NSAI Agrément

IRISH AGRÉMENT BOARD
CERTIFICATE NO. 16/0388
Juta UK,
Melton Grove Works,
Church Road,
Lytham,
FY8 5PL,
UK.

# Juta GP Radon, Ground Gas, VOC, Water, Air & Moisture Protection System

**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 Technical Guidance Document (TGD) Part D of the second schedule of the **Building Regulations 1997 to 2023.**


## SCOPE

This Certificate relates to the Juta GP 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 protect against the ingress of water, water vapour, radon, methane ($CH_4$), carbon dioxide ($CO_2$) and volatile organic compounds (VOCs) entering the building. The products are used as part of radon, $CO_2$, $CH_4$ and VOC protection systems in buildings. The venting systems are designed for use in passively ventilating ground gases and vapours beneath ground floor slabs.

In the opinion of NSAI, the Juta GP System as described in this Certificate, complies with the requirements of the Building Regulations.

## MANUFACTURE AND MARKETING:

The products are manufactured and marketed by:

Juta UK,
Melton Grove Works,
Church Road,
Lytham,
FY8 5PL,
UK.

**Part D – Materials and Workmanship**
**D1 – Materials and Workmanship**
**D3 – Proper Materials**
The Juta GP Radon, Ground Gas, VOC, Air & Moisture Protection System is comprised of 'proper materials' i.e., materials which are fit for their intended use and for the conditions in which they are to be used.

Buildings incorporating the Juta GP System can be designed to meet the requirements of the following clauses of the Building Regulations.

**Part A – Structure**
**A1 – Loading**

**Part B – Fire Safety**
**B3/B8 – Internal Fire Spread (Structure)**

**Part C – Site Preparation and Resistance to Moisture**
**C3 – Dangerous Substances**

**C4 – Resistance to Weather and Ground Moisture**

**Part F – Ventilation**
**F1 – Means of Ventilation**
The Juta GP 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**

## 2.1 PRODUCT DESCRIPTION

The membranes are low density multilayer polyethylene (LDPE) membranes, some of which incorporate a polypropylene (PP) reinforcing grid (the GP®H membranes are single layer membranes).

Juta GP®1 is a six-layer product with base layer LDPE film, PP reinforcement scrim, LDPE coating, copolymer adhesive, aluminium foil and top coating of LDPE.

Juta GP®2 is a four-layer product of low-density PE membranes with a PP reinforcing grid.

Juta GP®4 is a three-layer product of low-density PE membranes with a PP reinforcing grid.

JUTA GP®H 0.6mm is a 0.6mm thick mono layer, high-density PE membrane.

GP® TITANFLEX is a seven-layer product of PE and is typically a loose laid membrane.

GP® TITANBOND consists of GP® TITANFLEX bonded to a virgin PP geotextile fleece and is typically used as pre applied waterproofing.

GP® TITANTANK consists of GP® TITANFLEX bonded to a self-adhesive bitumen backing and is typically used as post applied waterproofing.

JUTA GP®H 1.0mm is a 1.0mm thick mono layer, high-density PE membrane.

GP® Liquid Gas Barrier (LGB) is a specialist styrene butadiene latex based liquid applied membrane. A minimum of 1mm thickness is required to provide a gas barrier. A total of 2kg/m$^2$ of product is required to achieve this thickness, so a 5kg tub will cover an area of 2.5m$^2$. GP® LGB should not be applied in wet conditions, or where inclement weather is expected before the membrane has dried or in temperatures below 7°C.

The product specifications are shown in Table 1, Table 2 and Table 3 of this certificate.

### 2.1.1 Jointing and Sealing

The membranes should be seam jointed by use of Juta GP 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, Juta recommends the use of a Construction Skills NVQ Level 2 qualified installer or equivalent.

#### 2.1.1.1 Ancillary Materials

**Juta GP® 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: 50mm x 30m.

**Juta Gas Resistant Self-Adhesive Membrane (GR-SAM/GP®1-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. Juta 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

Juta Starter Band and Juta GR-DPC can be used to seal through perimeter cavity walls and internal walls maintaining the gas membrane installation. Note: GP®1, GP®4, GP®H 0.6mm, GP®H 1.0mm and GP® TITANFLEX can be installed through the cavity wall acting as the starter band/DPC.

#### 2.1.2.1 Ancillary Materials

**Juta 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 Juta GR-DPC should be used with either gas barrier. Roll sizes: 0.6m x 50m.

**Juta GR-DPC** is a gas resistant DPC which is used with the membranes depending on site requirements. Roll sizes: Variable width x 20m.

