IRISH AGRÉMENT BOARD
CERTIFICATE NO. 05/0223
Mannok Insulation Ltd,
Scotchtown, Ballyconnell,
Co. Cavan, Ireland.
T: +353 (0)49 9525600
F: +353 (0)49 9525601
W: www.mannokbuild.com

Mannok Insulation
Rigid PIR Insulation Products

Isolation de murs
Wärmedämmung

NSAI Agrément (Irish Agrément Board) is designated by Government to issue European Technical Approvals.

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

PRODUCT DESCRIPTION:
This Certificate relates to the following products:

- Mannok Therm Cavity / MC Partial Fill Cavity Wall Insulation (Detail Sheet 1)
- Mannok Therm Floor / MF Floor Insulation (Detail Sheet 2)
- Mannok Therm Roof / MR Pitched Roof Insulation (Detail Sheet 3)
- Mannok Therm Laminate Dry Lining with Plasterboard Laminate (Detail Sheet 4)

This Certificate certifies compliance with the requirements of the Building Regulations 1997 to 2019.

USE:
This is covered in each individual Detail Sheet.

MANUFACTURE AND MARKETING:
Mannok Insulation Ltd.,
Scotchtown,
Ballyconnell,
Co. Cavan,
Ireland.
T: +353 (0)49 9525600
F: +353 (0)49 9525601
W: www.mannokbuild.com

1.1 ASSESSMENT

In the opinion of NSAI Agrément, Mannok Therm Rigid PIR Insulation Products if used in accordance with this Certificate and in conjunction with the relevant Detail Sheet, can meet the requirements of the Building Regulations 1997 to 2019, as indicated in Section 1.2 of this Irish Agrément Certificate.

1.2 BUILDING REGULATIONS 1997 to 2019

REQUIREMENTS:

Part D – Materials and Workmanship

D3 – Mannok Therm Rigid PIR Insulation Products, as certified in this Certificate, are comprised of 'proper materials' fit for their intended use (see Part 4 of this Certificate).

D1 – Mannok Therm Rigid PIR Insulation Products, as certified in this Certificate, meet the requirements of the building regulations for workmanship.

Part B – Fire Safety

B2 – Internal Fire Spread (Linings)

Part B Vol 2 – Fire Safety

B7 – Internal Fire Spread (Linings)

Mannok Therm Rigid PIR Insulation Products faced with plasterboard are considered to be Class 0. They may therefore be used on the internal surfaces of buildings of every purpose group.

B3 – Internal Fire Spread (Structure)

B8 – Internal Fire Spread (Structure)

The reaction to fire classifications for the Mannok Therm Rigid PIR Insulation Products are listed in their Detail sheets.

Part C – Site Preparation and Resistance to Moisture

C4 – Resistance to Weather and Ground Moisture

Mannok Therm Rigid PIR Insulation Products referred to in this Certificate when installed in compliance with the conditions indicated in Part 3 of the relevant Detail Sheet will not promote the passage of moisture and will minimise the risk of surface or interstitial condensation.

Part F – Ventilation

F1 – Means of Ventilation

Mannok Therm Rigid PIR Insulation Products can be incorporated into structures that meet the requirements of this Regulation.

Part J – Heat Producing Appliances

J3 – Protection of Building

In the opinion of NSAI Agrément, the Mannok Therm Rigid PIR Insulation Products, if used in accordance with this Certificate and the relevant Detail Sheet, can meet the requirements of Part J of the Building Regulations 1997 to 2019.

Part L – Conservation of Fuel and Energy

L1 – Conservation of Fuel and Energy

Based on the measured thermal conductivity of Mannok Therm Rigid PIR Insulation Products, the products can contribute to complying with the requirements of this Regulation.

Part Two / Technical Specification and Control Data 2

2.1 PRODUCT DESCRIPTION

Each of the Mannok Therm Rigid PIR Insulation Products is given a detailed description in the relevant Detail Sheet.

2.2 DELIVERY, STORAGE AND MARKING

Mannok Therm Rigid PIR Insulation Products are supplied palletised in labelled packs and shrink wrapped in polyethylene. Each pack carries a label bearing the CE Marking together with the product description, product characteristics (λ and R values), size, thickness, batch number and date of manufacture, the manufacturer's name, NSAI Agrément identification mark and NSAI Agrément Certificate number for the system.

The product packaging must not be considered adequate for outside protection. Ideally boards should be stored inside the building. If stored outside, the products should be stacked flat on a level base raised off the ground on skids and should be covered with a polythene sheet or protected with weatherproof tarpaulins.

Boards should be protected in transit and in storage from damage caused by ropes and tie straps.

The boards must not be exposed to a naked flame or other ignition sources.

On-site cutting of boards where it is necessary to maintain continuity of insulation around doors, windows or other openings is easily executed using a fine tooth saw or by cutting through the insulation, and paper backing of any plasterboard layer, then snapping the boards face down over a straight edge and cutting the paper facing of the plasterboard on the other side.

Tapered edged boards are jointed and finished in accordance with standard dry lining procedure offering a surface suitable for paper hanging and paint finishes.

Good workmanship and appropriate site procedures are necessary to achieve expected thermal and air tightness performance. Ensure accurate trimming to achieve close butting joints and continuity of insulation.

Adequate protection and safety precautions should be taken.

Part Three / Design Data 3

3.1 GENERAL

This matter is dealt with for each product in their Detail Sheet.

4.1 BEHAVIOUR IN FIRE
Each Detail Sheet contains the relevant information.

4.2 WATER PENETRATION
The Mannok Therm Rigid PIR Insulation Products referred to in this Certificate are of a closed cell structure, which does not allow water uptake by capillary action. When used in accordance with this Certificate, the products present no significant risk of water penetration.

4.3 THERMAL INSULATION
The aged/design thermal conductivity '$\lambda_{90/90}$' value' of the Mannok Therm Rigid PIR Insulation Products has been measured in accordance with I.S. EN 12667[1] (see each individual Detail Sheet). The high thermal resistance of the Mannok Therm Rigid PIR Insulation Products ensures that cold bridging and extra heat loss around the edges of openings can be avoided.

Lintel jamb and cill designs similar to those shown in Diagram 3 of the TGD to Part L of the Building Regulations 1997 to 2019 will be satisfactory to limit thermal bridging.

Uncontrolled leakage of air through the fabric of a building and/or cracks in and around door and window frames, sills, jambs etc. can occur due to wind pressure or air movement due to thermal effects. Details of how to avoid the infiltration of cold air are given in TGD to Part L of the Building Regulations 1997 to 2019, Section 1.6 page 14.

The required maximum U-values for external walls, floors and roofs can be obtained from the relevant Detail Sheet.

4.4 LIMITING THERMAL BRIDGING
The linear thermal transmittance 'ψ' (Psi) describes the heat loss associated with junctions and around openings. Window and door reveal design used with Mannok Therm Rigid PIR Insulation Products have been assessed and when detailed in accordance with this Certificate can meet the requirements of Table D2 of TGD to Part L of the Building Regulations 1997 to 2019.

When **all** bridged junctions within a building comply with the requirements of Table D2 of TGD to Part L, the improved 'y' factor of 0.08 can be entered into the DEAP building energy rating (BER) calculation. If **all** junctions can be shown to be equivalent or better than Acceptable Construction Details published by the DECLG, then the values published in Table D2 apply.

Where either of the above options are shown to be valid, or when the required values cannot be achieved, all relevant details should be recorded on the 'Certificate of Compliance' for that project for use in future BER calculations.

'ψ' values for other junctions outside the scope of this Certificate should be assessed in accordance with BRE IP1/06[2] and BRE BR 497[3] in accordance with Appendix D of TGD to Part L of the Building Regulations 1997 to 2019.

As per Acceptable Construction Details, a minimum thermal resistance of 0.6m^{2}K/W should be provided at window reveals, heads and sills.

4.5 MATERIALS IN CONTACT WITH ELECTRICAL WIRING
Electrical installations should be in accordance with IS 10101[4]. It is recommended that cables should not be buried in the insulation and carried in a conduit. In relation to recessed spotlights and other luminaries, IS 10101[4] requires they be not less than the minimum distances from combustible materials as specified in the standard. For extra low voltage (ELV) it is recommended that only surface mounted ELV lighting be permitted in conjunction with Laminate.

4.6 CONDENSATION RISK
The Mannok Therm Rigid PIR Insulation Products referred to in this Certificate have a high vapour resistance and are therefore unlikely to be affected by surface or interstitial condensation, provided all joints between boards are filled and taped in accordance with standard dry lining practice. Interstitial condensation analysis for average winter environmental conditions for cavity wall constructions indicate no condensation risk. When insulating buildings the recommendations of BS 5250[5] should be followed to minimise the risk of condensation within the building elements and structures.

4.7 RESISTANCE TO SOLVENTS, FUNGI AND RODENTS
The Mannok Therm Rigid PIR Insulation Products referred to in this Certificate do not promote infestation, as there is no food value in the materials used. They also resist attack by mould and microbial growth. The insulation core is resistant to dilute acids, alkalis, mineral oil and petrol. It is not resistant to some solvent-based adhesive systems, particularly those containing methyl ethyl keytone. Adhesives containing such solvents should not be used in association with the boards. Boards which have been in contact with harsh solvents, petrol, mineral oil or acids or

boards that have been damaged in any other way should not be used.

4.8 WALL MOUNTED FITTINGS
This matter is dealt with in the Detail Sheets.

4.9 MAINTENANCE
This matter is dealt with in the Detail Sheets.

4.10 DURABILITY
The Mannok Therm Rigid PIR Insulation Products referred to in this Certificate are rot-proof and durable. As insulation for cavity walls, floors and roofs and as dry lining, such products are judged to be stable and will remain effective as an insulation system for the life of the building, so long as it is installed in accordance with this Certificate. Mannok Therm Laminate should not be used to isolate dampness nor be used in continuously damp or humid conditions.

4.11 CE MARKING
The manufacturer has taken responsibility of CE marking the Mannok Therm Rigid PIR Insulation Products in accordance with harmonised European Standard IS EN 13165[6]. An asterisk (*) appearing in this Certificate indicates that data shown is an essential characteristic of the product and declared in the manufacturers Declaration of Performance (DoP).

Reference should be made to the latest version of the manufacturer's DoP for current information on any essential characteristics declared by the manufacturer.

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

(a) the specification of the product is unchanged.

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

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

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

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

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

This Certificate No. **05/0223** is accordingly granted by behalf of NSAI Agrément.

Date of Issue: **December 2005**

Signed

Seán Balfe
Director of NSAI AgrémentReaders may check that changed by contacting NSAI Agrément , NSAI, 1 Sw Dublin 9, Ireland. Telephone: (01) 807 3800. Fax:

Revisions:
8th January 2018: References to Building Regulations a specifications updated to reflect manufacturer's DoP.
10th September 2021: Change of company and produc Regulations and standards updated, bibliography added.

NSAI Agrément

This Certificate No. **05/0223** is accordingly granted by the NSAI to **Mannok Insulation Ltd** on behalf of NSAI Agrément.

Date of Issue: **December 2005**

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

Revisions:
8th January 2018: References to Building Regulations and standards updated, product specifications updated to reflect manufacturer's DoP.
10th September 2021: Change of company and product names, references to Building Regulations and standards updated, bibliography added.
04th October 2024: Changes to fire classification and compressive strength.

