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CERTIFICATE OF ASSESSMENT

CERTIFICATE NUMBER  
095/02

DATE OF ISSUE  
29 AUG 02

PRODUCT

POWERBASE MB 420  
GAS RESISTANT MEMBRANE

SUPPLIED BY

Industrial Textiles and Plastics  
Stillington Road  
Easingwold  
York  
YO61 3FA

Tel: 01347 868767

Fax: 01347 868737

SUMMARY

Powerbase MB 420 has been assessed to confirm its suitability for use as a gas and moisture resistant barrier for incorporation into the floor of a building to restrict the ingress of radon, methane and carbon dioxide from the ground in situations where there is a risk of contamination to the internal environment of the building.

Powerbase MB 420 and its method of application has been reviewed with respect to Building Regulations current in the United Kingdom and the Republic of Ireland. The assessment has referred to British Standards and other publications current in April 2002.

The assessment is described in the following pages which form integral parts of this [assessment](#).

LIMITATIONS OF USE

[Powerbase MB 420 is certified for use where a risk](#) of contamination by gases from the ground exists.

Powerbase MB 420 must be installed in accordance with the manufacturer's instructions and the requirements of this [assessment](#). For buildings in the UK the recommendations of the BRE Limited Reports BR 211 (BR 376 in Scotland and BR 413 in Northern Ireland) "Radon : guidance on Radon Protective measures for new dwellings", and BR 212 "Construction of new buildings on gas contaminated land" must be followed. Further guidance on detailing various constructions can be obtained from BR 414 "Protective measures for housing on gas contaminated land". In Ireland reference should also be made to the Department of the Environment publication "Radon in Buildings".

The product is not intended for use in conditions where it may become subjected to hydrostatic pressure from the ground. Sub-soil drainage should be provided where there is a risk of the ground becoming waterlogged.

The product is primarily intended for use in normal ground conditions ( $4 < \text{pH} < 9$ ). The product must remain protected from ultraviolet degradation and physical damage until immediately prior to use and once installed be covered as soon as practicable, but at the latest within two weeks.

Current information on the areas in the United Kingdom delineated by the Department of the Environment Transport and the Regions, with respect to the risk of radon infiltration levels for the purposes of the Building Regulations can be obtained from BR 211, BR 376 and BR 413). More up to date information may be available from local building control inspectors. In Ireland areas at risk of radon infiltration are designated in the Radiological Protection Institute of Ireland (RPII) publication "Radon in Irish Dwellings". This document is frequently updated and thus the latest version should be consulted.

## STATEMENT

It is the opinion of BRE Certification that the Powerbase MB 420 is satisfactory for use within the stated limitations provided that it is used in accordance with the manufacturer's instructions and the requirements of this certificate.

## CONFIRMATION

For and behalf of BRE Certification

Technical Director

### 1. TECHNICAL SPECIFICATION

#### 1.1 Description of Product

- 1.1.1 Powerbase MB 420 is a laminated and cast extrusion coated reinforced LDPE sheet membrane incorporating an internal aluminium film and is white or other in colour. The membrane has a nominal weight of 0.42 kg/m<sup>2</sup> with a nominal overall thickness of 0.65 mm.
- 1.1.2 Powerbase MB 420 is for supply in pre-fabricated panels or in rolls for welding or joining with tape on site. It is for use in conjunction with proprietary ancilliary products for sealing at penetrations by service pipes or ducts passing through the membrane into the building, allowing complete sealing over the footprint of the building.
- 1.1.3 The products characteristics are listed in Table 1.

Table 1

Product Characteristic	Nominal Value	
Length, m	50	50
Width, m	1.5	2.95
Roll weight, kg	32	63

#### 1.2 Product Performance

- 1.2.1 This membrane comprising a 400 µm Low Density Polyethylene (LDPE) sheet with an internal aluminium layer exceeds the recommendation given in BRE Reports BR 211 and BRE 212, for an adequate gas resistant membrane.
- 1.2.2 Powerbase MB 420 used with all joints lapped and sealed will provide resistance to the ingress of radon, methane and carbon dioxide into a building provided that it is installed in accordance with the manufacturer's instructions and the recommendations of this assessment. The membranes are for jointing by welding in accordance with the manufacturer's instructions. Detailing at corners and service entries is carried out using suitable proprietary tape and ancilliary components.
- 1.2.3 Powerbase MB 420 can additionally 'double' as a damp proofing membrane.
- 1.2.4 Powerbase MB 420 is considered to be adequately resistant to mechanical damage during the normal installation and construction processes provided no loads are placed on the material. The use of a super-imposed geotextile membrane should be considered if there is to be any trafficking. The membrane can be punctured by sharp objects. The integrity of the membrane must be checked prior to permanent covering and any necessary repairs carried out as detailed in Clause 3.3.11(below).