BS 8215[1] states that three-dimensional shapes in DPC should be prefabricated. Juta GP® 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 Juta GP® tape, Juta 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

**Juta 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 Juta GP® tape and strips of Juta 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 Juta GR-SAM are used to seal around the pipe. Top hats are supplied in 115mm, 125mm and 160mm options.

Strips of Juta 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, Juta 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. Juta GR-SAM should be rolled using 40mm silicone seal rollers to ensure adhesion. One coat of Juta GP Primer should be applied to concrete or steel before adhesion of the Juta GR-SAM. Roll sizes: 0.3m x 20m or 1m x 20m.

**Juta GP® Primer** is a quick drying bitumen primer to give a key prior to applying Juta GR-SAM. Juta GP® 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 6-10m$^2$/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

**Juta 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.

#### 2.1.4.2 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. Additional protection can be achieved by applying insulation, protection boards or fleece.

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

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

#### 2.1.4.3 Verification

On sites with radon, 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[2].

## 2.2 MANUFACTURE

Excluding the liquid membrane, Juta GP 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 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 I.S. EN 1996-1-1[3], BS 8102[4] and with this Certificate.

Design teams can contact the certificate holder for site specific advice on these typical considerations:

- 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 DHLGH document *Radon in Buildings*, 2002.

Guidance on the design of ground gas and VOC protection systems is given in BS 8485[5] and CIRIA C716[6].

Guidance on the verification of radon, ground gas and VOC protection systems is given in CIRIA C735[2].

Guidance on the design of waterproofing systems is given in BS 8102[4].

### 2.4.2 New Work

The Juta GP 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 or waterproof 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 the gas barrier or 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 Juta 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 EN 1996-1-1[3] 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 Juta GP® Tape or patches of Juta 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 Juta GP Radon, Ground Gas, VOC, Air & Moisture Protection System must be in accordance with the recommendations of IS EN 1996-1-1[3], BS 8102[4], and the requirements of this Certificate. Additional guidance on the use of damp proof membrane materials is given in BS 8000-4[7], BS 8485[5], CIRIA C716[6] and CIRIA C735[2].

In lieu of concrete blinding or compacted earth, a surface blinding of soft sand (50mm min. thickness) should be used to prevent puncture of the membrane during installation. Further protection of the membranes can be afforded by using high density insulation (25 kg/m$^3$) in lieu of protection boards/geotextiles.

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 made effective by the correct application of 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 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 layers 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.