NSAI Agrément

Bibliography

[1] IS EN 12667:2001 *Thermal performance of building materials and products – Determination of thermal resistance by means of guarded hot plate and heat flow meters method – Products of high and medium thermal resistance.*

[2] BRE IP1/06 *Assessing the effects of thermal bridging at junctions and around openings.*

[3] BRE BR 497 *Conventions for calculating linear thermal transmittance and temperature factors.*

[4] IS 10101:2020+AC1:2020 *National rules for electrical installations (incorporating Corrigendum 1:2020).*

[5] BS 5250:2011+A1:2016 *Code of practice for control of condensation in buildings.*

[6] IS EN 13165:2012 *Thermal insulation products for buildings – Factory made rigid polyurethane foam (PU) products – Specification.*

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

[8] IS EN 1996-1-2:2005 *Eurocode 6 – Design of masonry structures – Part 1-2: General rules – Structural fire design (including Irish National Annex).*

[9] IS EN 1996-2:2006 *Eurocode 6 – Design of masonry structures – Part 2: Design considerations, selection of materials and execution of masonry (including Irish National Annex).*

[10] IS EN 1996-3:2006 *Eurocode 6 – Design of masonry structures – Part 3: Simplified calculation methods for unreinforced masonry structures (including Irish National Annex).*

[11] IS EN 13501-1:2018 *Fire classification of construction products and building elements – Part 1: Classification using data from reaction to fire tests.*

[12] IS EN 1859:2009 *Chimneys: Metal chimneys: Test methods.*

[13] BS 8203:2017 *Code of practice for the installation of resilient floor coverings.*

[14] BS CP 102: 1973 *Code of Practice for the protection of buildings against water from the ground.*

[15] IS EN 1991-1-1:2002 *Eurocode 1: Actions on structures – Part 1-1: General actions – Densities, self-weight, imposed loads for buildings (including Irish National Annex).*

[16] SR 82:2017 *Slating and tiling – Code of practice.*

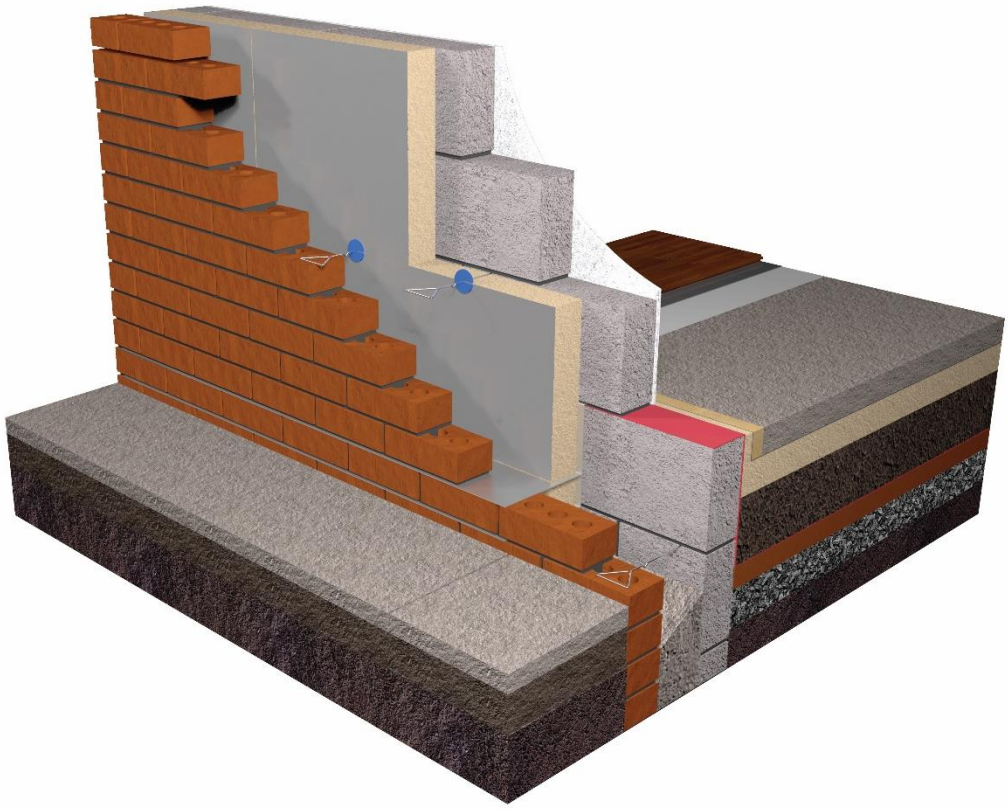
[17] IS EN 1991-1-4:2005 *Eurocode 1: Actions on structures: General actions: Wind actions (including Irish National Annex).*

[18] IS EN 520:2005 *Gypsum plasterboards: Definitions, requirements and test methods.*

[19] BS 8212:1995 *Code of practice for dry lining and partitioning using gypsum plasterboard.*

[20] BS 8000-8:1994 *Workmanship on building sites – Code of practice for plasterboard partitions and dry linings.*

Mannok Therm Cavity / MC Partial Fill Cavity Wall Insulation



PRODUCT DESCRIPTION:
This Detail Sheet relates to Mannok Therm Cavity / MC Partial Fill Cavity Wall Insulation, as defined in NSAI Agrément Certificate 05/0223.

USE:
Mannok Therm Cavity / MC Partial Fill Cavity Wall Insulation is used for the thermal insulation of new, cavity masonry walls of dwellings or buildings of similar occupancy type and conditions. It also facilitates the control of surface and interstitial condensation in walls.

NSAI Agrément

Part One / Certification 1

1.1 ASSESSMENT
In the opinion of NSAI Agrément, the Mannok Therm Cavity / MC Partial Fill Cavity Wall Insulation product, if used in accordance with this Detail Sheet, meets the requirements of the Building Regulations 1997 to 2019 as indicated in Section 1.2 of Certificate 05/0223.

1.2 BUILDING REGULATIONS 1997 to 2019
This matter is dealt with in NSAI Agrément Certificate 05/0223.

Part Two / Technical Specification and Control Data 2

2.1 PRODUCT DESCRIPTION
This Detail Sheet relates to Mannok Therm Cavity / MC Partial Fill Cavity Wall Insulation, a partial fill cavity wall board using a Polyisocyanurate (PIR) closed cell rigid insulation manufactured in accordance with IS EN 13165[6]. During the manufacturing process, liquid raw materials expanded by blowing agents are applied between low emissivity composite foil facings. Mannok Therm Cavity / MC is CFC and HCFC free and therefore has zero ozone depletion potential (zero ODP).

This Detail Sheet certifies compliance with the requirements of the Building Regulations 1997 to 2019.

Length	1200mm
Width	450mm
Thickness	20-200mm
Board density	26-32kg/m^3
Area per board	0.54m^2
Edge profiles	Butt edged; T&G
Thermal conductivity*	0.022W/mK
Water vapour resistivity	>300MNs/gm
Compressive strength*	≥140kPa
Other sizes are available on request	

Table 1: Product Range & Physical Properties

2.2 MANUFACTURE
Mannok Therm Cavity / MC is manufactured from a formulation of chemicals, which is poured onto low emissivity composite foil facings subsequently autohesively bonded to the insulation core during manufacture. The reflective low emissivity surface can increase the thermal resistance of the residual cavity airspace in which the board is placed.

2.3 DELIVERY, STORAGE AND MARKING
This matter is dealt with in Section 2.2 of NSAI Agrément Certificate 05/0223.

2.4 INSTALLATION
2.4.1 General
Walls are constructed in the conventional manner with the first row of ties one course below damp proof course (DPC) level at not greater than 600mm horizontal centres. It is recommended that the wall ties are not placed directly on the DPC. The first row of insulation boards should be supported by the ties providing edge insulation for the floor, as required by TGD to Part L of the Building Regulations 1997 to 2019. The mortar fill below DPC level must be considered and it is also necessary to ensure that any installed radon membrane is not damaged.

The walls are constructed by raising each section of the inner or outer leaf up to the level of the next run of wall ties, which are situated at a spacing shown in Table 2. Mannok Therm Cavity / MC boards are then placed in position behind the retaining clips of the wall ties tight against the cavity face of the inner leaf. The joints should be as neat as possible. This ensures maximum thermal performance. It is recommended that drainage holes be provided in the perpend block

joints below DPC level at approximately 1m centres.

Each board should be secured by a minimum of 3 retaining clips. Additional wall ties at unbonded openings, junctions and cut ends should be located at maximum 225mm vertical centres and within 150mm of any opening. All wall ties should be installed correctly, clear of all mortar, sloped downwards towards the outer leaf and conform to structural design requirements. In severe exposure zones, Mannok Therm Cavity / MC should be installed in walls whilst maintaining a 40mm cavity width. Only certified wall ties specified by Mannok Insulation Ltd should be used in conjunction with this system.

Cavity Width (mm)	Horizontal Spacing (mm)	Vertical Spacing (mm)	No of Wall Ties per m^2
76-110	750	450	3.0
111-150	450	450	4.9

Table 2: Maximum Wall Tie Spacing

Successive sections of wall fixed by certified stainless steel wall ties are constructed and Mannok Therm Cavity / MC boards are installed as work proceeds up to the required height. Excess mortar should be removed and mortar droppings cleaned from the exposed edges of the installed boards. Use of cavity battens or cavity boards or similar means is recommended to protect installed boards and keep the cavity mortar free. Penetration of damp across the cavity will be prevented with good practice.

Where the use of wall ties is inappropriate, e.g. under window sills, proprietary clips may be used to hold the cavity boards tightly in place. Jamb details must incorporate a vertical DPC, positioned between the Mannok Therm Cavity / MC board and the external leaf, returning a minimum of 150mm.

2.4.2 Cutting

On-site trimming of boards where necessary to maintain continuity of insulation around doors, windows or other openings is easily executed using a fine tooth saw or by cutting with a sharp trimming knife, cutting and snapping the board face down over a straight edge and cutting the foil facing on the other side.

To prevent damp penetrating across the cavity it is important to ensure the following:

- Mortar filling of cavity at wall base is not too high.
- Keep wall ties clean free from mortar droppings. This is achieved with the use of cavity board and daily cleaning of wall ties.
- The DPC should not project into cavity at ground floor level as it can lead to catching mortar droppings, resulting in bridging the cavity.
- Avoid the build up of mortar on trays/lintels and over window and door heads.
- Ensure the correct fitting of ties. Avoid wall ties sloping to the inside, which could be caused by the difference in level between the outer and inner leaf of the cavity wall.
- Ensure the Mannok Therm Cavity / MC board is placed against the inner leaf properly, i.e. as specified in this Detail Sheet and the manufacturer's instructions. This is critical in order to minimise the potential for thermal looping.
- Once the Mannok Therm Cavity / MC board is installed in the cavity wall, ensure that there are no gaps in the insulation and the joints are tight fitting, as this will reduce the risk of bold bridging.
- Good workmanship and appropriate site procedures are vital to achieve expected thermal and air tightness performance. Ensure accurate trimming to achieve close butting joints and continuity of insulation.

