

## MemTech Radon, Ground Gas, VOC, Air & Moisture Protection System

### Membrane Resistante au Radon Anti-Radon Membran

**NSAI Agrément (Irish Agrément Board)** is designated by Government to carry 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 2014**.



#### PRODUCT DESCRIPTION:

This Certificate relates to the MemTech Radon, Ground Gas, VOC, Air & Moisture Protection System and ancillary products including venting systems. The membranes are loose laid proprietary gas barriers designed to seal the ground floor construction, perimeter walls and around service penetrations to eliminate the potential of harmful gases and VOCs (volatile organic compounds) entering the structure and risk to the building occupant. The products are used as part of radon, CO<sub>2</sub>, CH<sub>4</sub> and VOC protection systems in buildings. The venting systems are designed for use in passively ventilating ground gases and vapours beneath ground floor slabs.

This Certificate certifies compliance with the requirements of the Building Regulations 1997 to 2014.

#### 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<sup>3</sup> (USA).

Passive control systems consist of a radon, ground gas and VOC resisting membrane extending across the whole of the building, including the floor and walls. These systems should also incorporate an underfloor sump, or sumps, which can be subsequently converted into an active control system by the use of suitable ventilation fans. **Note:** Ventilation systems for sites with perceived risk of VOC vapours and/or Methane and Carbon Dioxide, should have an appropriate ventilation design to ensure adequate ventilation of hazardous gases/VOCs.

MemTech Ltd supply radon sumps and passive ventilation systems which can be used to adequately collect radon or passively ventilate below the slab design.

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

**Note: DPMs must be CE marked to IS EN 13967:2012 Flexible sheets for waterproofing – Plastic and rubber damp proof sheets including plastic and rubber basement tanking sheet – Definitions and characteristics.**

Two of the most common encountered ground gases are Methane (CH<sub>4</sub>) and Carbon Dioxide (CO<sub>2</sub>). Methane is flammable and an asphyxiant whereas Carbon Dioxide is toxic and an asphyxiant. Sources of these gases range from local landfill sites, made ground, old coal workings and some natural deposits, e.g. peat and chalk. Assessment of the generation potential and risk of ground gas to the site in question is required at design stage to determine risk to human health.

Volatile Organic Compounds (VOCs) can be found in the ground as solid, liquid, dissolved phase and gaseous phase. VOCs encountered on ground gas sites range in type and risk. They are normally present due to historical contaminated ground through industrial use, and spills and leaks from commercial and industrial sources. Assessment of the site specific risks is completed at design stage to assess the risk to human health. **Note:** only MemTech M1 membrane has been tested and assessed as resistant to VOCs.

The potential risk to an end user from a source of ground gas or vapour contamination is determined through the conceptual site model and normally involves a protection system made up of a number of different levels. The designer should look to incorporate different levels of protection using passive ventilation, slab construction and membrane installation.

#### **MANUFACTURE AND MARKETING:**

The products are manufactured on behalf of and marketed by:

MemTech Ltd,  
12 Metcalf Drive,  
Altham Industrial Park,  
Altham,  
Lancashire BB5 5TU,  
UK.

### 1.1 ASSESSMENT

In the opinion of NSAI Agrément, MemTech Radon, Ground Gas, VOC, Air & Moisture Protection System, 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 2014

#### REQUIREMENT:

#### *Part D – Materials and Workmanship*

**D3** – MemTech Radon, Ground Gas, VOC, Air & Moisture Protection System, as certified in this NSAI Agrément Certificate are comprised of proper materials fit for their intended use (see Part 4 of this Certificate).

**D1** – MemTech Radon, Ground Gas, VOC, Air & Moisture Protection System, as certified in this Certificate, meet the requirements for workmanship.

#### *Part A – Structure*

##### **A1 – Loading**

MemTech Radon, Ground Gas, VOC, Air & Moisture Protection System, installed in accordance with this Certificate, will not adversely affect the designed safety and deflection characteristics of a building.

#### *Part B – Fire Safety*

##### **B3 – Internal Fire Spread (Structure)**

MemTech Radon, Ground Gas, VOC, Air & Moisture Protection System, 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**

MemTech Radon, Ground Gas, VOC, Air & Moisture Protection System, 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*

MemTech Radon, Ground Gas, VOC, Air & Moisture Protection System, when used in accordance with Part 3 of this Certificate, will meet this requirement.

#### *Part F – Ventilation*

##### **F1 – Means of Ventilation**

Air leakage can provide background ventilation, however this is uncontrolled ventilation and can cause discomfort to occupants as well as potential structural damage. Air tightness should form part of a balanced package of insulation and ventilation measures. The MemTech Radon, Ground Gas, VOC, Air & Moisture Protection System in conjunction with trickle vents, passive ventilation and mechanical ventilation systems can minimise background air leakage (uncontrolled ventilation) and provide controlled ventilation through the use of trickle vents etc.

#### *Part L – Conservation of Fuel and Energy*

##### **L1 – Conservation of Fuel and Energy**

The MemTech Radon, Ground Gas, VOC, Air & Moisture Protection System, when installed and used in accordance with this Certificate, can meet this requirement and contribute to less air leakage in the building and therefore less heat loss. A key parameter for achieving an efficient Building Energy Rating (BER) is that the building envelope is designed and insulated to a high level and the fabric air tightness is to a high standard.