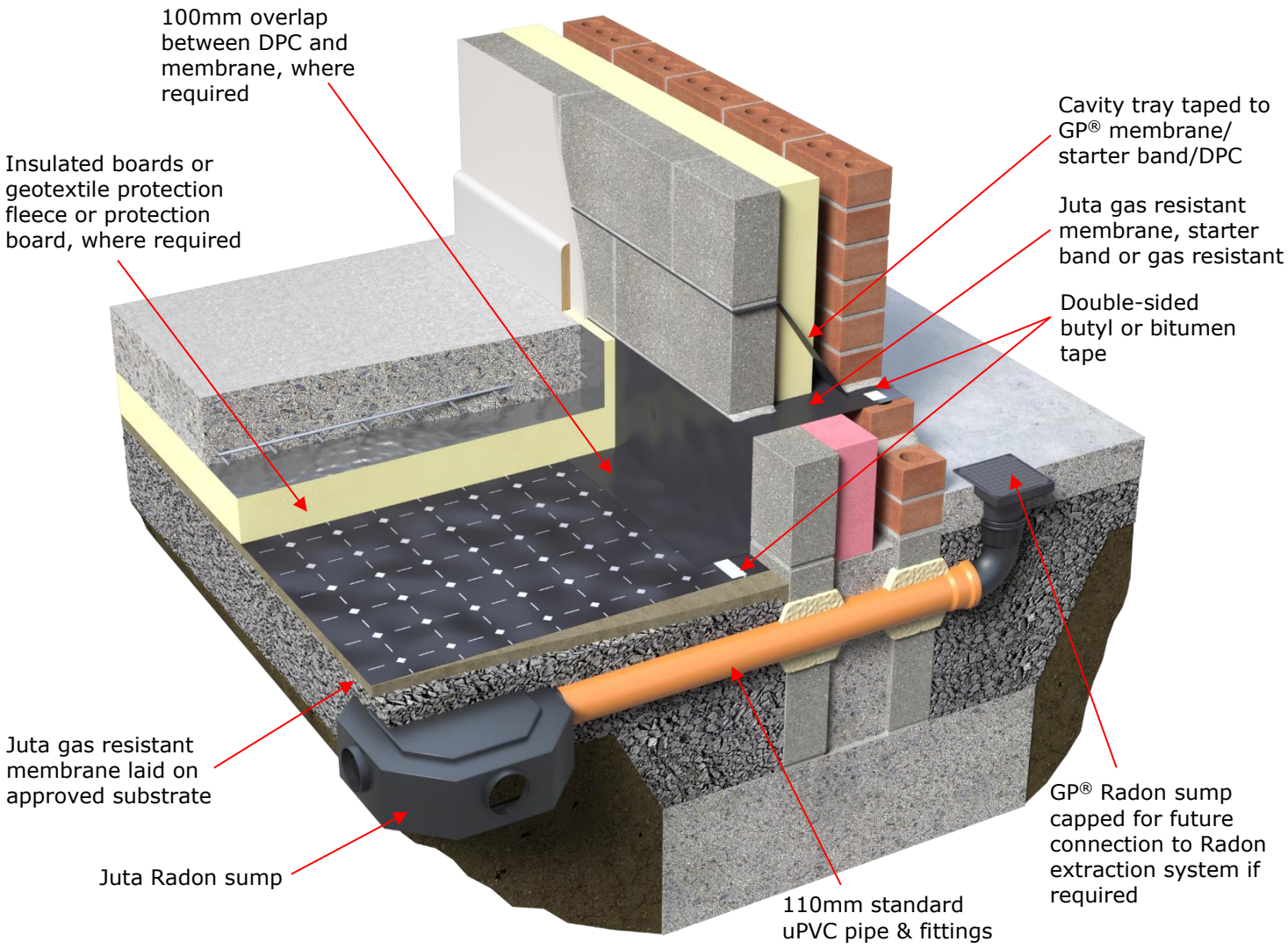


**Figure 1 - Ground bearing slab**

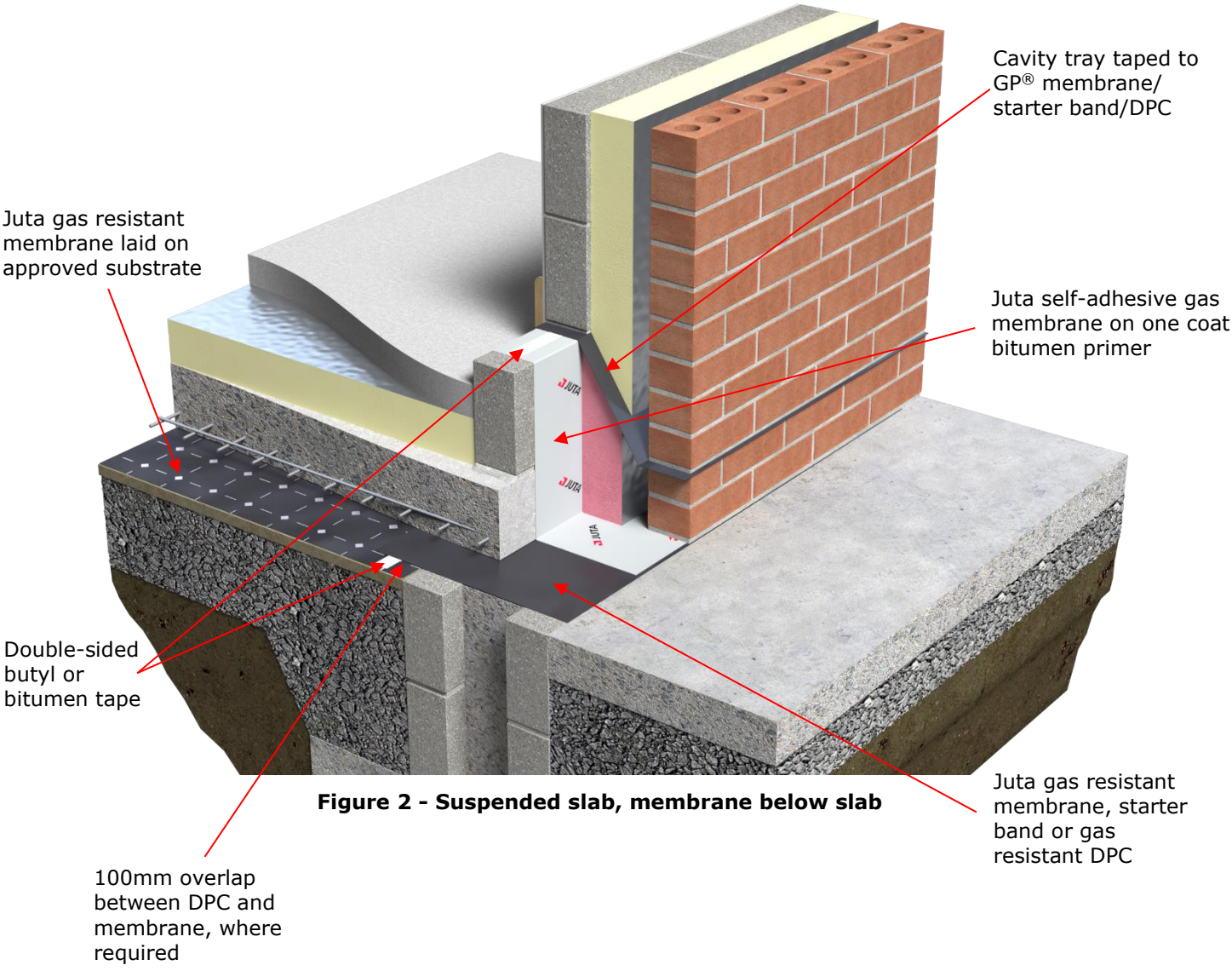


**Figure 2 - Suspended slab, membrane below slab**

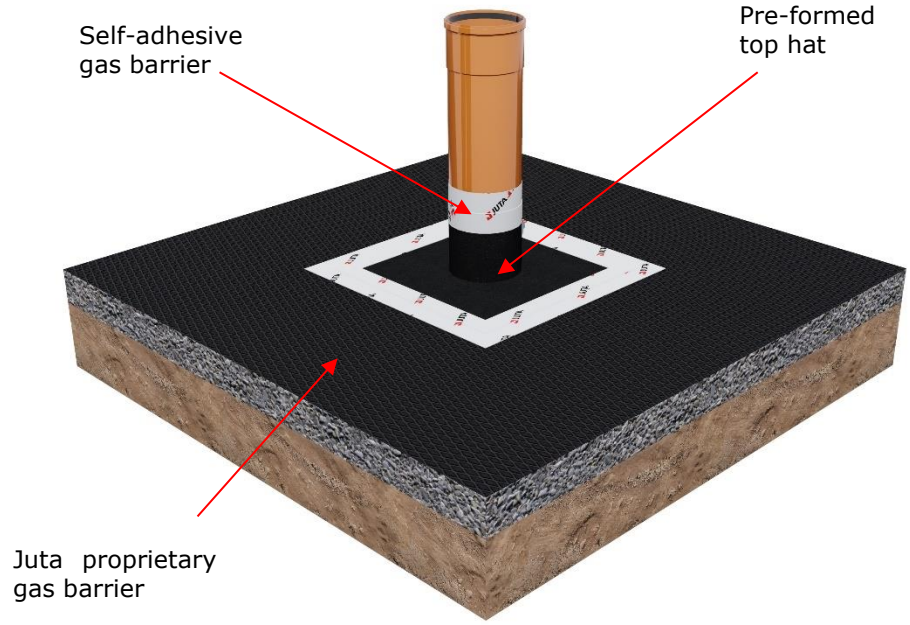


**Figure 3 - Typical detail at pipe penetration**

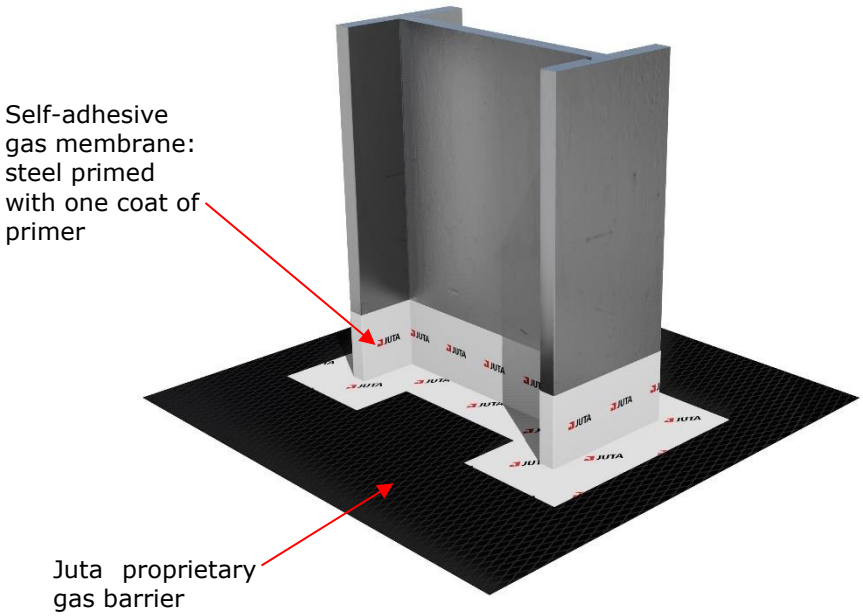


**Figure 4 - Stanchion detail**

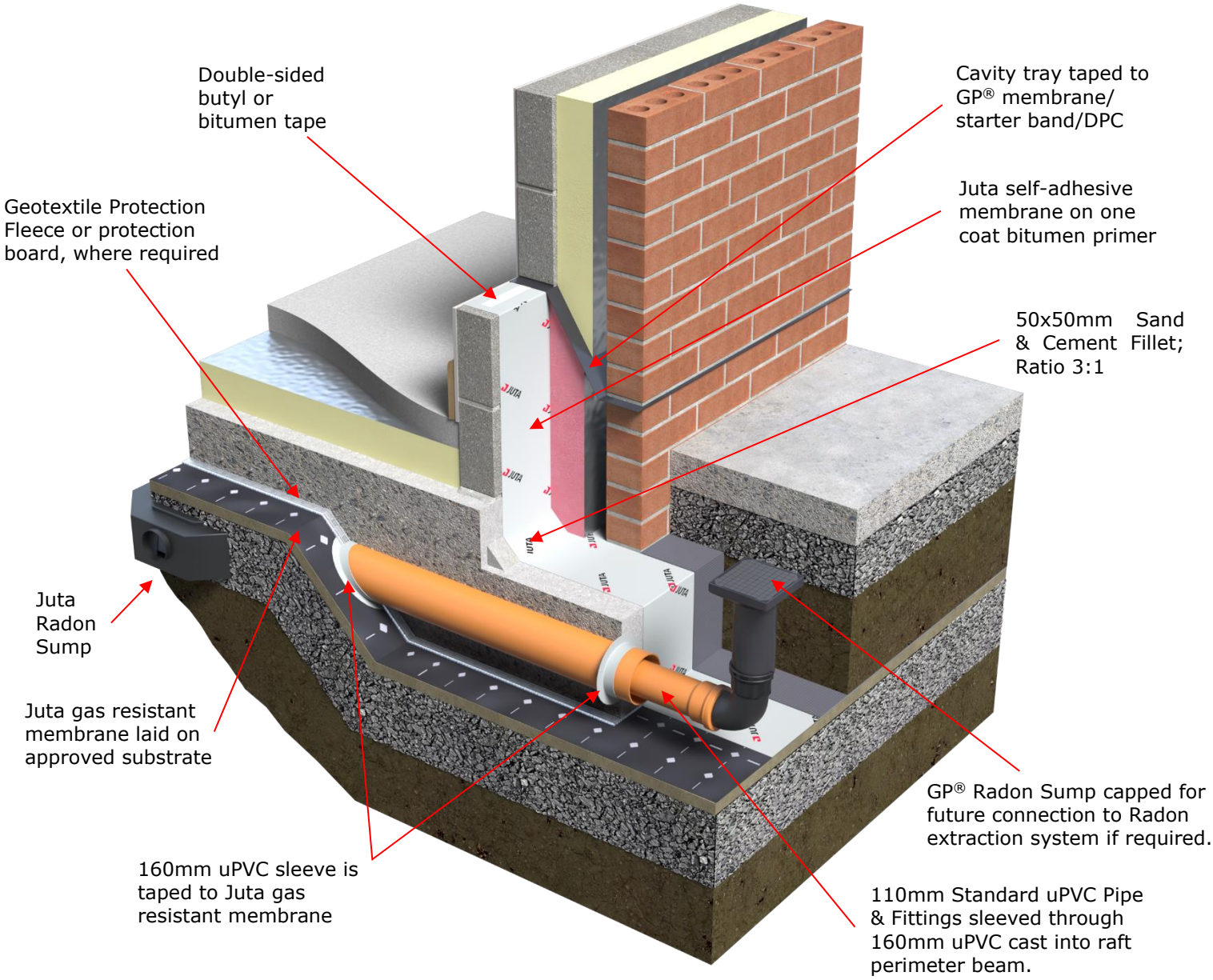


**Figure 5 - Raft foundation detail with Radon sump**

| Characteristic | Test Method | Result |
|---|---|---|
| **Juta GP®1** | | |
| Thickness | EN 1849-2 | 0.6 mm |
| Width | EN 1848-2 | Various |
| Length | EN 1848-2 | Various |
| Weight | EN 1849-2 | 370 g/m$^2$ |