- 1.2.5 Powerbase MB 420 must be covered by a screed of minimum thickness 50 mm if it is to be laid above the structural floor member. Where insulation is to be incorporated in a ground supported floor construction reference should be made to BRE Limited Report BR 262 "Thermal insulation: avoiding risks" regarding the positioning of the membrane.
- 1.2.6 For sites where the presence of gaseous contaminants are suspected, a site investigation should be carried out following the guidance of the BS Draft for Development DD175. Further general information on site investigations is given in BS 5930.
- 1.2.7 Powerbase MB 420 can be used as the primary protection measure in combination with either a suspended concrete floor with a ventilated subfloor void or a ground supported concrete floor. A high level of care must be exercised with detailing and joining and provision must be made for any anticipated settlement at junctions of structural elements. Guidance is given in BR 211, BR 212, BR 376 and BR 411, which give further guidance on additional secondary protection measures such as subfloor ventilation.  
In Ireland additional measures for protection from radon (subfloor depressurisation) in susceptible areas are indicated within DOELG Document "Radon in Buildings" as recommended in Technical Guidance Document C of the Ireland Building Regulations.
- 1.2.8 Powerbase MB 420 should retain its performance for the normal design life of standard floor constructions into which it is incorporated provided it has been installed in accordance with the manufacturer's instructions and the provisions of this assessment.

## 2. BUILDING REGULATIONS

The relevant Building Regulation requirements for these products are:

### 2.1 The Building Regulations (England & Wales) 2000 (as amended)

#### Requirement

- A1 Loading - Powerbase MB 420 will safely and without undue deformation sustain and transmit the dead and imposed service loads to the floor slab.
- C2 Dangerous and offensive substances - the installation of Powerbase MB 420 within the system is considered to be an acceptable precaution to limit the danger to health and safety caused by the permeation of radon, methane and carbon dioxide from the ground.
- C4 Resistance to weather and ground moisture - when installed in walls and floors in accordance with Section 3.3 of this assessment, Powerbase MB 420 within the system will adequately resist the passage of moisture to the inside of the building.

#### Regulation

- 7 Materials and workmanship - Powerbase MB 420 is manufactured from appropriate materials for the application in which it is intended to be used and can be installed satisfactorily.

### 2.2 The Building Standards (Scotland) Regulations 1990 (as amended)

#### Regulation

- B2.1 Selection and use of materials - Powerbase MB 420 is comprised of suitable materials for a radon, methane and carbon dioxide and moisture retarding membrane.

- C2.1 Construction - Powerbase MB 420 will safely and without undue deformation sustain and transmit the dead and imposed service loads to the floor slab.
- G2.1 Preparation of a site - when installed in accordance with Section 3.3 of this assessment, Powerbase MB 420 within the system will contribute to the safety of the building by limiting the effects of radon, methane and carbon dioxide
- G2.6 Resistance to moisture from the ground - when installed in a floor or wall in accordance with Section 3.3 of this assessment, Powerbase MB 420 within the system will prevent moisture from the ground reaching the inner surface of any part of the building which it could damage.

### 2.3 The Building Regulations (Northern Ireland) 2000

#### Regulation

- B2 Fitness of materials and workmanship - Powerbase MB 420 is manufactured from materials of a suitable nature for the intended purpose and can be installed so as to limit the danger to the health or safety of persons in or about the building.
- C2 Preparation of site - when installed in accordance with Section 3.1 of this assessment Powerbase MB 420 within the system will contribute to the safety of the building by limiting the effects caused by radon, methane and carbon dioxide.
- C4 Resistance to ground moisture and weather - when installed in a wall or floor in accordance with Section 3.1 of this assessment, Powerbase MB 420 within the system will prevent the passage of moisture to any part of the building from the ground.
- D3 Stability - Powerbase MB 420 will safely and without undue deformation sustain and transmit the dead and imposed service loads to the floor slab.

### 2.4 The Building Regulations 1997 Ireland (as amended)

#### Requirement

- A1 Loading – Powerbase MB 420 will safely and without undue deformation sustain and transmit the dead and imposed service loads to the floor slab.
- C3 Dangerous and offensive substances – the installation of Powerbase MB 420 within the system is considered to be an acceptable precaution to limit the danger to health and safety caused by the permeation of radon, methane and carbon dioxide from the ground.  
  
This membrane meets the minimum performance requirement of this technical guidance document for a reinforced membrane.
- C4 Resistance to weather and ground moisture – when installed in walls and floors in accordance with Section 3.3 of this assessment, Powerbase MB 420 will adequately resist the passage of moisture to the inside of the building.
- D2 Materials and workmanship - Powerbase MB 420 is manufactured from appropriate materials for the application in which it is intended to be used and can be installed satisfactorily.