<b>MemTech M1</b>		
<b>Characteristic</b>	<b>Test Method</b>	<b>Result</b>
Thickness	EN 1849-2	0.6 mm
Width	EN 1848-2	Various
Length	EN 1848-2	Various
Weight	EN 1849-2	350 g/m <sup>2</sup>
Water column	EN 20811	>300
Resistance to water penetration	EN 13967, EN 1928	Pass
Water tightness	EN 1296, EN 1367, EN 1928	Pass
Resistance to static load	EN 12730-B	20 kg
Tensile strength: - MD - CMD	EN 12311-1	- 600 N/50mm - 480 N/50mm
Elongation: - MD - CMD	EN 12311-1	- 20% - 20%
Puncture resistance	EN 12236	1.25 kN
Resistance to tearing (nail shank): - MD - CMD	EN 12310-1	- 330 N - 400 N
Methane permeability	EN ISO 15105-1	<0.09 ml/m <sup>2</sup> /day/atm
Carbon Dioxide permeability	EN ISO 15105-1	<0.09 ml/m <sup>2</sup> /day/atm
Radon permeability	K124/02/95	8.0 x 10 <sup>-15</sup> m <sup>2</sup> /s
Transmission rate of volatile liquids – Diesel	ISO 6179:2010 (B)	0.246 g/m <sup>2</sup> /h
Transmission rate of volatile liquids – Xylene	ISO 6179:2010 (B)	0.571 g/m <sup>2</sup> /h
Transmission rate of volatile liquids – Toluene	ISO 6179:2010 (B)	0.583 g/m <sup>2</sup> /h
Transmission rate of volatile liquids – Petrol	ISO 6179:2010 (B)	0.135 g/m <sup>2</sup> /h
<b>MemTech R1</b>		
<b>Characteristic</b>	<b>Test Method</b>	<b>Result</b>
Thickness	EN 1849-2	0.5 mm
Width	EN 1848-2	Various
Length	EN 1848-2	Various
Weight	EN 1849-2	275 g/m <sup>2</sup>
Water column	EN 20811	Pass
Resistance to water penetration	EN 13967, EN 1928	Pass
Water tightness	EN 1296, EN 1367, EN 1928	Pass
Resistance to static load	EN 12730-B	20 kg
Tensile strength: - MD - CMD	EN 12311-1	- 500 N/50mm - 470 N/50mm
Elongation: - MD - CMD	EN 12311-1	- 15% - 20%
Puncture resistance	EN 12236	1.04 kN
Resistance to tearing (nail shank): - MD - CMD	EN 12310-1	- 400 N - 350 N
Methane permeability	EN ISO 15105-1	<514 ml/m <sup>2</sup> /day/atm
Carbon Dioxide permeability	EN ISO 15105-1	<514 ml/m <sup>2</sup> /day/atm
Radon permeability	K124/02/95	4.3 x 10 <sup>-12</sup> m <sup>2</sup> /s

**Table 1: Product Specification**

## 2.1 PRODUCT DESCRIPTION

This Certificate relates to the MemTech Radon, Ground Gas, VOC, Air & Moisture Protection System. Both membranes are low-density polyethylene membranes reinforced with a polypropylene reinforcing grid. MemTech M1 and MemTech R1 are low density polyethylene membranes which incorporate a polypropylene reinforcing grid. MemTech M1 is a six layer product with base layer LDPE film, PP reinforcement scrim, LDPE coating, co-polymer adhesive, aluminium foil and top coating of LDPE, whilst MemTech R1 is a four layer product of low density polyethylene membranes with a polypropylene reinforcing grid. MemTech R1 is red in colour on the top side and black on the bottom side. The product specifications are shown in Table 1.

Both membranes are printed with their logo on the top side along with cautionary advice 'Gas membrane, Caution, No unauthorised personnel'. In addition, MemTech M1 is black in colour on the top side and white on the bottom side, which will aid in the verification process as damage is highlighted from the white underside to the black upper finish.

### 2.1.1 Jointing and Sealing

MemTech M1 and R1 membranes should be seam jointed by use of MemTech tape or heat welded. Membrane joints should be overlapped by 100mm minimum before seam jointing is carried out. If any heat welding is to be carried out, MemTech Ltd recommends the use of a Construction Skills NVQ Level 2 qualified installer or equivalent.

#### 2.1.1.1 Ancillary Materials

**MemTech tape** is a double sided thermoplastic sealant tape with high surface tack suitable for sealing membrane joints. All seam joints should be rolled using a 40mm silicone seam roller to remove any trapped air and ensure adhesion between the membranes. Rolls sizes: 30/50mm x 30m.

**MemTech Gas Resistant Self Adhesive Membrane (GR-SAM)** is a self-adhesive bituminous waterproofing sheet. It is composed of self-adhesive SBS polymer modified bitumen with an upper surface finish of aluminium foil to provide resistance to radon, ground gases and VOCs. This membrane can be used in certain areas to seal membrane joints. In lower temperatures heat may be required to the bituminous side of the membrane to aid cohesion. MemTech GR-SAM should be rolled

using 40mm silicone seam rollers to ensure adhesion. Roll sizes: 0.3m x 20m or 1m x 20m.

### 2.1.2 Walls and Corner Details

When sealing through perimeter walls, a membrane system must seal through any cavities or continue through the blockwork to the outside of the structure to maintain gas resistance across the footprint of the building. MemTech M1 & R1 Starter Band and MemTech GR-DPC can be used to seal through perimeter cavity walls and internal walls maintaining the gas membrane installation.

#### 2.1.2.1 Ancillary Materials

**MemTech M1 & R1 Starter Band** is a smaller roll size manufactured gas barrier to seal through the blockwork across the cavity and incorporated below the damp proof course cavity tray in the outer leaf. If the membrane is to be carried through the cavity to act as a DPC then MemTech GR-DPC should be used with either gas barrier. Roll sizes: 0.6m x 50m.

**MemTech GR-DPC** is a gas resistant DPC which is used with MemTech M1 and R1 depending on site requirements. Roll sizes: 1m x 20m.

BS 8215:1991 *Code of practice for design and installation of damp-proof courses in masonry construction* states that three-dimensional shapes in DPC should be pre-fabricated. MemTech Preformed Corners are supplied for both membrane options and are manufactured from the specific membrane material to be used with. The corners are installed by placing in the internal or external area to be sealed by applying MemTech tape, MemTech GR-SAM or heat welding. Supplied in 75mm, 150mm, 225mm and 300mm options.

### 2.1.3 Service Penetrations

All service penetrations through the membrane must be adequately sealed. In the main, these penetrations will be pipe and column details, however any non-standard penetrations must also be sealed around. Advice on specific detailing should be sought from the manufacturer before continuing.