| 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:<br>- MD<br>- CMD | EN 12311-1 | <br>- 600 N/50mm<br>- 480 N/50mm |
| Elongation:<br>- MD<br>- CMD | EN 12311-1 | <br>- 20%<br>- 20% |
| Puncture resistance | EN 12236 | 1.25 kN |
| Resistance to tearing (nail shank):<br>- MD<br>- CMD | EN 12310-1 | <br>- 330 N<br>- 400 N |
| Methane permeability | EN ISO 15105-1 | <0.09 ml/m$^2$/day/atm |
| Carbon Dioxide permeability | EN ISO 15105-1 | <0.09 ml/m$^2$/day/atm |
| Radon diffusion co-efficient (D) | K124/02/95 | 8.0 x $10^{-15}$ m$^2$/s |
| Transmission rate of volatile liquids – Diesel | ISO 6179:2010 (B) | 0.246 g/m$^2$/h |
| Transmission rate of volatile liquids – Xylene | ISO 6179:2010 (B) | 0.571 g/m$^2$/h |
| Transmission rate of volatile liquids – Toluene | ISO 6179:2010 (B) | 0.583 g/m$^2$/h |
| Transmission rate of volatile liquids – Petrol | ISO 6179:2010 (B) | 0.135 g/m$^2$/h |
| **Juta GP®2** | | |
| Thickness | EN 1849-2 | 0.5 mm |
| Width | EN 1848-2 | Various |
| Length | EN 1848-2 | Various |
| Weight | EN 1849-2 | 275 g/m$^2$ |
| 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:<br>- MD<br>- CMD | EN 12311-1 | <br>- 500 N/50mm<br>- 470 N/50mm |
| Elongation:<br>- MD<br>- CMD | EN 12311-1 | <br>- 15%<br>- 20% |
| Puncture resistance | EN 12236 | 1.04 kN |
| Resistance to tearing (nail shank):<br>- MD<br>- CMD | EN 12310-1 | <br>- 400 N<br>- 350 N |
| Methane permeability | EN ISO 15105-1 | <514 ml/m$^2$/day/atm |
| Carbon Dioxide permeability | EN ISO 15105-1 | <514 ml/m$^2$/day/atm |
| Radon diffusion co-efficient (D) | K124/02/95 | 4.3 x $10^{-12}$ m$^2$/s |
| **Juta GP®4** | | |
| Thickness | EN 1849-2 | 0.6 mm |
| Width | EN 1848-2 | Various |
| Length | EN 1848-2 | Various |
| Weight | EN 1849-2 | 400 g/m$^2$ |
| 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:<br>- MD<br>- CMD | EN 12311-1 | <br>- 600 N/50mm<br>- 570 N/50mm |
| Elongation:<br>- MD<br>- CMD | EN 12311-1 | <br>- 15%<br>- 15% |
| Resistance to tearing (nail shank):<br>- MD<br>- CMD | EN 12310-1 | <br>- 500 N<br>- 500 N |
| Radon diffusion co-efficient (D) | ISO/TS 11665-13 | 8.0 x $10^{-12}$ m$^2$/s |

