Irish Agrément Board Certificate will not adversely affect the control of fire and smoke within concealed spaces in the structure or fabric of a properly designed building.

C3 - Dangerous Substances
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
Dura Skrim 15 WW Radon Resisting Membranes, when used in accordance with Part 3 of this Irish Agrément Board Certificate, will meet this requirement.

PART 2 TECHNICAL SPECIFICATION AND CONTROL DATA

2.1 PRODUCT DESCRIPTION

This Certificate relates to Dura Skrim 15 WW Radon Resisting Membranes a four layer extrusion laminate consisting of two sheets of high strength polyethylene film laminated together with moulten 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.

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).

It is essential that these products are laid in accordance with the recommendations of IS 325: Part 2: 1995, *Code of Practice for Use of Masonry*, and BS CP 102. 1973 *'Code of Practice for protection of buildings against water from the ground'*, and with this Certificate.

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

2.2.I 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, IAB Identification mark, IAB 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 DoELG Document. *'Radon in Buildings'*, and in the BRE (UK) Document: *'Radon- Guidance on protective measures for new dwellings'*.

2.4.2 New Work
Design Details.
Dura Skrim 15 WW Radon Resisting Membranes can be used in most floor constructions. They are installed in a similar way to damp proof membranes, but with much greater attention to detailing, joint sealing and workmanship. The radon resisting membranes will also perform the same function as damp proof 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 damp proof course in contact with a barrier (see the recommendations in IS 325. Part 2: 1995)

Consideration must be given to the positioning of a radon resisting membrane in relation to thermal insulation. The recommendations contained in IS 325: Part 2, and the BRE Report. *'Thermal insulation - avoiding risks'* should be followed."

Table 1. Technical Data

Dura Skrim Radon Resisting Membrane		
15 WW		
Physical Properties	Test Method	Result
Colour		White
Thickness		0.37 mm
Mass Per Unit Area		0.5 kg/m^2
Tensile Strength	ASTM D751	62.5N/mm^2
Elongation	ASTM D751	52 %
Trapezoid Tear	ASTM D 4533	25N/mm^2
Hydrostatic Resistance	ASTM D751	731 kPa
Max. Use Temperature		82°C
Min. Use Temperature		– 57°C
Permeability 10^{-12}m^2 s^{-1} - 15 WW - 15 WW Foil		 4.23 0.58
MVTR	ASTM E96 Method A	0.43 g/m^2/day

	Width	Length
Roll Size	5.48 m 9.15 m	18.25 m 16.45 m

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 325 Part 2, and BS CP 102: 1973: and the requirements of this Certificate. Additional guidance on the use of damp proof membrane materials is given in BS 8000: Part 4. 1989 *'Code of Practice for Waterproofing'*.

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

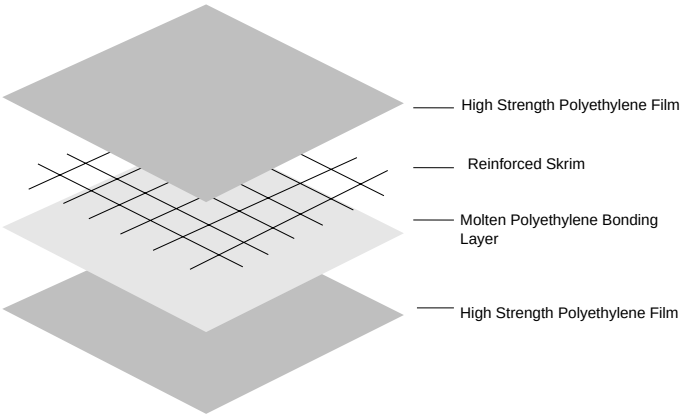
Dura Skrim 15WW Radon Resisting Membranes are normally supplied to site factory sealed or sealed on site using a fusion process which gives mechanical properties equivalent to the parent membrane. However, when this is not possible unroll one width of membrane after determining the most effective method 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 l50mm. Remove the backing paper from the Polyseal sealant tape and join the top sheet to the bottom sheet by applying pressure. When the weather is cold keep the Polyseal 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).