#### 2.1.3.1 Ancillary Materials

**MemTech Preformed Top Hats** are used to seal around pipe penetrations. The top hats are one piece units manufactured from the specific membrane material being installed on site around 110mm pipes. All top hats are sealed using MemTech tape and strips of MemTech GR-SAM. In some cases it may not be possible to fit the

preformed unit to a pipe which has a collar, socket or is wider than a standard 110mm pipe. In these cases, strips of MemTech GR-SAM are used to seal around the pipe. Top hats are supplied in 115mm, 125mm and 160mm options.

Strips of MemTech GR-SAM can be used to seal around awkward pipe sizes or penetrations. Where columns are to be sealed around, threshold details or concrete upstands are to be sealed, MemTech GR-SAM is used by cutting relevant lengths of membrane to achieve a seal. In lower temperatures, heat may be required to the bituminous side of the membrane to aid adhesion. MemTech GR-SAM should be rolled using 40mm silicone seal rollers to ensure adhesion. Two coats of MemTech Primer should be applied to concrete or steel before adhesion of the MemTech GR-SAM. Roll sizes: 0.3m x 20m or 1m x 20m.

**MemTech Primer** is a quick drying bitumen primer to give a key prior to applying MemTech GR-SAM. MemTech Primer can be used on concrete, cementitious screeds and renders, steel and iron. It should be applied without thinning and should be scrubbed in by brush to ensure an even coverage. Coverage rate 6-10 m<sup>2</sup>/litre depending on porosity of substrate, and drying time 3-4 hours depending on conditions. Supplied in 25 litre drums.

#### 2.1.4 Venting

Depending on the site specific risks there may be a requirement for radon sumps or passive ventilation. This should be determined at the design stage of the project with an approved product selected.

##### 2.1.4.1 Ancillary Materials

**MemTech Radon Sump** is a lightweight and easy installed HDPE unit. It can be converted to an active sump system if needed using activation of fans. All sumps must be linked by appropriate pipe work. Outlet positions for standard 110mm vent pipes for extraction and dispersion should be connected to the sump relative to site requirements.

#### 2.1.5 Other Ancillaries

Once the membrane has been installed it should be covered immediately after verification inspections and integrity testing has been completed (where required). This is to maintain the performance of the gas membrane and to protect from future trades. Protection can be achieved by applying insulation, protection boards or fleece.

**MemTech 3mm Protection Boards** are high density boards which are supplied in 2.5m x 1m x 2m sizes.

**MemTech Protection Fleece** is a 300g non-woven geotextile and is supplied in 2m x 50m rolls.

#### 2.1.6 Verification

On sites with radon and ground gas and VOC contamination, there should be a degree of independent verification carried out on the installation of venting and gas membranes. This could also require integrity testing of the membrane installation and should be carried out in line with CIRIA C735:2014 *Good practice on the testing and verification of protection systems for buildings against hazardous ground gases*.

### 2.2 MANUFACTURE

MemTech Radon, Ground Gas, VOC, Air & Moisture Protection System is manufactured by an extrusion/coating process.

#### 2.2.1 Product Quality Control

Quality control checks are carried out on the raw material, during and at the end of production. Checks on the final product include dimensions, tensile strength, tear strength, and elongation.

The management systems of the manufacturer have been assessed and registered as meeting the requirements of EN ISO 9001:2008 by Quality Austria.

### 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

It is essential that the products are laid in accordance with the recommendations of IS EN 1996-1-1:1995 *Code of practice for use of masonry – Part 2: Masonry construction*, BS 8102:2009 *Code of practice for protection of below ground structures against water from the ground*, and with this Certificate.

Design teams can contact the certificate holder for site specific advice away from typical consideration of:

- Type, source and quantity of gas and/or soil contamination
- Building and receptor sensitivity
- Complexity of design
- Installation teams competency
- Level of independent verification and integrity testing employed
- Expected differential settlement
- Will the membrane be installed above or below the slab
- Will steel reinforcement be applied on the membrane

- Protection to membrane after verification inspections

Guidance on the design of radon protection systems for new and existing buildings is given in the DoEHLG document *Radon in Buildings*, 1995.

Guidance on the design of ground gas and VOC protection systems is given in BS 8485:2015 *Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings* and CIRIA C716:2012 *Remediating and mitigating risks from VOC vapours from land affected by contamination*.

Guidance on the verification of radon, ground gas and VOC protection systems is given in CIRIA C735:2014.

#### 2.4.2 New Work

MemTech Radon, Ground Gas, VOC, Air & Moisture Protection System can be used in most common floor constructions. They are installed in a similar way to damp proof membranes but with much greater attention to detailing and workmanship. The radon, ground gas and VOC resisting membranes will also perform the same function as a damp proof membrane.

To be fully effective, a radon, ground gas and VOC resisting membrane must bridge cavities in walls. If the purpose is to seal straight through the cavity then MemTech M1 or R1 Starter Band can be brought directly through the blockwork and incorporated below a damp proof course cavity tray in the outer leaf. If the intention is to create a DPC cavity tray from the membrane sealing the cavity then MemTech GR-DPC should be used to step through the cavity and sealed to the membrane internally. All designed cavities must be properly closed.

To avoid creating slip planes in masonry walls, do not place a DPC in direct contact with a membrane. Consideration must be given to the positioning of a radon, ground gas and VOC resisting membrane in relation to thermal insulation. The recommendations contained in IS 325-2:1995 should be followed. If the gas membrane has been taken through the cavity then a cavity tray can be installed above this providing a capillary break is used between the membrane and the cavity tray.

The integrity of a radon, ground gas and VOC resisting membrane must be maintained during installation. The risk of on-site damage is lessened by robust independent verification inspections and integrity testing. Damage to the membrane can be caused by foot traffic, other trades, steel reinforcement, potential differential settlement and accidental damage. Where damage occurs this should be remediated using a second layer of membrane sealed around its

edges to the original membrane with MemTech Tape or patches of MemTech GR-SAM. All patches of membrane or GR-SAM should extend a minimum of 150mm beyond the edge of the damaged area with all corners of GR-SAM rounded before application.