**Table 1 - Product Specification**

| Characteristic | Test Method | Result |
|---|---|---|
| **Juta GP®H 0.6mm** | | |
| Thickness | EN 1849-2 | 0.6 mm |
| Width | EN 1848-2 | Various |
| Length | EN 1848-2 | Various |
| Weight | EN 1849-2 | 600 g/m$^2$ |
| Water tightness | EN 1296, EN 1367, EN 1928 | Pass |
| Resistance to static load | EN 12730-B | >20 kg |
| Tensile strength:<br>- MD<br>- CMD | EN 12311-1 | <br>- 500 N/50mm<br>- 570 N/50mm |
| Resistance to tearing (nail shank):<br>- MD<br>- CMD | EN 12310-1 | <br>- 450 N<br>- 500 N |
| Radon diffusion co-efficient (D) | K124/02/95 | 2.0 x 10$^{-12}$ m$^2$/s |
| **Juta GP® TITANFLEX** | | |
| Thickness | EN 1849-2 | 0.5 mm |
| Width | EN 1848-2 | 2 m |
| Length | EN 1848-2 | 50 m |
| Weight | EN 1849-2 | 500 g/m$^2$ |
| Water vapour transmission rate | EN 1931 | 0.11 – 0.18 g/m$^2$/day |
| Water tightness | EN 1928 | Pass |
| Resistance to static load | EN 12730-B | ≥ 20 kg |
| Tensile strength:<br>- MD<br>- CMD | EN 12311-1 | <br>- 550 N/50mm<br>- 400 N/50mm |
| Elongation:<br>- MD<br>- CMD | EN 12311-1 | <br>- 550%<br>- 550% |
| Puncture resistance | EN 12236 | ≥ 2.0 kN |
| Resistance to tearing (nail shank):<br>- MD<br>- CMD | EN 12310-1 | <br>- 300 N<br>- 300 N |
| Methane permeability | EN ISO 15105-1 | 0.13 ml/m$^2$/day/atm |
| Carbon Dioxide permeability | EN ISO 15105-1 | 3.01 ml/m$^2$/day/atm |
| Radon diffusion co-efficient (D) | K124/02/95 | 1.0 x 10$^{-12}$ m$^2$/s |
| Transmission rate of volatile liquids – Xylene | EN ISO 15105-2 | <7.7 mg/m$^2$/day |
| Transmission rate of volatile liquids – Toluene | EN ISO 15105-2 | <13.8 mg/m$^2$/day |
| **Juta GP® TITANTANK** | | |
| Thickness | EN 1849-2 | 1.2 mm |
| Width | EN 1848-2 | 1 or 0.3 m |
| Length | EN 1848-2 | 20 m |
| Weight | EN 1849-2 | 1350 g/m$^2$ |
| Water vapour transmission rate | EN 1931 | 0.11 – 0.18 g/m$^2$/day |
| Water tightness | EN 1928 | Pass |
| Resistance to static load | EN 12730-B | ≥ 20 kg |
| Tensile strength:<br>- MD<br>- CMD | EN 12311-1 | <br>- 550 N/50mm<br>- 400 N/50mm |
| Elongation:<br>- MD<br>- CMD | EN 12311-1 | <br>- 550%<br>- 550% |
| Puncture resistance | EN 12236 | ≥ 2.0 kN |
| Resistance to tearing (nail shank):<br>- MD<br>- CMD | EN 12310-1 | <br>- 300 N<br>- 300 N |
| Methane permeability | EN ISO 15105-1 | 0.13 ml/m$^2$/day/atm |
| Carbon Dioxide permeability | EN ISO 15105-1 | 3.01 ml/m$^2$/day/atm |
| Radon diffusion co-efficient (D) | K124/02/95 | 1.0 x 10$^{-12}$ m$^2$/s |
| Transmission rate of volatile liquids – Xylene | EN ISO 15105-2 | <7.7 mg/m$^2$/day |
| Transmission rate of volatile liquids – Toluene | EN ISO 15105-2 | <13.8 mg/m$^2$/day |

**Table 2 - Product Specification**

| Juta GP® TITANBOND | | |
|---|---|---|
| Thickness | EN 1849-2 | 2.0 mm |
| Width | EN 1848-2 | 1.9 m |
| Length | EN 1848-2 | 25 m |
| Weight | EN 1849-2 | 650 g/m$^2$ |
| Water vapour transmission rate | EN 1931 | 0.11 – 0.18 g/m$^2$/day |
| Water tightness | EN 1928 | Pass |
| Resistance to static load | EN 12730-B | ≥ 20 kg |
| Tensile strength:<br>- MD<br>- CMD | EN 12311-1 | <br>- 550 N/50mm<br>- 400 N/50mm |
| Elongation:<br>- MD<br>- CMD | EN 12311-1 | <br>- 550%<br>- 550% |
| Puncture resistance | EN 12236 | ≥ 2.0 kN |
| Resistance to tearing (nail shank):<br>- MD<br>- CMD | EN 12310-1 | <br>- 300 N<br>- 300 N |
| Methane permeability | EN ISO 15105-1 | 0.13 ml/m$^2$/day/atm |
| Carbon Dioxide permeability | EN ISO 15105-1 | 3.01 ml/m$^2$/day/atm |
| Radon diffusion co-efficient (D) | K124/02/95 | 1.0 x 10$^{-12}$ m$^2$/s |
| Transmission rate of volatile liquids – Xylene | EN ISO 15105-2 | <7.7 mg/m$^2$/day |
| Transmission rate of volatile liquids – Toluene | EN ISO 15105-2 | <13.8 mg/m$^2$/day |
| **JUTA GP®H 1.0mm** | | |
| Thickness | EN 1849-2 | 1.0 or 1.5 mm |
| Width | EN 1848-2 | 5.1 or 2.5 m |
| Length | EN 1848-2 | 100 or 25 m |
| Weight | EN 1849-2 | 939 g/m$^2$ |
| Water vapour transmission rate | EN 1931 | 300 m |
| Water tightness | EN 1928 | Pass |
| Resistance to static load | EN 12730-B | ≥ 20 kg |
| Tensile strength 1.0 m thickness:<br>- MD<br>- CMD | EN 12311-1 | <br>- 850 N/50mm<br>- 850 N/50mm |
| Tensile strength 1.5 m thickness:<br>- MD<br>- CMD | EN 12311-1 | <br>- 1000 N/50mm<br>- 1000 N/50mm |
| Elongation:<br>- MD<br>- CMD | EN 12311-1 | <br>- 950%<br>- 950% |
| Puncture resistance 1.0 m thickness | EN 12236 | 3.2 kN |
| Puncture resistance 1.5 m thickness | EN 12236 | 4.3 kN |
| Tear strength | ISO 34-1 | 140 N |
| Methane permeability | EN ISO 15105-1 | < 55 ml/m$^2$/day/atm |
| Carbon Dioxide permeability | EN ISO 15105-1 | < 55 ml/m$^2$/day/atm |
| Radon diffusion co-efficient (D) | K124/02/95 | 1.1 x 10$^{-11}$ m$^2$/s |
| Transmission rate of volatile liquids – Diesel<br>- 1.0 m thickness<br>- 1.5 m thickness | ISO 6179 | <br>- 0.047 g/m$^2$/h<br>- 0.026 g/m$^2$/h |
| Transmission rate of volatile liquids – Xylene<br>- 1.0 m thickness<br>- 1.5 m thickness | ISO 6179 | <br>- 1.886 g/m$^2$/h<br>- 0.549 g/m$^2$/h |
| Transmission rate of volatile liquids – Toluene<br>- 1.0 m thickness<br>- 1.5 m thickness | ISO 6179 | <br>- 4.432 g/m$^2$/h<br>- 0.987 g/m$^2$/h |
| Transmission rate of volatile liquids – Petrol<br>- 1.0 m thickness<br>- 1.5 m thickness | ISO 6179 | <br>- 2.318 g/m$^2$/h<br>- 0.623 g/m$^2$/h |