### 3. INSTALLATION/PRACTICAL APPLICATION

#### 3.1 Identification

3.1.1 Powerbase MB 420 is supplied in rolls as listed in Table 1. Each roll is secured by circumferential tapes displaying the manufacturer's name. The roll weights are listed in Table 1.

#### 3.2 Storage and Handling

3.2.1 Rolls of Powerbase MB 420 should be securely stacked on site under cover and protected from accidental damage. The rolls must not be stored on their ends. The Powerbase ancilliary components should be protected from rain, frost and exposure to sunlight during storage. It should be ensured that the temperatures of these materials does not fall below 5°C or exceed 30°C at any time.

Care should be taken when handling these materials on site in order to avoid accidental perforation. If repairs are required they must be carried out as stated in Clause 3.3.11,(below).

#### 3.3 Installation

3.3.1 The Powerbase MB 420 must be installed in accordance with the manufacturer's written instructions, and must be installed in accordance with the recommendations of British Standard Code of Practice CP102 (and IS 325:Part 2 in Ireland). In all cases the workmanship must meet the requirements laid down in BS 8000:Part 4 taking sufficient care to ensure sealing over the whole footprint of the building.

3.3.2 The membrane must be made continuous through the external walls of the building traversing any cavities. For cavity walls the membrane should form a cavity tray stepped down towards the outer leaf, as is normal practice with cavity trays with the sealing of the overlaps continuing across the cavity. The membrane should be supported across the cavity by filling to the level of the membrane with mortar.

3.3.3 Where the membrane is to be used for ground supported slab applications, provisions must be made for any anticipated movement of the slab during the life of the building(determined from a prior site investigation) to ensure that the membrane integrity is not compromised.

3.3.4 Surfaces which are to receive Powerbase MB 420 should be prepared to avoid any damage to the membrane occurring. If the surface is a concrete slab or masonry surface it should have a smooth clean and dry finish free of projections or indentations. If it is intended to lay Powerbase MB 420 on to sand blinding, this must be of sufficient thickness to cover all sharp projections and be tamped flat.

3.3.5 Installation of Powerbase MB 420 must be over prepared ground or sub-floor. When the membrane is to be installed below a suspended concrete slab it should be loosely laid to accommodate any small movements that may occur subsequent to installation.

The membranes can be prefabricated by welding to suit each application. Welding can also be carried out on site according to the manufacturer's instructions provided conditions are suitable. The membrane must be clean and dry. A test sample should be welded prior to welding the installed membrane to confirm that a satisfactory joint has been achieved. If there are any doubts about the site weld the overlap should be secured with tape.

- 3.3.6 Where joints are to be made with adhesive tape all surfaces must be dried thoroughly to ensure adequate adhesion prior to the application of the bonding tape. The joint should then be consolidated, preferably by firm rolling with a roller. Continuity of the membrane must be maintained at all positions and corners and all gaps sealed.
- 3.3.7 The surface of the components to be joined must be free of any mortar droppings, loose matter, grease or other deleterious substance. Jointing of components with the tapes must not be carried out below 5°C and some warming with a hot air gun may be required between temperatures of 5 and 10°C to ensure a satisfactory seal. Any self-adhesive primer used must not be applied to surfaces at or below 5°C.
- 3.3.8 It must be ensured that no bridging by the membrane should be allowed to occur at internal corners where concreting is to be carried out; the membrane should be laid sufficiently loosely so that it is not stretched or torn.  
Where sharp corners are unavoidable, internal and external angles must be strengthened with a 300 mm wide strip of membrane fixed as appropriate and interleaved with the adjacent layers of membrane.
- 3.3.9 In order to ensure the continuity of the membrane, it will be necessary to construct an airtight seal around all service entry points and features such as structural columns. Proprietary 'top-hat' units should be used for sealing around pipe entries. It should be noted that any gap between the inside of any service duct and an encased service pipe or cable should also be sealed preferably with a minimum of 150 mm depth of cold applied sealant. Service entry points should not be coincident with lapped joints in the membrane.
- 3.3.10 Where the membrane is to be laid over, for example, a slab movement joint it should be loosely folded back on itself during laying.
- 3.3.11 Powerbase MB 420 must be protected from site damage immediately that installation work is completed. Before the permanent protection is placed, the membrane area must be inspected for defects which should be repaired with an overlay of membrane extending beyond the point of damage by a minimum of 150 mm in all directions and securely taped in position.

#### 4. TECHNICAL APPRAISAL

##### 4.1 Performance Tests

Tests and investigations have been carried out by BRE Certification to determine the properties of the Powerbase MB 420 to include:-

- thickness
- weight per square metre
- tensile strength
- dimensional stability
- tensile strength before and after heat ageing
- water penetration resistance
- resistance to cracking at low temperature
- shear strength of joints.