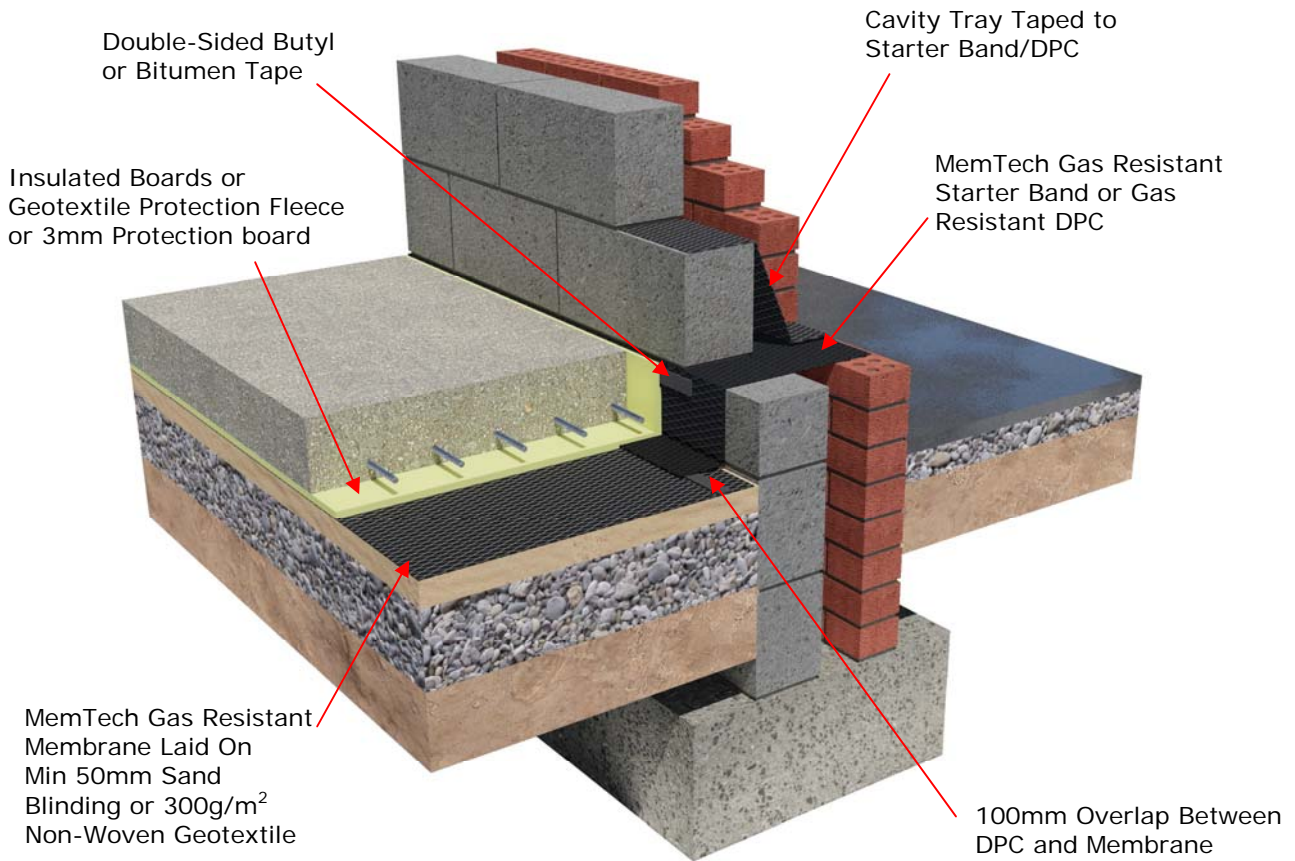
Installation of MemTech Radon, Ground Gas, VOC, Air & Moisture Protection System must be in accordance with the recommendations of IS EN 1996-1-1:1995, BS 8102:2009, and the requirements of this Certificate. Additional guidance on the use of damp proof membrane materials is given in BS 8000-4:1989 *Workmanship on building sites – Part 4: Code of practice for waterproofing*, BS 8485:2015, CIRIA C716 and CIRIA C735.

A surface blinding of soft sand (50mm min. thickness) 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<sup>3</sup>).