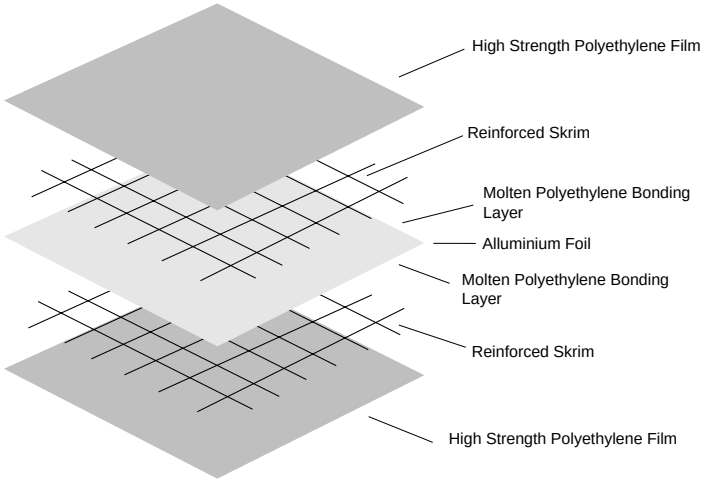
Also care should be taken to ensure that all corner joints at rising walls are fully sealed using the appropriate membrane and Polyseal tape.

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 150-mm 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

CONSTRUCTION DETAILING

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 sided tape and Polyseal Tape