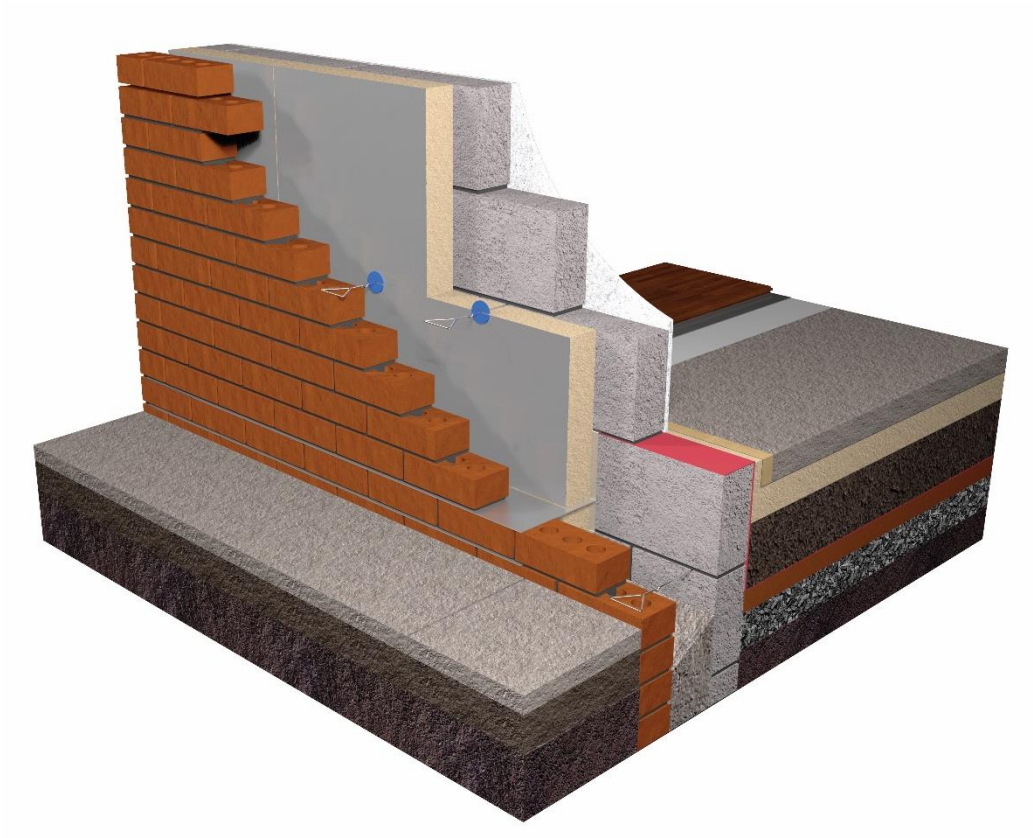


Figure 1: Insulating partial fill cavity walls

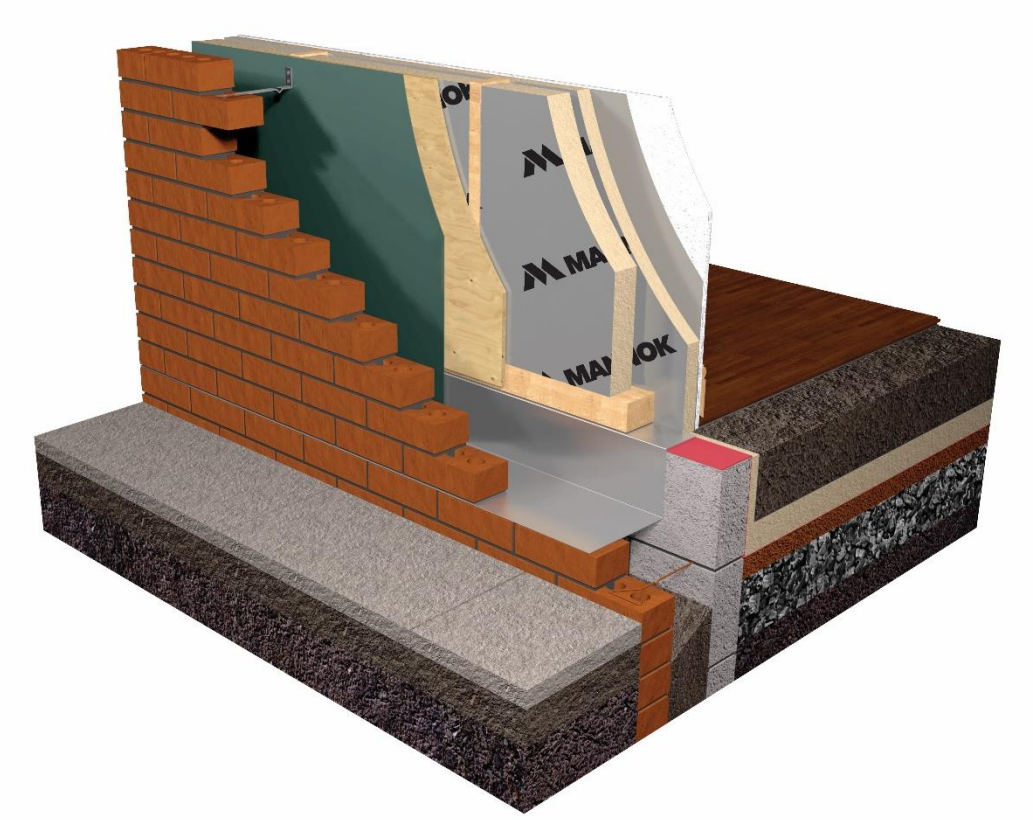


Figure 2: Insulating timber framed walls

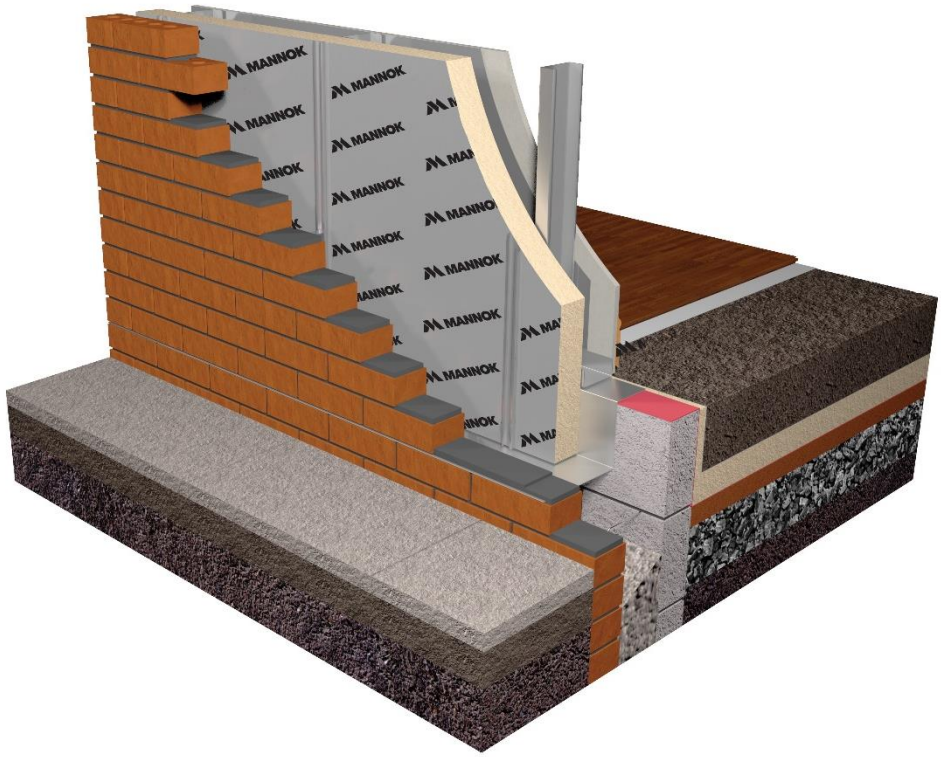


Figure 3: Insulating steel framed walls

Part Three / Design Data 3

3. GENERAL

3.1 Mannok Therm Cavity / MC Partial Fill Cavity Wall Insulation, when installed in accordance with this Detail Sheet, is effective in reducing the U-value (thermal transmittance) of new external masonry cavity walls, using clay or calcium silicate bricks, concrete blocks, or natural and reconstituted stone blocks. It is essential that such walls are designed and constructed to prevent moisture penetration having regard to the Driving Rain Index.

3.2 External walls of buildings subject to the relevant requirements of the Building Regulations 1997 to 2019 should be constructed in accordance with IS EN 1996-1-1[7], IS EN 1996-1-2[8], IS EN 1996-2[9] and IS EN 1996-3[10]. The relevant recommendations of these standards should be followed where the wall incorporates stone or cast stone.

3.3 The use of a cavity board or cavity batten during construction is recommended to prevent accumulation of mortar droppings on the top edge of the Mannok Therm Cavity / MC board and to prevent bridging of cavity by mortar droppings.

3.4 As with all cavity wall insulation, the construction detailing should comply with good practice (see also Section 2.4).

3.5 It is recommended that installation be carried out to the highest level on each wall. Where appropriate the top edge of the insulation should be protected by a cavity tray. On site trimming of boards may be necessary to achieve this (see Section 2.4.2).

3.6 Where a nominal residual cavity width of at least 40mm is maintained, Mannok Therm Cavity / MC is suitable for use in any exposure conditions, in buildings up to 12m in height. For buildings greater than 12m in height and up to 25m in height, the exposure factor must not exceed 122, calculated in accordance with IS EN 1996-3[10] and using the Irish Map of Driving Rain Index.

It is important to ensure during installation that:

a) Wall ties and fixings are installed correctly and are thoroughly clean.
b) Excess mortar is cleaned from the inside face of the leading leaf and any debris is removed from the cavity.

c) Mortar droppings are cleaned from the exposed edges of installed slabs.

3.7 Data obtained by NSAI Agrément confirms that a masonry wall incorporating Mannok Therm Cavity / MC and built to the requirements of IS EN 1996-1-1[7] will not transmit water to the inner leaf.

3.8 Data obtained by NSAI Agrément also demonstrates that Mannok Therm Cavity / MC boards do not absorb water by capillary action. When the product is used in situations where it bridges the DPC in walls, dampness from the ground will not pass through, provided the cavity is taken down to at least 150mm below the level of the lowest DPC.

3.9 A minimum residual cavity width of at least 40mm should be maintained where possible. Where, for structural reasons, the cavity width is reduced by the intrusion of ring beams or other structural elements, the manufacturer's advice on fixing and weather-proofing should be sought. Raked or recessed mortar joints are not suitable in high exposure areas and must be avoided.

Part Four / Technical Investigations 4

4.1 BEHAVIOUR IN FIRE

Mannok Therm Cavity / MC Partial Fill Cavity Wall Insulation may be used in buildings of any purpose group in a wall in which the cavity intercommunicates with another such cavity, and may be unlimited in extent in respect of the provision of barriers provided the walls comply with B3 of TGD to Part B of the Building Regulations 1997 to 2019 (Cavity walls excluded from provisions for cavity barriers) as follows:

a) The wall consists of two leaves, each being not less than 75mm thick and constructed of non-combustible materials;
b) The cavity does not exceed 110mm in width and is closed by a cavity barrier at the top of the wall and at the top of any opening through any leaf of the wall; and
c) There is no combustible material exposed or situated within the cavity other than:
   - Timber lintels, window or door frames or the end faces of joists;
   - Pipes, ducts or cables;
   - Closers, flashings, DPCs or wall ties;
   - Thermal insulating material; or
   - Meter boxes which require an opening in the outer leaf of not greater than 800mm x 500mm and do not penetrate the inner leaf except through a sleeve of not more than 80mm x 80mm which is fire stopped where it passes through the inner leaf.