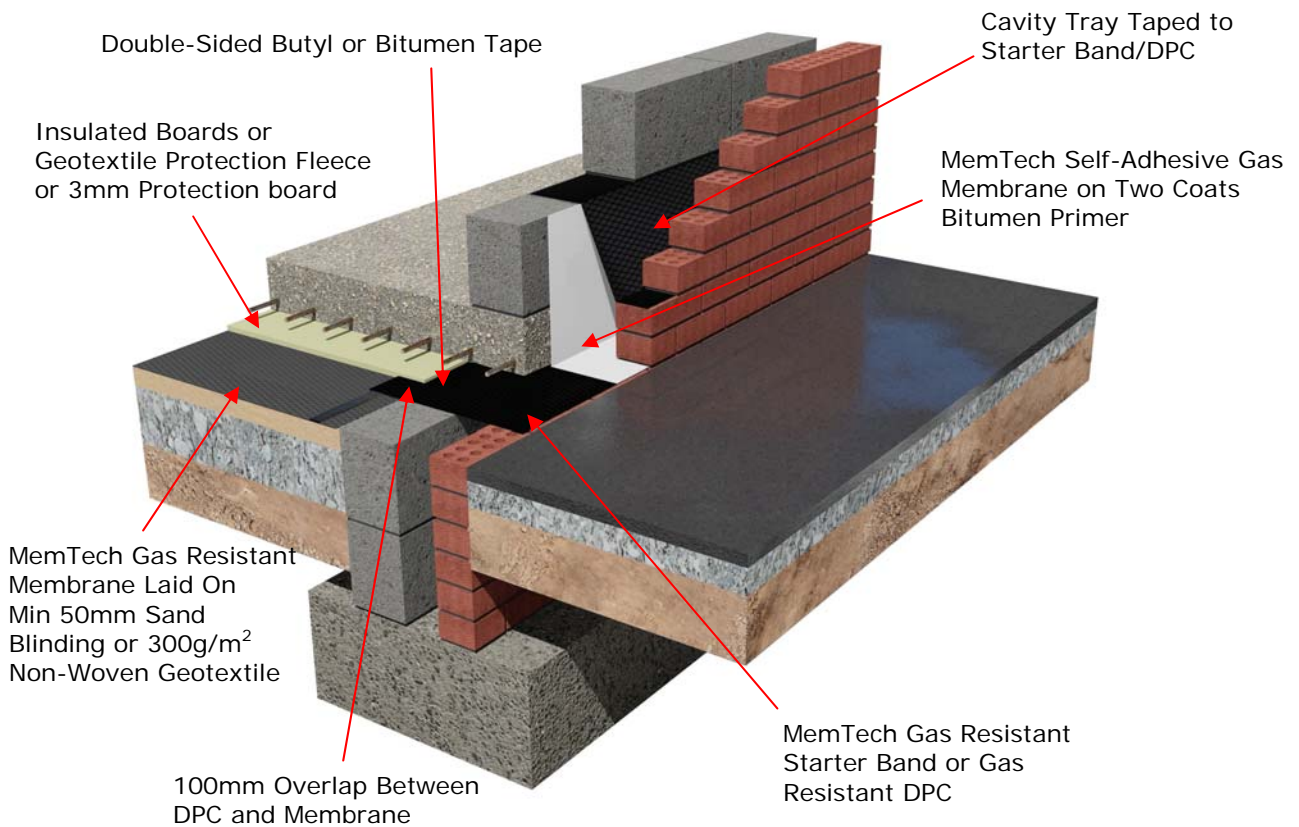
Sheets must be clean and free from dirt and grease before application, and in view of the difficulty of achieving gas tight seals under wet or dirty site conditions it is recommended that special care is taken with this aspect of the installation.

Where service ducts or pipes penetrate the membrane, gas tight joints are effected using sealant tape and top hat units with retention clips. Pipes, steel stanchions and concrete columns can be sealed using the approved adhesive radon, ground gas and VOC resisting membrane with an overlap of 150mm on each surface and rolled firmly. 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.

The 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 other protective layer over it. Great care should be taken to avoid bridging (i.e. creating areas of unsupported membrane) during screeding operations, for example at internal angles.