**Table 3 - Product Specification**

## 3.1 GENERAL

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 as set out in Technical Guidance Document (TGD) to Part C.

The TGD to Part C of the Building Regulations gives a National Reference Level (NRL) for long-term exposure to radon in **Dwellings** is 200 Bq/$m^3$. Above this level the need for remedial action should be considered.

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. Juta 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 I.S. EN 13967[8].**

Two of the most common encountered ground gases are Methane ($CH_4$) and Carbon Dioxide ($CO_2$). 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:** Table 1, Table 2 and Table 3 list the membranes that have 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.

### 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, $CO_2$, $CH_4$, VOCs, liquid water and water vapour from the ground.

### 3.1.2 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. Juta GP membranes 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/$m^3$) is an effective protection after laying. Juta GP 3mm Protection Boards or Juta GP Protection Fleece can also be 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 I.S. EN 1996-1-1[3] and BS 8102[4].

### 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 I.S. EN 1996-1-1[3]);
- ensure that all designed cavities are effectively closed to interior spaces;

**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, Juta 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, Juta membranes 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, Juta membranes should be installed with folds as shown:

- 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 Juta GP Radon, Ground Gas, VOC, Air & Moisture Protection System 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, ground gas and VOC resistance performance will occur.

### 3.4 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.

### 3.5 REUSE AND RECYCLABILITY

The membranes contain polymer materials which can be recycled.

## Part Four / Technical Investigations 4

### 4.1 TESTS / ASSESSMENTS

Various technical investigations were carried out on Juta GP® Radon, Ground Gas, VOC, Air & Moisture Protection System. Typical results are shown in Table 1, Table 2 and Table 3 certificate.

### 4.2 OTHER INVESTIGATIONS

**4.2.1** 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**.**

**4.2.2** 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 latest revision so long as:

(a) the specification of the product is unchanged.

(b) the Building Regulations 1997 to 2023 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 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

## NSAI Agrément

This Certificate No. **16/0388** is accordingly granted by the NSAI to **Juta UK** on behalf of NSAI Agrément.

Date of Issue: **December 2016**

**Signed**

**Kevin D. Mullaney**
**Director of NSAI Certification**

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

Revision:
**27th October 2022** Addition of JUTA GP®H 0.6mm, GP® TITANFLEX, GP® TITANBOND, GP® TITANTANK, JUTA GP®H 1.0mm and GP® Liquid Gas Barrier.
**14th August 2024** Revised JUTA GP®4 Radon diffusion co-efficient (D)

**Bibliography**


[1] BS 8215:1991, Code of practice for design and installation of damp-proof courses in masonry construction.

[2] CIRIA C735:2014, Good practice on the testing and verification of protection systems for buildings against hazardous ground gases.

[3] I.S. 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).

[4] BS 8102:2022, Protection of below ground structures against water ingress - Code of practice

[5] BS 8485:2015+A1:2019, Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings

[6] CIRIA C716:2012, Remediating and mitigating risks from volatile organic compound (VOC) vapours from land affected by contamination

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

[8] I.S. EN 13967:2012, Flexible sheets for waterproofing – Plastic and rubber damp proof sheets including plastic and rubber basement tanking sheet – Definitions and characteristics.