Spread of flame within the cavity – Mannok Therm Cavity / MC is designated Class F in accordance with IS EN 13501-1[11]. The boards are combustible and must be protected from naked flames and other ignition sources during and after installation.

Toxicity – Negligible when used in a cavity wall situation.

Mannok Therm Cavity / MC is manufactured without the use of CFCs or HCFCs, and there is no release of such gas on burning.

4.1.1 J3 – Protection of Building

Combustible wall insulation material shall generally be separated by solid non-combustible material not less than 200mm thick, from any heating appliance or from any flue pipe or opening to a heating appliance. Particular details are given in TGD to Part J of the Building Regulations 1997 to 2019. It should also be separated by 40mm from the external surface of a masonry chimney. For chimneys covered by IS EN 1859[12], separation between this product and the external surface of the chimney shall be determined in accordance with TGD to Part J of the Building Regulations 1997 to 2019.

4.2 WATER PENETRATION

Capillary action – The closed cell structure does not allow water uptake by capillary action.

Mannok Therm Cavity / MC, when used in accordance with this Certificate, presents no significant risk of water penetration.

4.3 WATER VAPOUR PENETRATION & CONDENSATION RISK

Mannok Therm Cavity / MC board has an integral vapour check and has a significant resistance to the passage of water vapour, when used in conventional masonry cavity wall construction. This obviates the risk of surface condensation and presents no significant risk of damage from

interstitial condensation. Correct use of the heating and ventilation system is important.
When insulating buildings the recommendations of BS 5250[5] should be followed to minimise the risk of condensation within the building elements and structures.

4.4 THERMAL INSULATION

The aged/design thermal conductivity '$\lambda_{90/90}$' value of Mannok Therm Cavity / MC when measured in accordance with IS EN 12667[1] is 0.022W/mK. The high thermal resistance of Mannok Therm Cavity / MC ensures that cold bridging and extra heat loss around the edges of openings can be avoided. A minimum thickness of 25mm of Mannok Therm Cavity / MC would be suitable.

Uncontrolled leakage of air through the fabric of a building and/or cracks in and around door and window frames, sills, jambs etc, air movement due to thermal effects or due to wind pressure can occur. Details of how to avoid infiltration of cold air are given in TGD to Part L of the Building Regulations 1997 to 2019.

Lintel jamb and sill designs similar to those shown in TGD to Part L of the Building Regulations 1997 to 2019 will be satisfactory to limit thermal bridging.

The required maximum U-values for external walls can be obtained with Mannok Therm Cavity / MC constructions as indicated in Table 3. For the purpose of the calculations below all examples are based on 100mm brick outer leaf, 40-50mm low emissivity residual cavity, 100mm concrete block (conductivity as shown), 12mm plaster, brick and block leaves with 10mm nominal mortar joints.

4.5 DURABILITY

Mannok Therm Cavity / MC is judged to be stable and will remain effective as an insulation system for the life of the building, so long as it is installed in accordance with this Detail Sheet. Its durability depends upon the supporting structure and the conditions of use.

4.6 TESTS AND ASSESSMENTS WERE CARRIED OUT TO DETERMINE THE FOLLOWING:

- Density
- Water vapour resistance
- Water uptake
- Dimensional accuracy
- Compressive and cross breaking strength
- Dimensional stability
- Thermal conductivity
- Efficiency of the construction process

4.7 RESISTANCE TO SOLVENTS, FUNGI AND RODENTS

Mannok Therm Cavity / MC boards do not promote infestation, as there is no food value in the materials used. They also resist attack by mould and microbial growth. The insulation is not resistant to some solvent-based adhesive systems, particularly those containing methyl ethyl keytone. Adhesives containing such solvents should not be used in association with the boards. Boards which have been in contact with harsh solvents, petrol, mineral oil or acids, or boards that have been damaged in any other way should not be used.

4.8 OTHER INVESTIGATIONS

(i) Existing data on product properties in relation to fire, toxicity, environmental impact and the effect on mechanical strength/stability and durability were assessed. Mannok Therm Cavity / MC does not contain CFC or HCFC gas and has zero ODP.

(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.

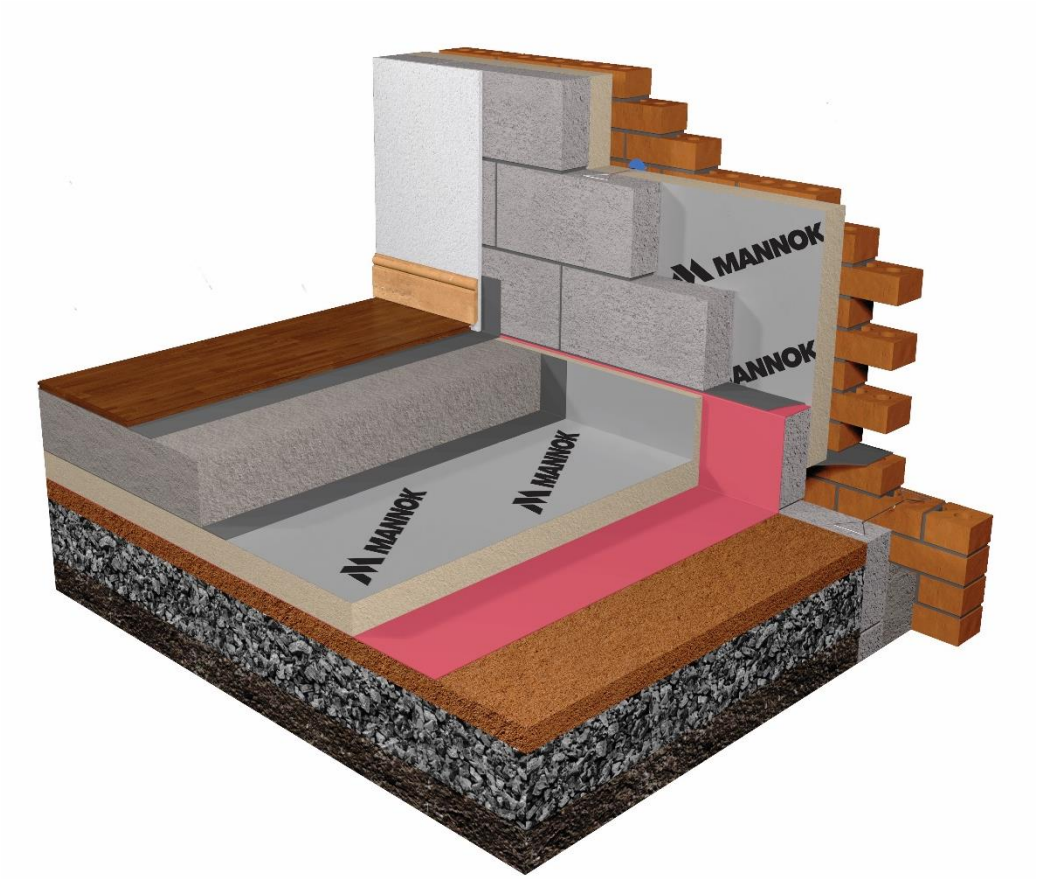
(iii) Site visits were conducted to assess the practicability of installation and the history of performance in use of the product.

(iv) A condensation risk analysis was performed.

U-value (W/m²K)	Thickness of Mannok Therm (mm)		
0.45	30	25	25
0.35	45	40	35
0.30	55	50	50
0.27	60	60	60
Conductivity (W/mK)	1.33	0.45	0.30
Block type	Concrete block		

Table 3: Wall Construction Typical U Values (Partial Fill)

Mannok Therm Floor/ MF Floor Insulation



PRODUCT DESCRIPTION:
This Detail Sheet relates to Mannok Therm Floor / MF Floor Insulation, as defined in NSAI Agrément Certificate 05/0223.

USE:
Mannok Therm Floor / MF Floor Insulation is used for the thermal insulation of ground supported and suspended floors and may be installed:

1. Below a concrete floor slab;
2. Below a cement based floor screed on a concrete slab with a hardcore base;
3. Above a suspended concrete floor (e.g. beam and block) with a cement based screed;
4. Between the joists of a suspended timber floor.

NSAI Agrément

Part One / Certification 1

1.1 ASSESSMENT
In the opinion of NSAI Agrément, the Mannok Therm Floor / MF Floor Insulation product, if used in accordance with this Detail Sheet, meets the requirements of the Building Regulations 1997 to 2019 as indicated in Section 1.2 of Certificate 05/0223.

1.2 BUILDING REGULATIONS 1997 to 2019
This matter is dealt with in NSAI Agrément Certificate 05/0223.

Part Two / Technical Specification and Control Data 2

2.1 PRODUCT DESCRIPTION
This Detail Sheet relates to Mannok Therm Floor / MF Floor Insulation using a Polyisocyanurate (PIR) closed cell rigid insulation manufactured in accordance with IS EN 13165[6]. During the manufacturing process, liquid raw materials expanded by blowing agents are applied between low emissivity composite foil facings. Mannok Therm Floor / MF is CFC and HCFC free and therefore has zero ozone depletion potential (zero ODP).

This Detail Sheet certifies compliance with the requirements of the Building Regulations 1997 to 2019.

Length	2400mm
Width	1200mm
Thickness	20-200mm
Board density	26-32kg/m^3
Area per board	0.72 or 2.88m^2
Edge profiles	Butt edged
Thermal conductivity*	0.022W/mK
Water vapour resistivity	>300MNs/gm
Compressive strength*	≥140kPa
Other sizes are available on request	

Table 1: Product Range & Physical Properties

2.2 MANUFACTURE
Mannok Therm Floor / MF is manufactured from a formulation of chemicals, which is poured onto low emissivity composite foil facings subsequently autohesively bonded to the insulation core during manufacture.

2.3 DELIVERY, STORAGE AND MARKING
This matter is dealt with in Section 2.2 of NSAI Agrément Certificate 05/0223.

2.4 INSTALLATION
2.4.1 General
Mannok Therm Floor / MF boards are placed below the slab or between the slab and the screed. Boards can also be used to provide insulation to suspended timber floors. Vertical upstands of insulation (perimeter insulation strips) should be used to separate the screed/slab from the wall to reduce thermal bridging at the wall/floor junction.

2.4.2 Laying Below the Floor Screed
Where Mannok Therm Floor / MF boards are placed below the floor screed, it is simply laid loose over the concrete floor slab with the necessary water and vapour protection. Board joints should be lightly butted, staggered and laid to break-bonded pattern. The floor slab should be uniformly flat without steps or gaps to provide continuous bearing support to the Mannok Therm Floor / MF board. A strip of board 25mm thick should be used around the perimeter of the floor area being insulated. This should also be placed vertically against the abutting wall so that it connects with the insulation laid over the slab and protects the edge of the screed, so preventing cold bridging of the floor screed. Boards are overlaid with a separating layer of polythene sheet (not less than 500 gauge) or building paper, Grade B1F, between the screed and the Mannok Therm Floor / MF board to prevent wet screed penetrating joints between the boards. The minimum thickness of sand and cement screed is 65mm for domestic construction and 75mm for most other buildings.
The concrete floor over which the insulation is to be laid should be left as long as possible to

maximise drying out in accordance with the relevant recommendations of BS 8203[13].