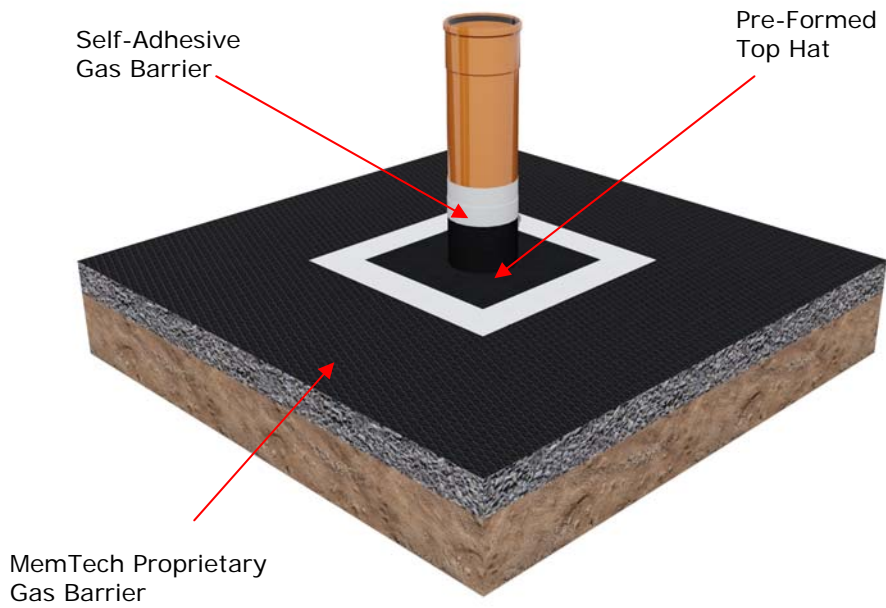


**Figure 1: Ground bearing slab**

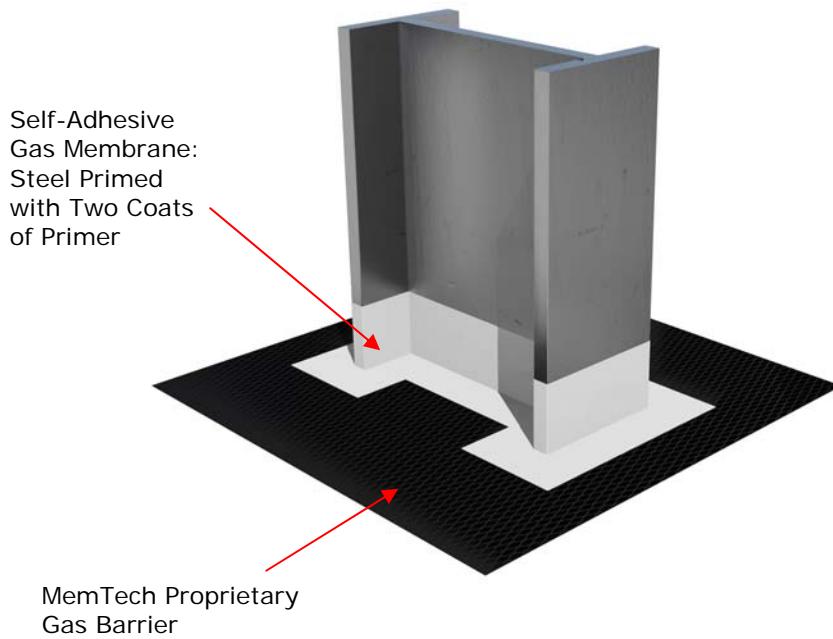


**Figure 2: Suspended