Factory Weld Membrane

Fig. 1B 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

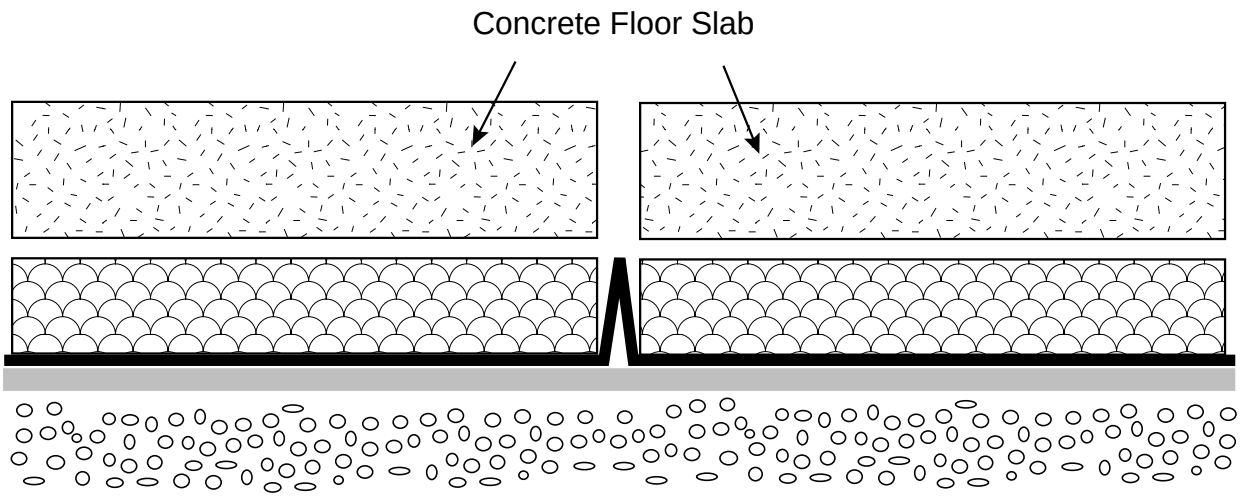


Fig. 6 Detail of Movement Joint in Floor Slab

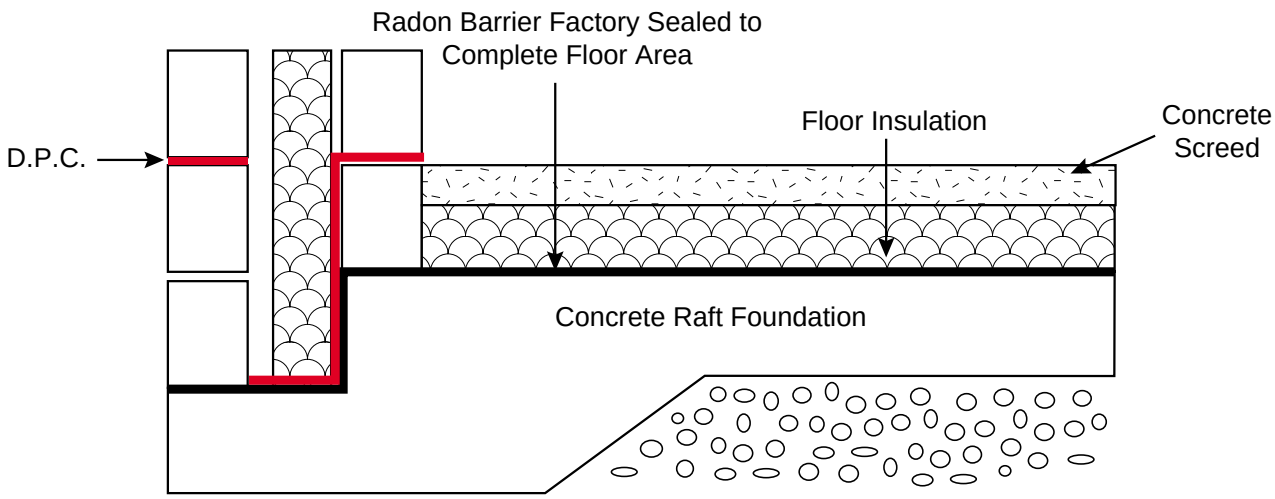


Fig. 7 Detail showing raft foundation

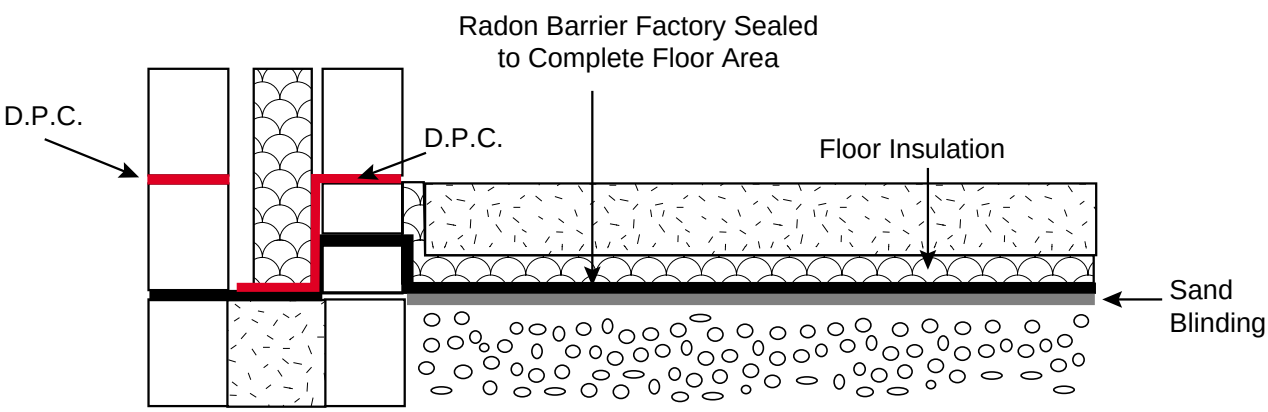


Fig. 8 Detail showing 300 mm masonry cavity wall

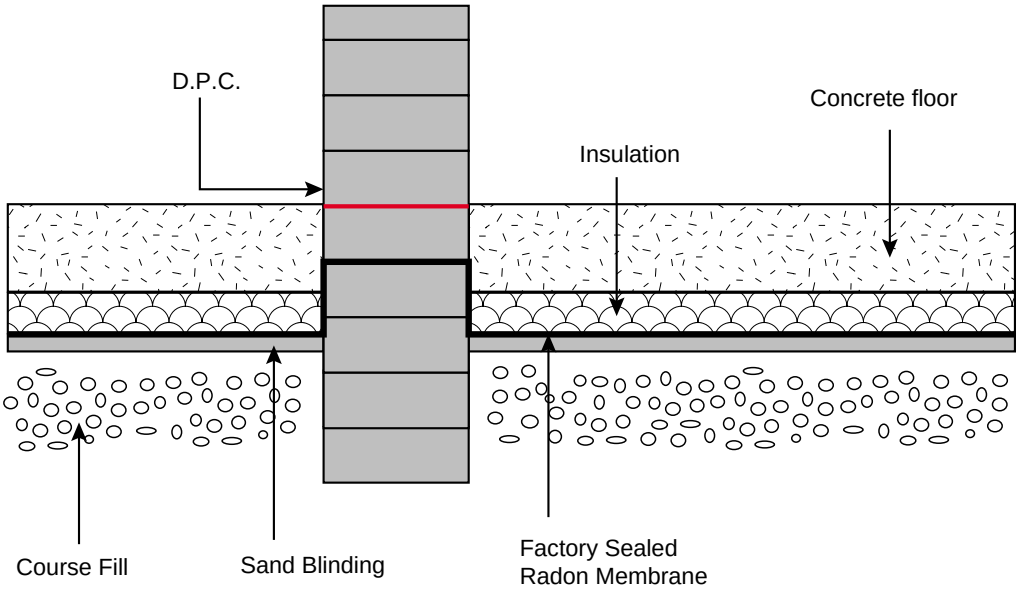


Fig. 9 Detail showing party wall

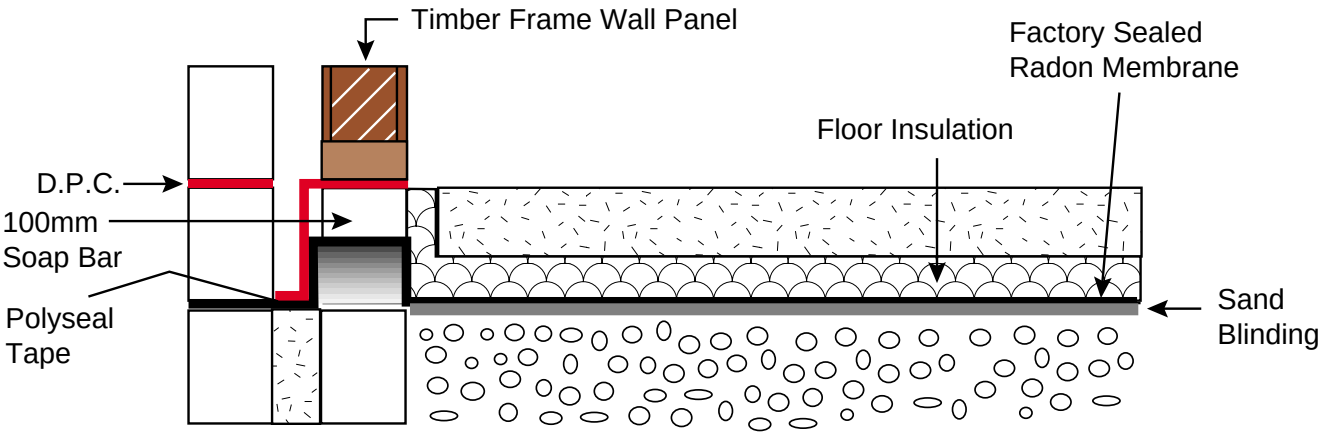


Fig. 10 Detail showing radon protection for timber frame construction

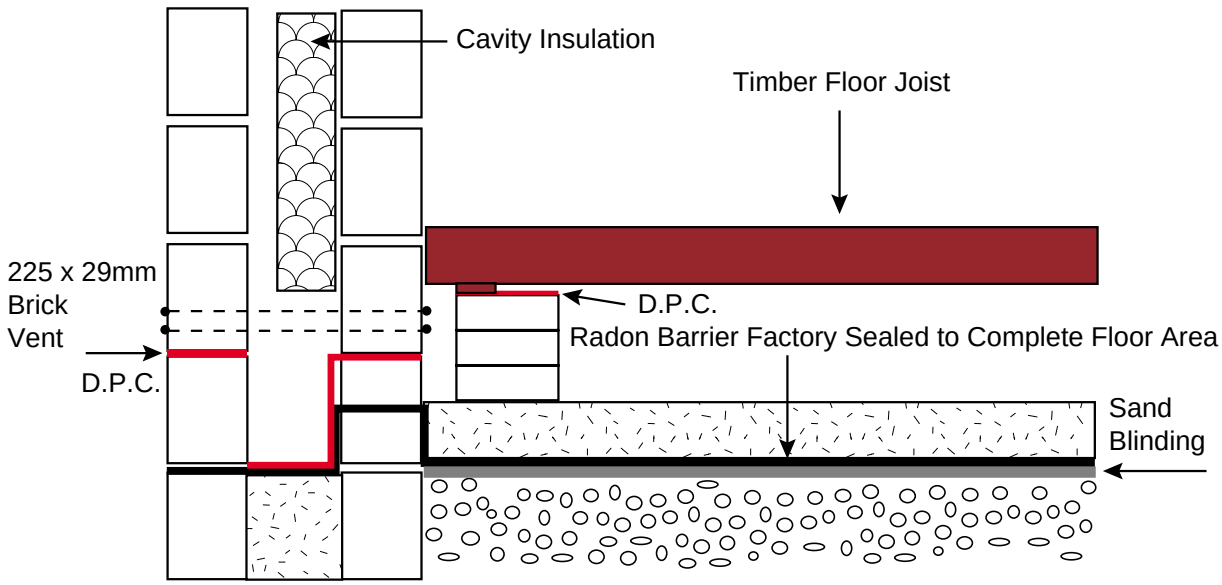


Fig. 11 Detail showing radon protection for suspended timber floor

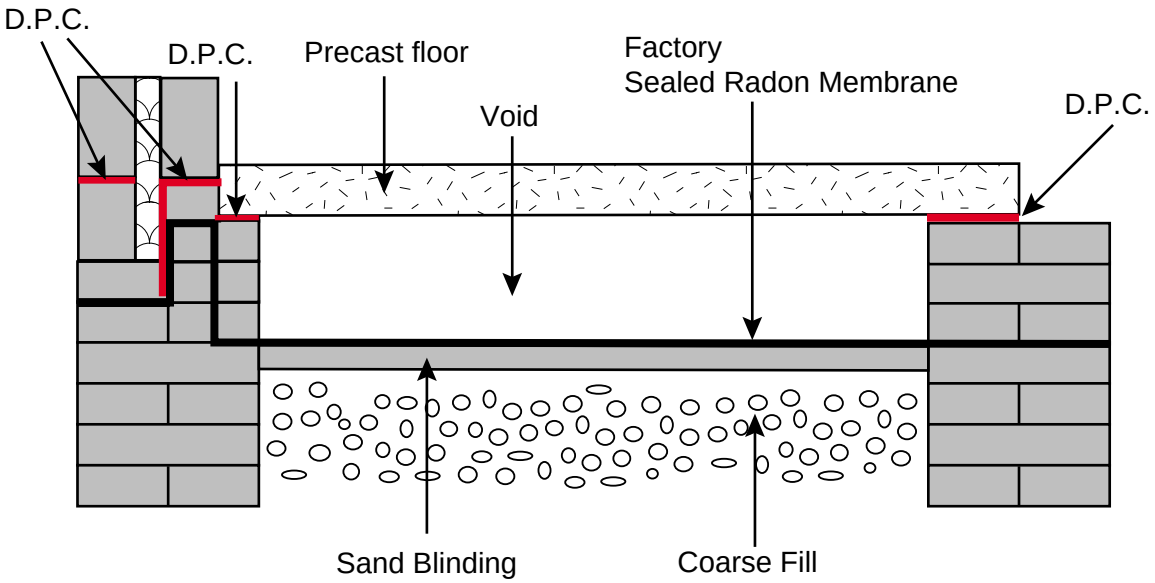


Fig. 12 Detail showing radon protection for suspended concrete floor

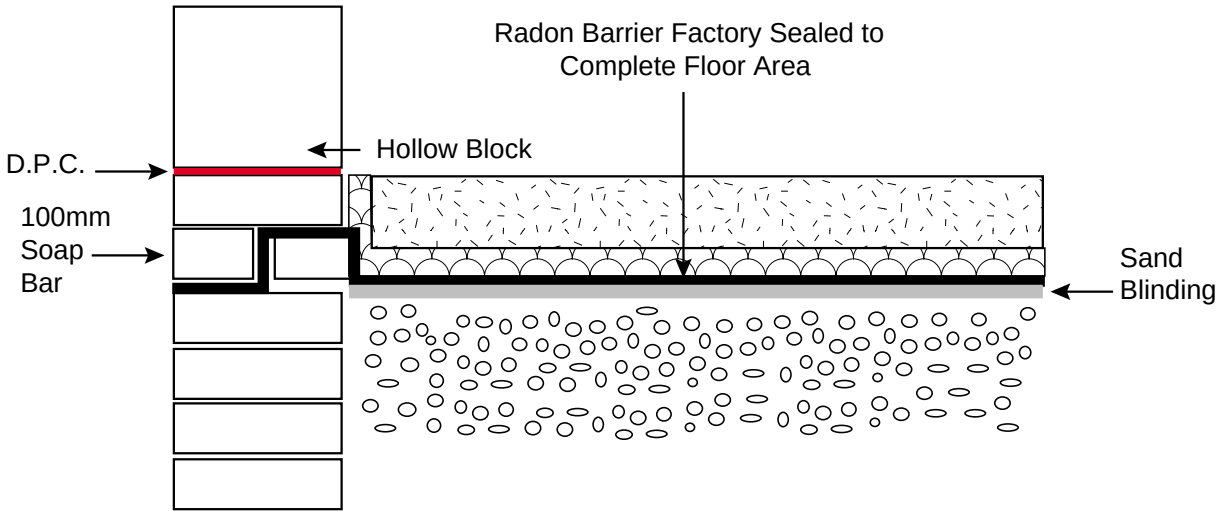


Fig. 13 Detail showing hollow block wall

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 life cycle of a building the Dura Skrim 15 WW Radon Resisting Membranes may be installed thus:

(Straight through)

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 an upstand, thus:

l50mm