2.4.3 Laying Below the Floor Slab
Where Mannok Therm Floor / MF is used below the floor slab, lay the hardcore in layers: min 150-225mm. Each layer should be well compacted, with the surface blinded with a thin layer of sand to provide a suitable surface for laying a damp proof membrane (DPM) or radon barrier.

A DPM, e.g. 1200 gauge polythene, or a radon barrier, subject to site conditions and statutory requirements, should be laid over the well compacted hardcore and blinding with joints taped and folded to prevent the passage of ground moisture. The DPM should be carried up the surrounding foundation walls until it meets and seals with the DPC.

Mannok Therm Floor / MF should be laid staggered to break-bonded pattern with closely butted joints, fitted tightly at the edges and around any service penetrations. A strip of 25mm thick board should be used around the perimeter of the floor slab in order to prevent cold bridging of the slab. Boards are overlaid with a separating layer of polythene sheet (not less than 500 gauge) or building paper, Grade B1F.

Care should be taken to avoid damage to the insulation or DPMs and radon barriers as the slab is being poured and operatives should make use of barrow runs and walkways whilst installation progresses.

A vapour barrier is to be provided over the insulation board to prevent condensation damage from cold bridging.

2.4.4 Laying on Precast Beam & Block Floor
All surfaces should be level to accept the Mannok Therm Floor / MF board. The floor surface should be smooth; uneven surfaces should be levelled prior to laying of the floor and flat irregularities should be removed by a levelling screed. Lay a DPM, ensure that it is correctly positioned and turned up to meet the seal with the DPC.

Mannok Therm Floor / MF should be laid with joints tightly butted. During construction the boards must be protected from damage by moisture sources, water spillage, plaster droppings etc. Use scaffold boards to prevent wheelbarrow and other traffic damage to the boards. Mannok Therm Floor / MF should be over laid with 500 gauge polythene sheet to prevent the wet screed from penetrating the joints between the insulation boards.

As in the case with solid ground floors, attention should be given to detailing to avoid thermal bridging.

2.4.5 Laying in Suspended Timber Floors
The application of Mannok Therm Floor / MF in suspended floor constructions should be carried out before commencement of floor boarding. Mannok Therm Floor / MF should be cut to fit snugly between the timber joists. It should be supported on softwood timber battens, proprietary galvanised steel saddle clips or galvanised nails partly driven into the side of the joists. Battens/nails should be placed at an appropriate height to suit the thickness of board being employed and nails should remain 40mm proud of the joist. The board should then be laid between the joists so that they are supported by the battens, clips or nails. Any narrow gaps between the joist and perimeter walls should be insulated by specially cut pieces of board. Mannok Therm Floor / MF is not suitable for laying over timber joists.

Where services need to be accommodated below the floor, an insulated duct can be created by lowering the Mannok Therm Floor / MF board.

Install flooring grade chipboard, ply or softwood timber flooring directly onto the joists fixing in the normal manner.

Ensure that the void below the insulated suspended floor is well ventilated and that the airflow is not restricted by sleeper walls.

2.4.6 Cutting
On-site trimming of boards where necessary to maintain continuity of insulation around doors, windows or other openings is easily executed using a fine tooth saw or by cutting with a sharp trimming knife, cutting and snapping the board face down over a straight edge and cutting the foil facing on the other side.