slab**

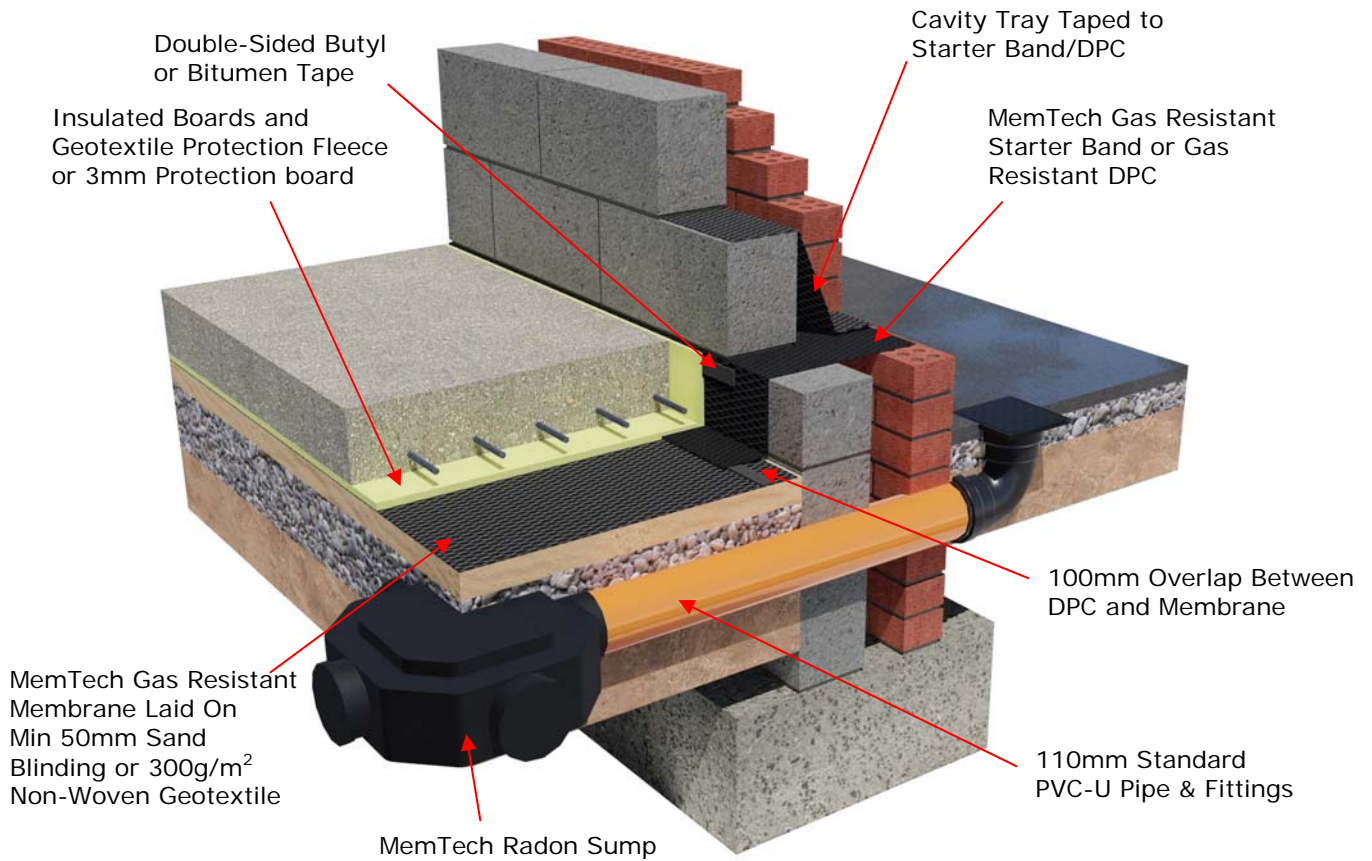




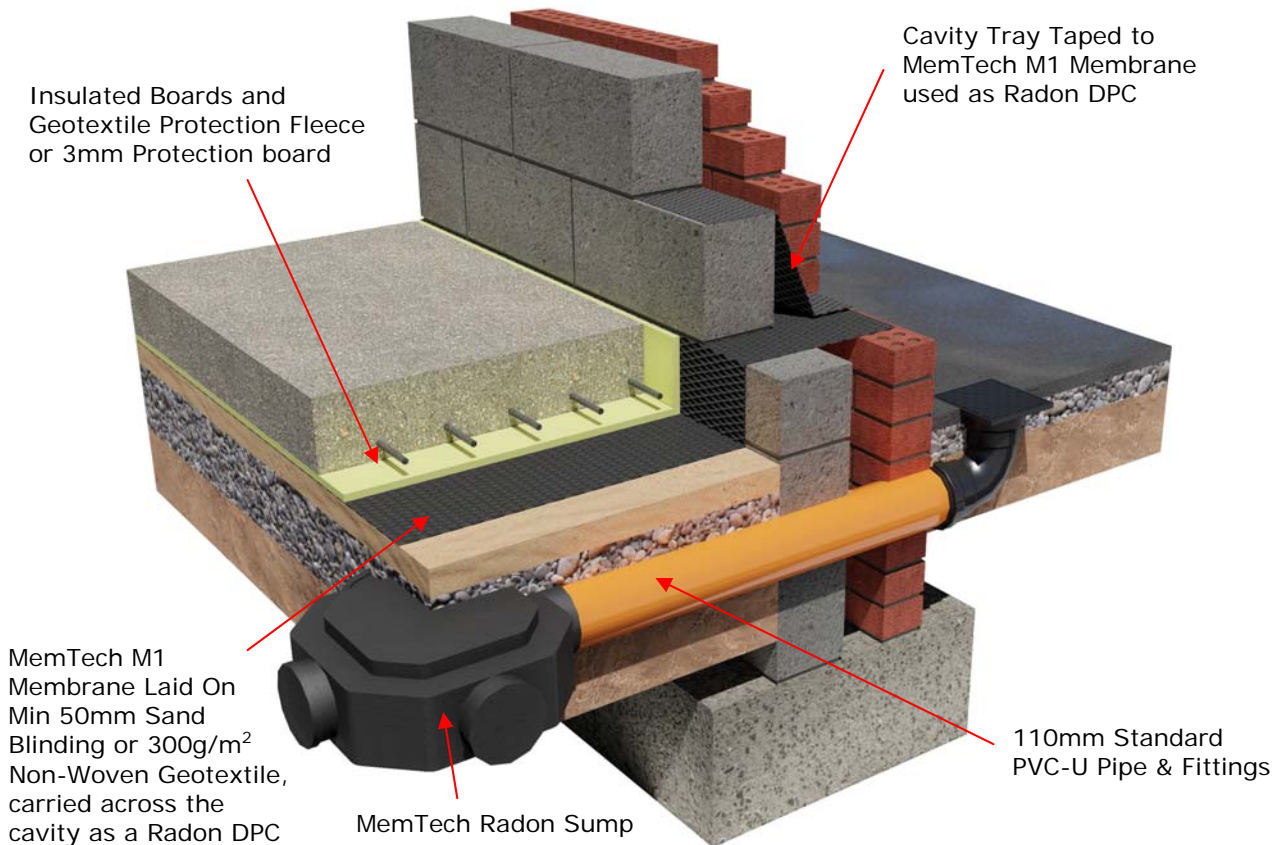
**Figure 3: Typical detail at pipe penetration**