(Upstand)

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 thus.

(Folds)

N.B. 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.

PART 3 DESIGN DATA

3.1 GENERAL
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 325 : Part 2 and of BS CP 102: 1973.

The products can be installed as oversite membranes, 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 product has 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/m3) is an effective protection after laying.

Site conditions.
The product may be installed in all conditions normal for ground floor slab construction. Where there is a risk of ground becoming waterlogged, sub-soil drainage must be provided in accordance with IS 325 Part 2, and BS CP 102: 1973.

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 325: Part 2);
- 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 provide 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 a 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 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.

PART 4 TECHNICAL INVESTIGATIONS

4.I TESTS/ASSESSMENTS
Technical investigations were carried out on Dura Skrim 15 WW Radon Resisting Membranes.

Typical results are shown in Table I.

4.2 MAINTENANCE
No maintenance of a radon resisting membrane is required when installed in accordance with this Certificate.

4.3 DURABILITY
When installed in accordance with this Certificate and subject to normal conditions of use, the Dura Skrim 15 WW Radon Resisting 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 ultraviolet light can reduce the effectiveness of a membrane. However, during storage, and when installed in accordance with this Certificate, the membrane will be protected from such exposure.

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

4.4 OTHER INVESTIGATIONS

(i) Existing data on properties in relation to fire, and toxicity, 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 product quality control, and details were obtained of the quality and composition of the materials used.

(iii) Site visits were conducted to assess the practicability of installation.

PART 5 CONDITIONS

5.1 CONDITIONS OF CERTIFICATION
The National Standards Authority of Ireland ("NSAI") following consultation with the Irish Agrément Board ("IAB") 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 so long as:

(a) the specification of the product is unchanged;

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

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

5.3 In granting this certificate, the NSAI makes no representation as to:

(a) the presence or absence 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 or 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, 1989 or of any other current or future statute or 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.

THE IRISH AGRÉMENT BOARD

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

Date of Issue: February 2000

Signed: _____

Chief Executive, NSAI

Readers may check that the status of this Certificate has not changed by contacting the Irish Agrément Board, NSAI, Glasnevin, Dublin 9. Ireland.

Telephone: (01) 807 3800.
Telefax: (01) 807 3838.

Irish Agrément Board,
NSAI,
Glasnevin,
Dublin 9.
Ireland.
Telephone: (01) 807 3800.
Telefax: (01) 807 3838.