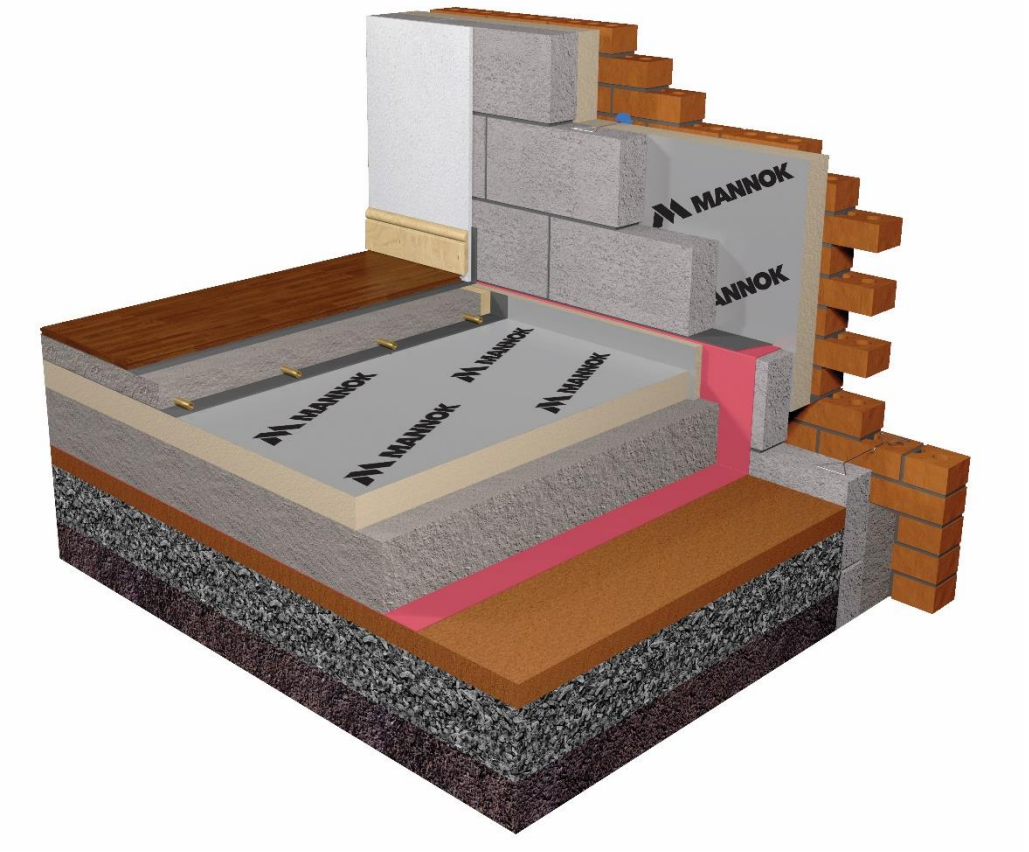


Figure 1: Insulating floors above ground bearing concrete slab

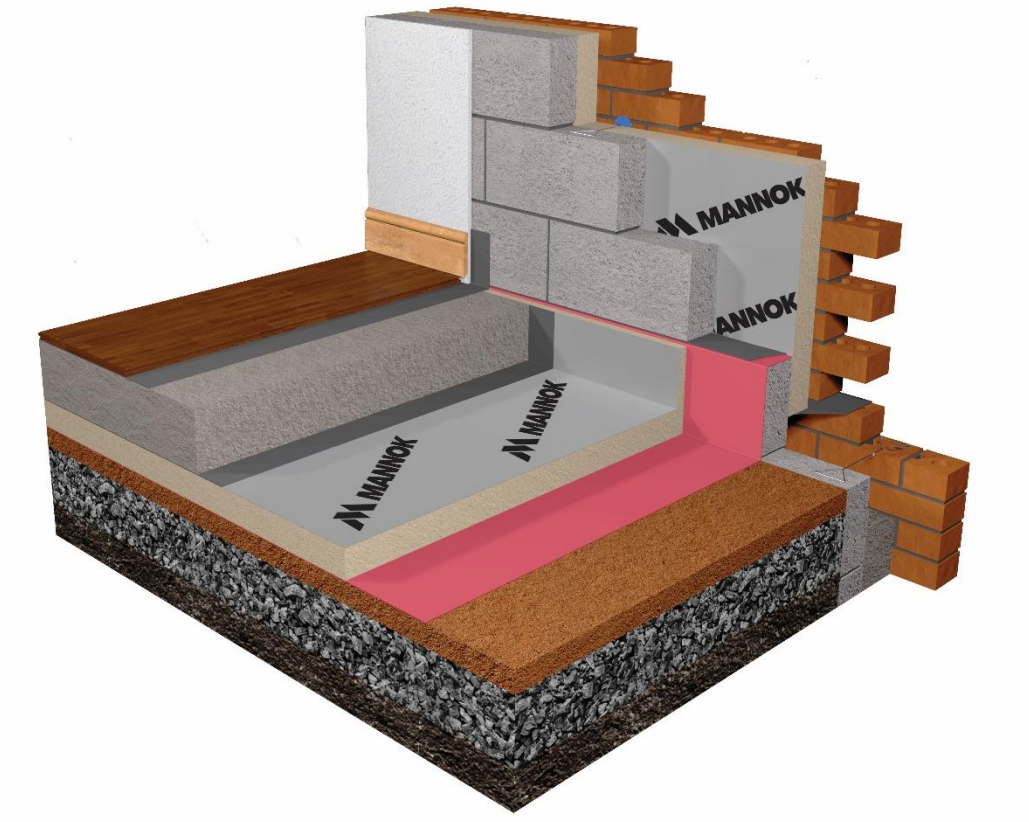


Figure 2: Insulating floors beneath ground bearing concrete slab

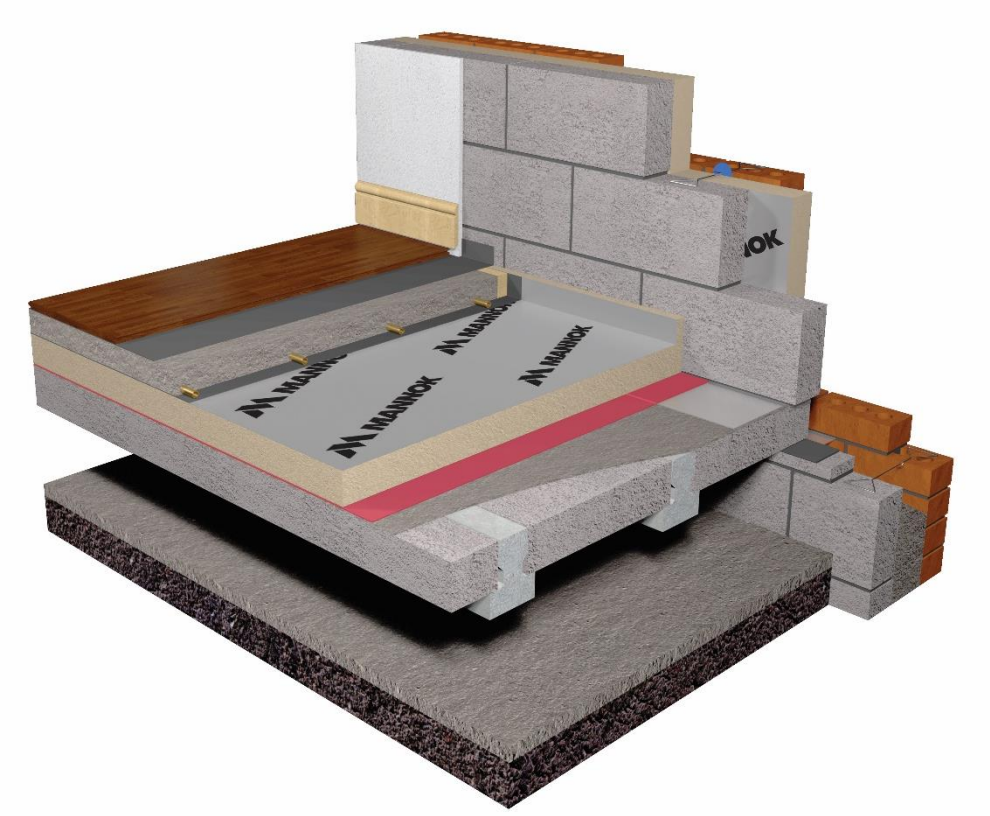


Figure 3: Insulating suspended concrete and beam & block floors

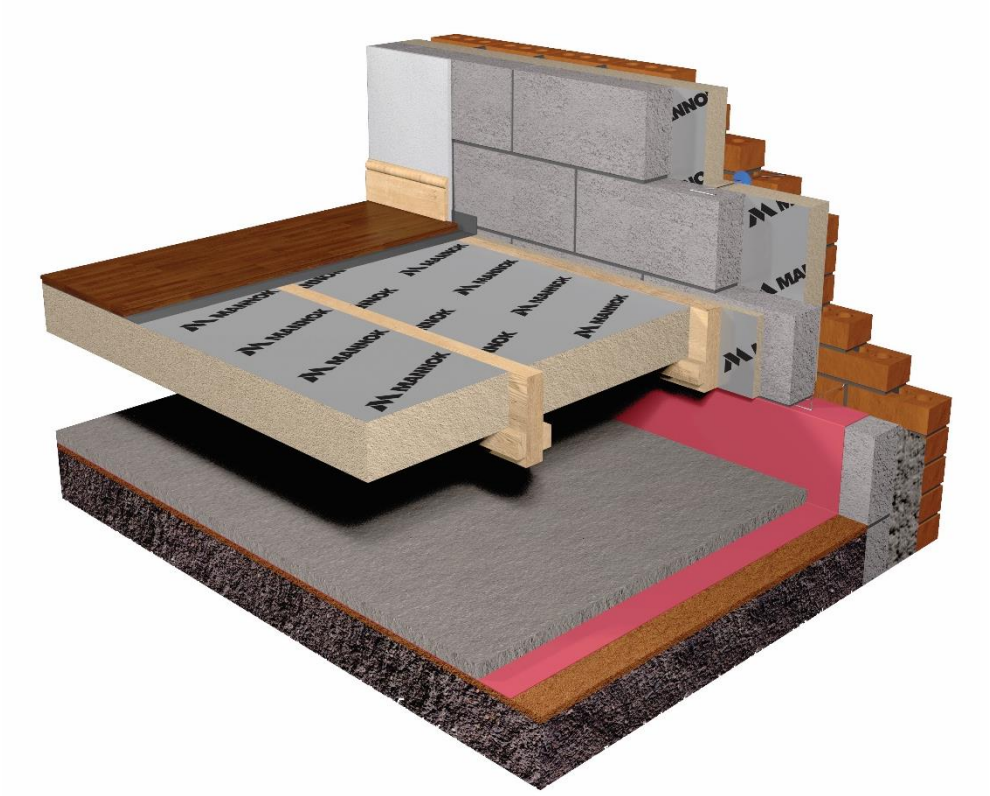


Figure 4: Insulating suspended timber floors

3.1 GENERAL

Mannok Therm Floor / MF Floor Insulation, when installed in accordance with this Detail Sheet, is effective in reducing the U-value (thermal transmittance) of new and existing floor constructions.

Ground supported floors incorporating Mannok Therm Floor / MF must include a suitable DPM laid in accordance with BS CP 102[14].

Suspended concrete ground floors incorporating Mannok Therm Floor / MF must include suitable ventilation.

The overlay to Mannok Therm Floor / MF should be a cement based floor, or a concrete slab.

3.2 FLOOR LOADING

The design loadings for self-contained single family dwelling units are defined in IS EN 1991-1-1[15].

Mannok Therm Floor / MF covered with chipboard, OSB or similar material (laid over joists) or a screed can support these design loadings without undue deflection.

Where Mannok Therm Floor / MF is used under a concrete slab, resistance to concentrated and distributed loads is a function of the slab specification.

3.3 UNDERLOOR SERVICES

The maximum continuous working temperature of PIR is 100°C. Where underfloor heating systems are to be used, installers should ensure that this temperature is not exceeded.

3.4 WATERPROOFING

If an overlay of chipboard, OSB or similar material is to be used in a bathroom or kitchen, a continuous waterproof finish (e.g. vinyl) must be provided to protect it. Please note that OSB or similar material must be laid over joists and not directly overlaid onto the insulation.

4.1 BEHAVIOUR IN FIRE

Combustibility – Mannok Therm Floor / MF is classified as Class F to IS EN 13501-1[11]. The boards when in proximity to a constructional hearth must be protected by 250mm of solid concrete or as detailed in TGD to Part J of the Building Regulations 1997 to 2019. The boards are combustible and must be protected from naked flames and other ignition sources during and after installation.

Toxicity – Negligible when used in a ground floor construction.

Mannok Therm Floor / MF is manufactured without the use of CFCs or HCFCs, and there is no release of such gas on burning.

4.2 STRENGTH

Mannok Therm Floor / MF exceeds 140kPa at 10% yield and when installed in accordance with the manufacturer's instructions and this Detail sheet, will resist the loads likely to be met in service.

4.3 RESISTANCE TO MOISTURE

Mannok Therm Floor / MF will not allow moisture to cross the floor construction provided it is installed in accordance with this Detail Sheet.

4.4 CONDENSATION RISK

Mannok Therm Floor / MF has a vapour resistivity of greater than 400MNs/gm. It has significant resistance to the passage of water vapour when used in ground floor construction using a suitable DPM.

Capillary action – The closed cell structure does not allow water uptake by capillary action.

4.5 THERMAL INSULATION

The aged/design thermal conductivity '$\lambda_{90/90}$' value of Mannok Therm Floor / MF when measured in accordance with IS EN 12667[1] is 0.022W/mK.

The required maximum U-values for ground floors can be obtained with Mannok Therm Floor / MF as indicated in Table 2. For the purpose of these calculations all examples are based on 150mm concrete, 60mm cement, sand screed (floor finish omitted).

4.6 DURABILITY

Mannok Therm Floor / MF is rot proof and durable. As floor insulation, Mannok Therm Floor / MF is judged to be stable and will remain effective as an insulation system for the life of the building, so long as it is installed in accordance with this Detail Sheet.

4.7 TESTS AND ASSESSMENTS WERE CARRIED OUT TO DETERMINE THE FOLLOWING:

- Density
- Water vapour transmission
- Long term water absorption
- Dimensional accuracy
- Compressive and cross breaking strength
- Dimensional stability
- Thermal conductivity
- Efficiency of the construction process

4.8 OTHER INVESTIGATIONS

(i) Existing data on product properties in relation to fire, toxicity, environmental impact and the effect on mechanical strength/stability and durability were assessed. Mannok Therm Floor / MF does not contain CFC or HCFC gas and has zero ODP.

(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.

(iii) Site visits were conducted to assess the practicability of installation and the history of performance in use of the product.

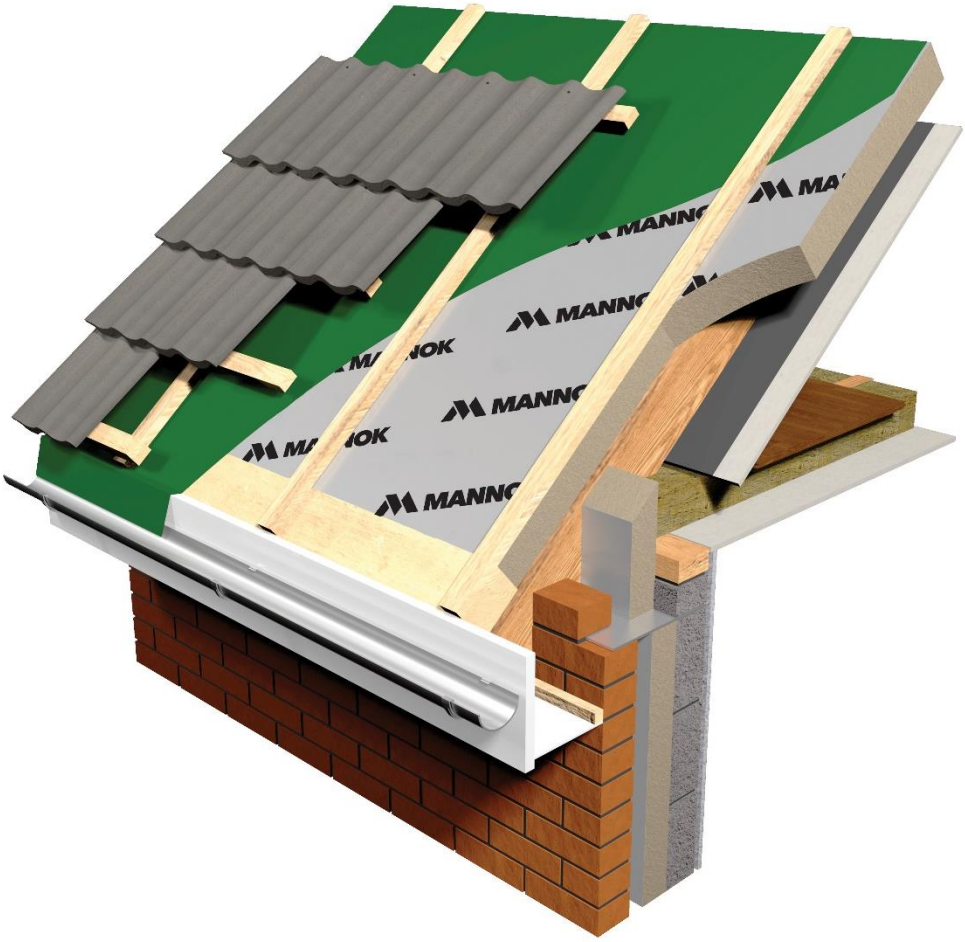
(iv) A condensation risk analysis was performed.

Typical thicknesses to achieve 0.25 W/m²K									
P/A	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
	25	40	50	55	60	65	65	70	70

Perimeter/Area
Above values are based on assuming a thermal conductivity value of 2.0 for earth.

Table 2: Ground Floor Construction Typical U Values

Mannok Therm Roof / MR Pitched Roof Insulation



PRODUCT DESCRIPTION:
This Detail Sheet relates to Mannok Therm Roof / MR Pitched Roof Insulation, as defined in NSAI Agrément Certificate 05/0223.

USE:
Mannok Therm Roof / MR Pitched Roof Insulation is used for the thermal insulation of pitched and tiled roofs constructed in accordance with SR 82[16]. It can be used between, between and under, over or between, and over rafters. It also facilitates the control of surface and interstitial condensation in roofs.