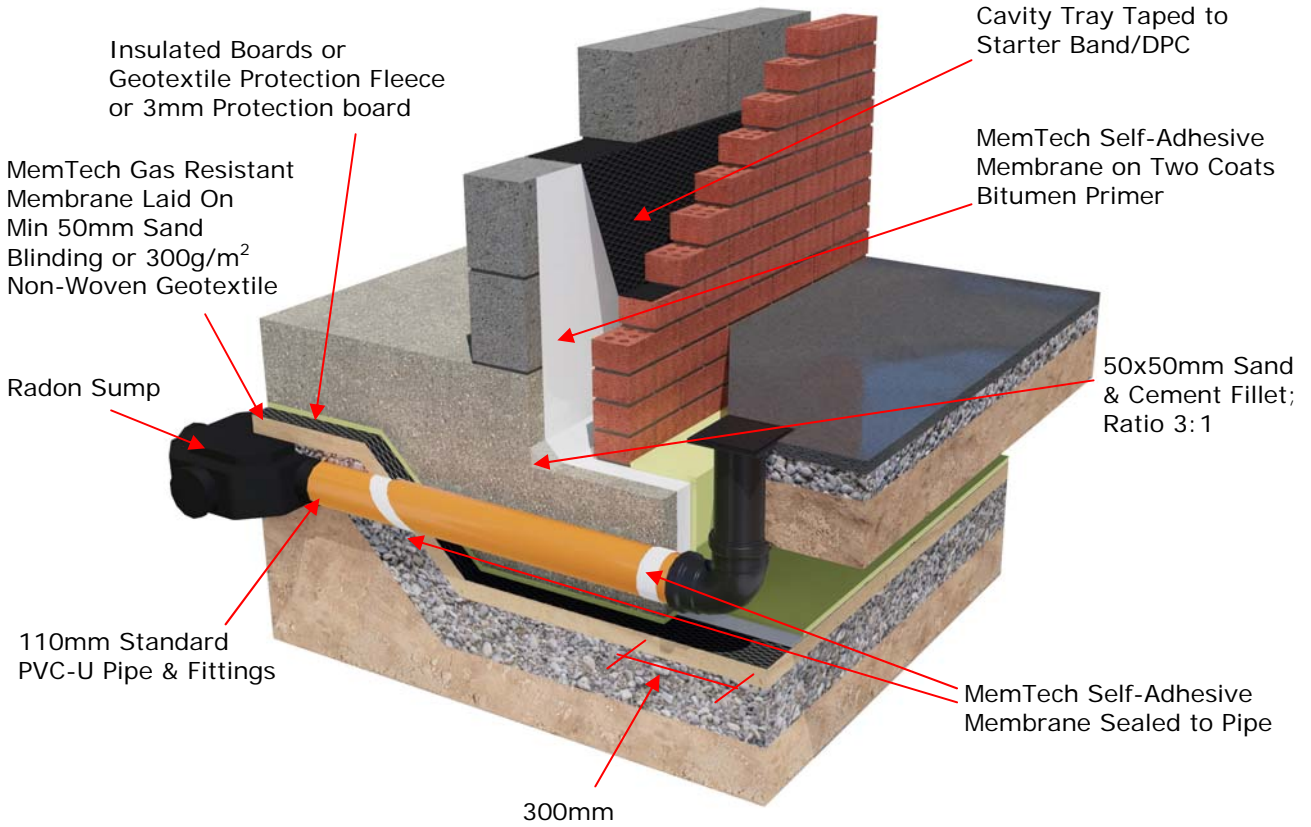
**Figure 4: Stanchion detail**



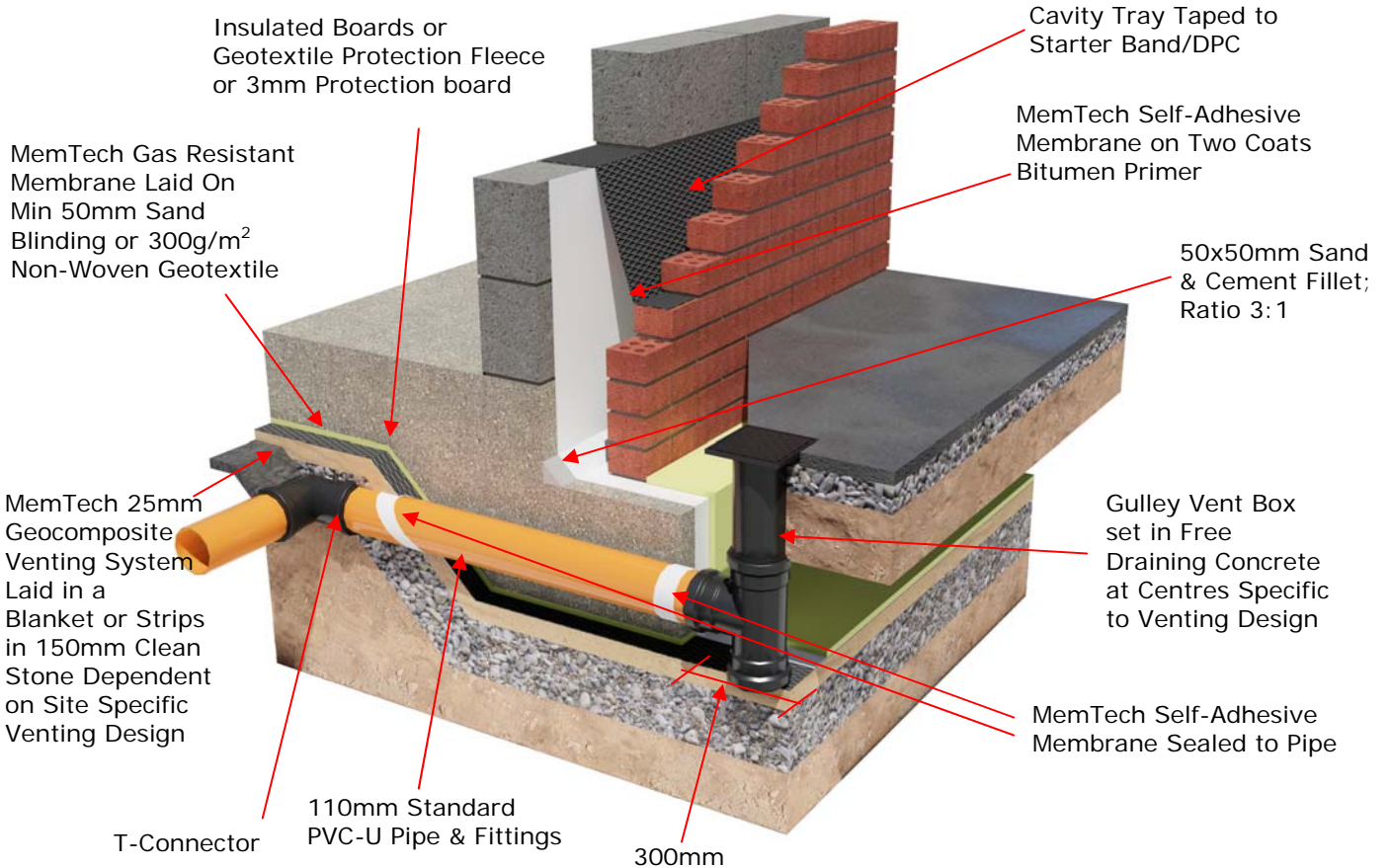
**Figure 5: Standard ground bearing perimeter detail with radon sump**



**Figure 5a: Standard ground bearing perimeter detail with radon sump and radon DPC**



**Figure 6: Standard raft foundation perimeter detail with radon sump**



**Figure 7: Standard raft foundation perimeter detail with gas venting system**

**3.1 GENERAL**

MemTech Radon, Ground Gas, VOC, Air & Moisture Protection System is suitable for use in concrete floors not subject to hydrostatic pressure, in accordance with the relevant clauses of IS EN 1996-1-1:1995, BS 8102:2009 and BS 8485:2015. The products can be installed as over-site membranes, either between a sand blinded hardcore (50mm of sand minimum) bed and the base concrete, on top of the base concrete and finished floor screed, or layered on top of high density insulation (25kg/m<sup>3</sup>) with a concrete screed laid over it.

**3.1.1 Resistance to water and water vapour**

The membranes and the methods of jointing provide an effective barrier to the passage of radon, CO<sub>2</sub>, CH<sub>4</sub>, VOCs, liquid water and water vapour from the ground.

**3.1.2 Resistance to tear**

The products have a high resistance to tear. 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. MemTech M1 and <2 are printed with cautionary advice that 'All non-essential personnel should keep off'. When installed as set out in this Certificate there should be minimum risk of puncture or tear damage. High density insulation (25kg/m<sup>3</sup>) is an effective protection after laying. MemTech 3mm Protection Boards or MemTech Protection Fleece can also be used if there is no insulation being used on site.

**3.1.3 Site conditions**

The products 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 1996-1-1:1995 and BS 8102:2009.

**3.1.4 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.

**3.2 CONSTRUCTION DETAILING**

To reduce radon and ground gas migration/ingress into buildings the following guidelines should be followed:

- design for controlled movement of construction (see IS 325-2:1995);
- 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.

**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, ground gas and VOC 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 MemTech Radon, Ground Gas, VOC, Air & Moisture Protection System represents an

**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, MemTech M1 & R1 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, MemTech M1 & R1 may be installed with an 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, MemTech M1 & R1 should be installed with folds as shown:



effective measure against radon health hazards. It is important to note that following any elongation in a membrane, a reduction in its radon, ground gas and VOC resistance performance will occur.

#### **4.1 TESTS / ASSESSMENTS**

Various technical investigations were carried out on MemTech Radon, Ground Gas, VOC, Air & Moisture Protection System. 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, ground 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 protective system must take into account the integrity of the radon, ground gas and VOC resisting membrane.

#### **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.

**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 2014 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 2005, 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.

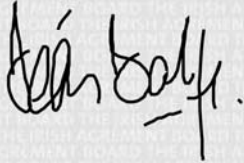
**5.7** Where reference is made in this Certificate to any Act of the Oireachtas, Regulation made thereunder, Statutory Instrument, Code of Practice, National Standards, manufacturer's instructions, or similar publication, it shall be construed as reference to such publication in the form in which it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

## NSAI Agrément

This Certificate No. **17/0390** is accordingly granted by the NSAI to **MemTech** on behalf of NSAI Agrément.

Date of Issue: **April 2017**

Signed



**Seán Balfe**  
**Director of NSAI Agrément**

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](http://www.nsai.ie)