Typical technical data for the membrane is presented in Table 2.

#### 4.2 Quality Control

The Powerbase MB 420 is manufactured under a quality system independently assessed to BS EN ISO 9002. The supplier carries out quality control tests and inspections to ensure that the finished products conform to the Powerbase MB 420 products specification.

Traceable quality records are maintained by the manufacturer. In the opinion of BRE Certification the materials and procedures of the manufacturer are adequate for the product.

#### 4.3 British Standards

The following British Standards and other standards have been referred to for this assessment:-

BS 2782:Part 3:1977	Methods of testing plastics. Methods 326A to 326C. Determination of tensile strength and elongation of plastics films.
BS 2782:Part 3:1991	Methods of testing plastics. Method 360B. Determination of tear resistance of plastics film and sheeting by the trouser tear method.
BS 3177:1959	Method for determining permeability to water vapour of flexible sheet materials used for packaging.
BS 5628:Part 3:1985	Code of practice for use of masonry. Materials and components, design and workmanship
BS 5930:1981	Code of practice for site investigations
BS 6515:1984	Specification for polyethylene damp proof-courses for masonry
BS 6399:Part 1:1984	Loading for buildings. Code of practice for dead and imposed loads
BS 8000:Part 4:1989	Workmanship on building sites. Code of practice for waterproofing
BS 8102:1990	Code of practice for protection of structures against water from the ground
BS 8215:1991	Code of practice for design and installation of damp proof courses in masonry construction
CP102:1973	Code of practice for protection of buildings against water from the ground
BS 10175	Code of practice for the identification of potentially contaminated land and its investigation.
IS 325:Part 2:(1995)	Code of Practice for the use of masonry. Masonry Construction.
BR 211 (BR 376 in Scotland and BR 413 in Northern Ireland)	Radon : guidance on Radon Protective measures for new dwellings.

The following Union Européenne Pour L'Agrément Technique Dans La Construction (UEAtc) document has been referred to for this assessment:-

MOAT 27

General Directive for the Assessment of Roof Waterproofing Systems

## 5. CONDITIONS OF ASSESSMENT ISSUE

### 5.1 Validity

This assessment will be valid for a period of three years. It will remain valid in so far as:

- a) The materials and method of manufacture are unchanged.
- b) The design and specification are unaltered from those examined by BRE Certification.
- c) Powerbase Building Products continues to have the product regularly checked by BRE Certification.

### 5.2 Health and Safety

This assessment and the recommendations herein do not purport in any way to restate the requirements of the Health and Safety at Work Act 1974 or any statutory or common law duty of care which exists now or in the future; nor is compliance with these recommendations to be assumed as satisfying the requirements of the said Act or any existing or future statutory or common law duty of care.

### 5.3 Reference to Other Documentation

Where reference is made in this assessment to any Act of Parliament, Regulation, Code of Practice, British or other Standard or other publication, it shall be construed as reference to such publication in the form in which it is in force at the date of the assessment.

### 5.4 Patents

BRE Certification makes no representational warranty that any patent or similar industrial property right is valid or that the manufacture, use, sale, lease or any other dealing or disposition of the product in whole or in part is not an infringement of any patent or industrial property right not owned by Industrial Textiles and Plastics.

TABLE 2 Typical Technical Data for Powerbase MB 420

Property	Test Description	Result
Dimensions(nominal)		Overall thickness 0.65 mm
Weight		Density (nominal) 0.42 kg/m <sup>2</sup>
Tensile elongation <sup>(1)</sup>	ISO 1421	Elongation(at max load) 20 %
Resistance to tearing <sup>(1)</sup>	Nail tear MOAT 27 (5.4.1)	Resistance 208 N
Resistance to passage of water vapour	Water vapour permeability to the method of BS 3177.  Equivalent water vapour transmission rate	Permeability < 0.17 g/m <sup>2</sup> /24h  1200 MNs/g
Resistance to passage of methane <sup>(2)</sup>	Permeability to methane generally in accordance with ISO 2782	Permeability (see note 2) $4.0 \times 10^{-19}$ m <sup>2</sup> /s/Pa
Water penetration resistance	EN 1928 Leakage	Nil
Low temperature flexibility	Flexibility on rolling MOAT 27(5.4.2)	Condition of Membrane No fracture -20 °C

Footnotes

1. Results quoted for these tests are the minimum value obtained with test-piece taken from either the longitudinal, or the transverse, roll alignment.
2. The value reported for resistance to methane is indicative only and based on the results from a single test. Under the same test conditions, a value of permeability of  $1.8 \times 10^{-17}$  m<sup>2</sup>/s/Pa was obtained for 1200 gauge polyethylene sheet.