Part One / Certification 1

1.1 ASSESSMENT
In the opinion of NSAI Agrément, the Mannok Therm Roof / MR Pitched Roof Insulation product, if used in accordance with this Detail Sheet, meets the requirements of the Building Regulations 1997 to 2019 as indicated in Section 1.2 of Certificate 05/0223.

1.2 BUILDING REGULATIONS 1997 to 2019
This matter is dealt with in NSAI Agrément Certificate 05/0223.

Part Two / Technical Specification and Control Data 2

2.1 PRODUCT DESCRIPTION
This Detail Sheet relates to Mannok Therm Roof / MR Pitched Roof Insulation using a Polyisocyanurate (PIR) closed cell rigid insulation manufactured in accordance with IS EN 13165[6]. During the manufacturing process, liquid raw materials expanded by blowing agents are applied between low emissivity composite foil facings. Mannok Therm Roof / MR is CFC and HCFC free and therefore has zero ozone depletion potential (zero ODP).

This Detail Sheet certifies compliance with the requirements of the Building Regulations 1997 to 2019.

Length	2400mm
Width	1200mm
Thickness	20-200mm
Board density	26-32kg/m^3
Area per board	2.88m^2
Edge profiles	Butt edged
Thermal conductivity*	0.022W/mK
Water vapour resistivity	>300MNs/gm
Compressive strength*	≥140kPa
Other sizes are available on request	

Table 1: Product Range & Physical Properties

2.2 MANUFACTURE
Mannok Therm Roof / MR is manufactured from a formulation of chemicals, which is poured onto low emissivity composite foil facings subsequently autohesively bonded to the insulation core during manufacture.

2.3 DELIVERY, STORAGE AND MARKING
This matter is dealt with in Section 2.2 of NSAI Agrément Certificate 05/0223.

2.5 INSTALLATION
2.4.1 General
Installation must be in accordance with the relevant clauses of SR 82[16] and the manufacturer's instructions, and can be carried out in all conditions normal for roof construction.

Mannok Therm Roof / MR is light to handle and can be easily cut or shaped. The boards will not support the weight of operatives and care must be taken during tiling.

Where the board is installed in traditional and timber frame construction, cavity barriers at the junction of the external wall and roof space should be provided in accordance with the requirements of TGD to Part B of the Building Regulations 1997 to 2019.

2.4.2 Over Rafter Layer of Insulation
Ensure that Mannok Therm Roof / MR has been continued to roof height to engage with the roof insulation. The insulation must be continuous to provide a complete envelope to reduce the risk of thermal bridging and condensation risk.

Mannok Therm Roof / MR is laid over the rafters and under the treated softwood counter battens. The boards should be tightly butted and positioned in a break-bond pattern with all the joints running from eaves to ridge occurring over the rafters. It is preferable to use crawling boards as the insulation will not support operatives, and continue until the entire area from the eaves to ridge has been covered. Any gaps in the insulation

must be sealed with flexible sealant or expanding foam. Use large headed clout nails to hold boards temporarily in place until the counter battens secure them. Secure the counter battens to the rafters by fixing through the counter battens, the sarking board and the Mannok Therm Roof / MR. A treated timber stop rail, the same thickness as Mannok Therm Roof / MR, is fixed to the rafters close to the eaves to provide a firm fixing point for the counter battens.

Treated counter battens are fixed through the insulation into the rafter with approved proprietary fixings at the appropriate centres, taking account of the specific roof design, e.g. pitch, weight of slates/tiles and location of the building.

A vapour permeable roof tile underlay should be installed depending on the type and in accordance with its certification. Using the underlay over the counter battens ensures a marginally better thermal performance from the Mannok Therm Roof / MR.

2.4.3 Between and Below Rafter Layer of Insulation

Mannok Therm Roof / MR may be used in pitched roof constructions where the insulation follows the slope of the roof. Battens fixed to the rafters may be used as a retaining stop. The required thickness of Mannok Therm Roof / MR is fixed between the rafters to achieve the relevant U-value. However, where the requirement is for very low U-values or to reduce the effects of thermal bridging, a second layer fixed to the underside of the rafters under the first layer may be appropriate. When using multiple layers of Mannok Therm Roof / MR, ensure that the thinnest layer is placed on the warm side of the insulation. As in the solution for over rafter layer of insulation, when the relevant space is to be used as a living area, Mannok Therm Roof / MR should be covered with 12.5mm plasterboard or Mannok Therm Laminate which eliminates the cold bridge effect of the rafters.

2.4.4 Between and Over Rafter Layer of Insulation

In cases where the insulation between rafters is to be flush with the top of the rafters but does not fill the full rafter depth, the insulation can be installed by the use of nailable sarking clips. These clips are driven into the upper surface of each rather at 1m intervals up to the roof slope. The nailable sarking clips then support lengths of Mannok Therm Roof / MR suitably trimmed to size and placed between the rafters.

In cases where Mannok Therm Roof / MR between the rafters is to be flush with the bottom of the rafters but does not fill the rafter depth, install the insulation with the aid of battens nailed to the side of the rafters. The battens should be in the appropriate position to ensure the insulation is flush with the bottom of the rafters.

In cases where Mannok Therm Roof / MR between rafters fully fills the rafter depth, simply install the correct thickness of insulation in such a manner that it is flush with the bottom of the rafters.

In accordance with the Building Regulations 1997 to 2019, a 50mm ventilation space should be maintained between the sarking board and the insulation in cold roof construction, unless a vapour permeable membrane is used allowing for a reduction in the recommended airspace (refer to manufacturer's instruction and conditions of Certificate).

2.4.5 Cutting

On-site trimming of boards where necessary to maintain continuity of insulation around doors, windows or other openings is easily executed using a fine tooth saw or by cutting through the insulation, then snapping the board face down over a straight edge.

Good workmanship and appropriate site procedures are necessary to achieve expected thermal and air tightness performance. Ensure accurate trimming to achieve close butting joints and continuity of insulation.

2.4.6 Finishing

Details of the finishing to the under rafter insulation layer can be found in Detail Sheet 4 for Mannok Therm Laminate.

2.4.7 Vapour Permeable Membranes

Vapour permeable membranes for the purposes of this Detail Sheet should be approved for use with the system by Mannok Insulation Ltd or may be any NSAI Agrément certified breather membrane.

2.4.8 Slating and Tiling

Slating and tiling is installed in accordance with SR 82[16]. When the relevant space is to be used as a living area, Mannok Therm Roof / MR should be covered with 12.5mm plasterboard.

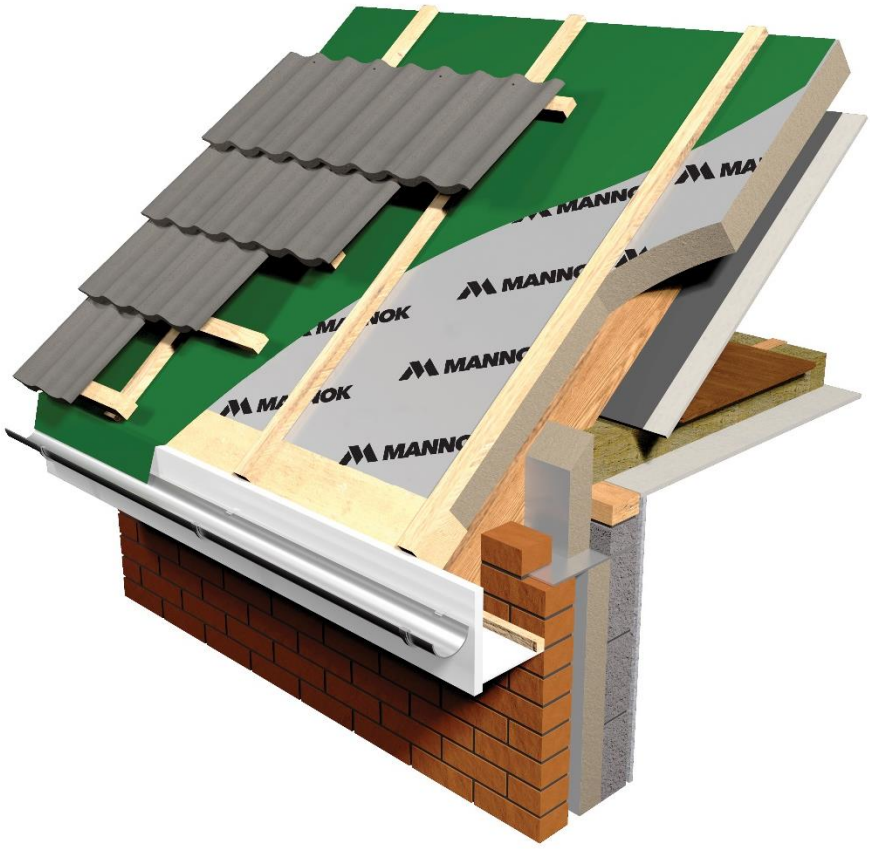


Figure 1: Insulating pitched roofs above the rafters

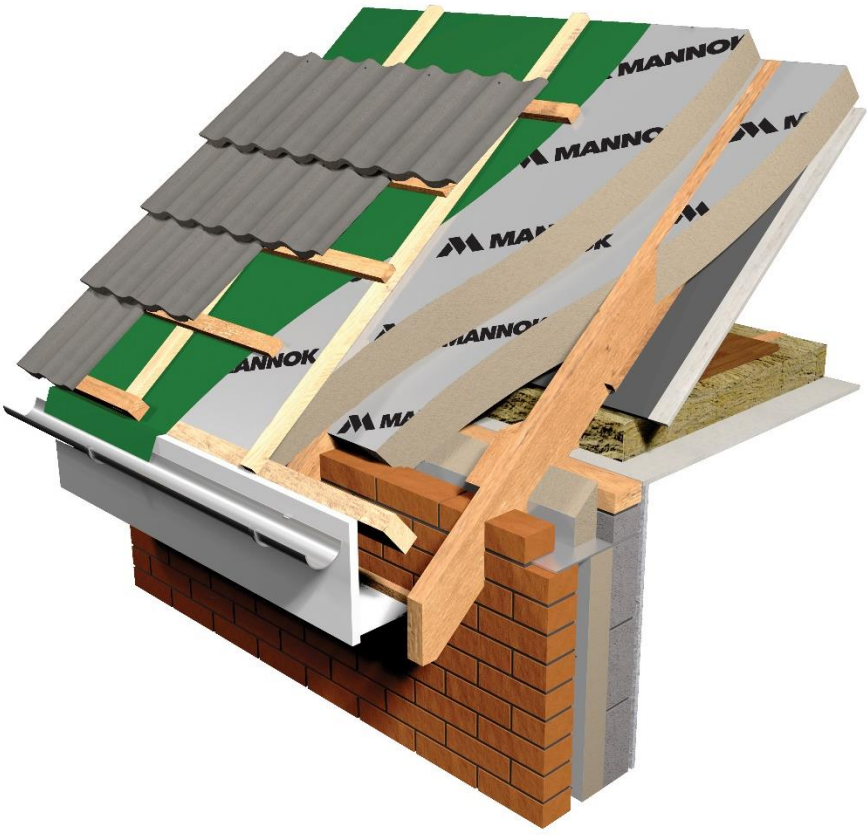


Figure 2: Insulating pitched roofs above and between the rafters

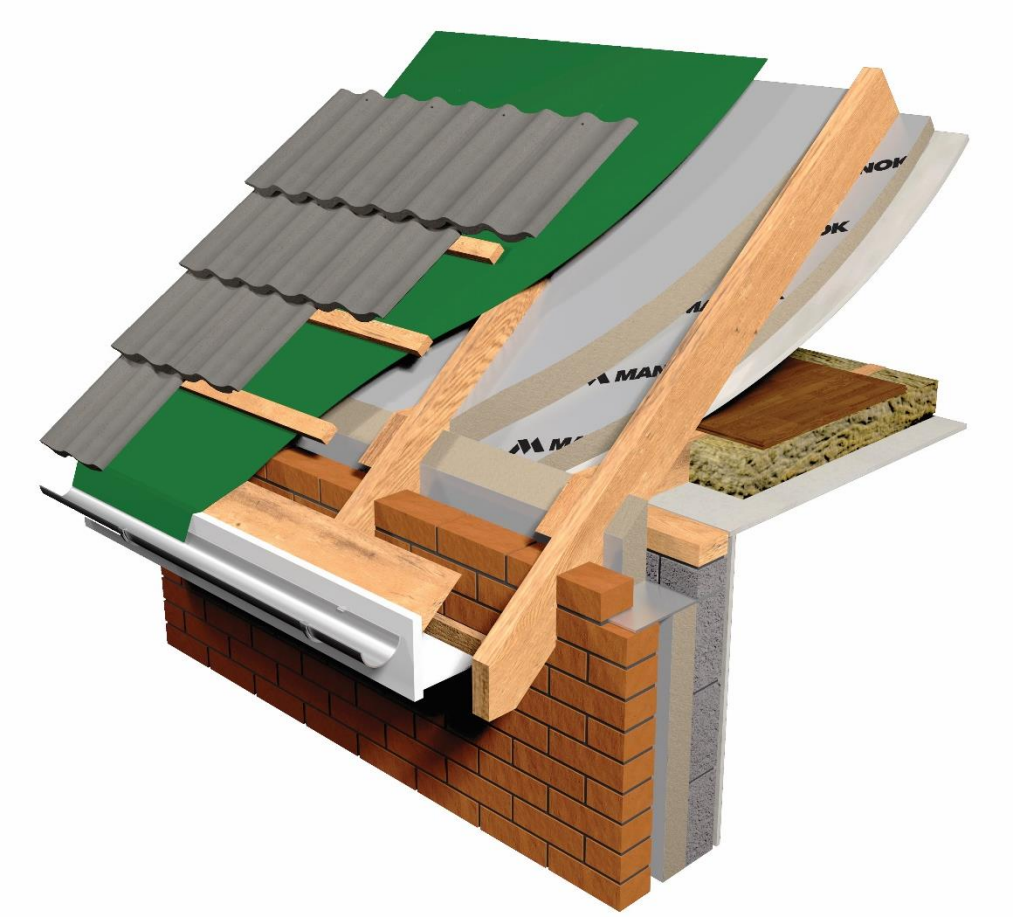


Figure 3: Insulating pitched roofs between and below the rafters

Part Three / Design Data 3

3.1 GENERAL

Mannok Therm Roof / MR Pitched Roof Insulation, when installed in accordance with this Detail Sheet, is effective in reducing the U-value (thermal transmittance) of new and existing floor pitched roof constructions. It is essential that such roofs are designed and constructed to prevent moisture penetration having regard to the Driving Rain Index.

Roofs subject to the relevant requirements of the Building Regulations 1997 to 2019 should be constructed in accordance with SR 82[16].

When installed in accordance with this Detail Sheet, Mannok Therm Roof / MR will contribute to the buckling and racking strength of the roof as described in SR 82[16]. However, it is not recommended that they be considered as an alternative to cross-bracing.

During installation, boards must not be walked on except over supporting timbers. The boards have insufficient nail holding ability to be considered as an alternative to timber sarking.

Roof tile underlays must be approved by the manufacturer or hold a current NSAI Agrément Certificate for such use. Underlays should be installed with, and within the limits of, that Certificate.

Moisture entering the roof must be minimised using a minimum 500 gauge polyethylene with sealed gaps, placed under the inclined ceiling. Gaps in the ceiling should be minimised and service openings should be sealed.

4.1 BEHAVIOUR IN FIRE

Combustibility – Mannok Therm Roof / MR is classified as Class F to IS EN 13501-1[11]. The boards are combustible and must be protected from naked flames and other ignition sources during and after installation.

Toxicity – Negligible when used in a protected roof situation.

Mannok Therm Roof / MR is manufactured without the use of CFCs or HCFCs, and there is no release of such gas on burning.

4.2 STRENGTH

Mannok Therm Roof / MR, when installed in accordance with the manufacturer's instructions and this Detail Sheet, will resist the loads likely to be met during installation and in service.

4.3 RESISTANCE TO WIND LOAD

The resistance to wind uplift depends on many factors peculiar to each project. The effect of wind loading should be calculated in accordance with IS EN 1991-1-4[17] using the appropriate basic wind speed shown on the map in Diagram 15 of TGD to Part A of the Building Regulations 1997 to 2019.

When installed in accordance with this Detail Sheet, Mannok Therm Roof / MR will have sufficient resistance to wind uplift.

4.4 RESISTANCE TO MOISTURE

Mannok Therm Roof / MR will not be adversely affected by rain during installation for a limited time scale or by wind driven snow or rain penetrating the tiling in service.

4.5 CONDENSATION RISK

Mannok Therm Roof / MR has a vapour resistivity of greater than 400MNs/gm. The Certificate holder should be contacted for the purpose of calculating a project specific condensation risk analysis.

The risk of condensation to the underside of the sarking will be minimal under normal conditions of use.

4.6 THERMAL INSULATION

The aged/design thermal conductivity '$\lambda_{90/90}$' value of Mannok Therm Roof / MR when measured in accordance with IS EN 12667[1] is 0.022W/mK.

The required maximum U-values for pitched roof constructions can be obtained with Mannok Therm Roof / MR as indicated in Table 2. For the purpose of the calculations below, all examples are based on 12.5mm plasterboard, polyethylene vapour control layer, 150mm deep rafters at 600mm centres, vapour open underlay, 50mm cavity formed by counter battens and battens, large format concrete tiles.

Construction Type	Thickness to achieve 0.25W/m²K
Above the rafters	75mm
Above and between the rafters	50 + 30mm
Between and below the rafters	60 + 25mm

Table 2: Pitched Roof Construction Typical U-values

4.7 RESISTANCE TO SOLVENTS, FUNGI AND RODENTS

Mannok Therm Roof / MR boards do not promote infestation as there is no food value in the materials used. They also resist attack by mould and microbial growth. The insulation is not resistant to some solvent-based adhesive systems, particularly those containing methyl ethyl keytone. Adhesives containing such solvents should not be used in association with the boards. Boards which have been in contact with harsh solvents, petrol, mineral oil or acids of boards that have been damaged in any other way should not be used.

4.8 DURABILITY

Mannok Therm Roof / MR is rot proof and durable. As roof insulation, Mannok Therm Roof / MR is judged to be stable and will remain effective as an insulation system for the life of the building, so long as it is installed in accordance with this Detail Sheet.

4.9 MAINTENANCE AND REPAIR

Damaged boards can be easily replaced prior to the installation of counter battens.

4.10 TESTS AND ASSESSMENTS WERE CARRIED OUT TO DETERMINE THE FOLLOWING:

- Density
- Water vapour transmission
- Long term water absorption
- Dimensional accuracy
- Compressive and cross breaking strength
- Dimensional stability
- Thermal conductivity
- Efficiency of the construction process

4.11 OTHER INVESTIGATIONS

(i) Existing data on product properties in relation to fire, toxicity, environmental impact and the

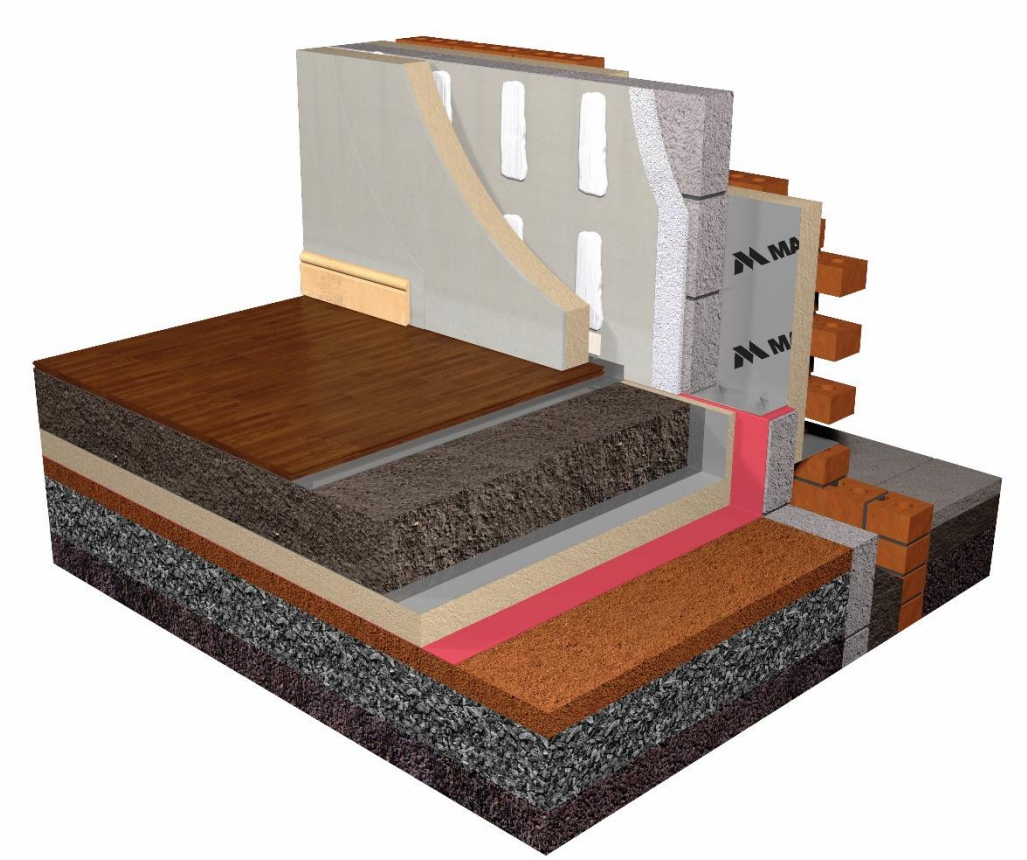
effect on mechanical strength/stability and durability were assessed. Mannok Therm Roof / MR does not contain CFC or HCFC gas and has zero ODP.

(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.

(iii) Site visits were conducted to assess the practicability of installation and the history of performance in use of the product.

(iv) A condensation risk analysis was performed.

Mannok Therm Laminate - Dry Lining with Plasterboard Laminate



PRODUCT DESCRIPTION:
This Detail Sheet relates to Mannok Therm Laminate Dry Lining with Plasterboard Laminate, as defined in NSAI Agrément Certificate 05/0223.

USE:
Mannok Therm Laminate is used for the thermal insulation of existing or new, solid or cavity masonry walls of dwellings or buildings of similar occupancy type and conditions. It may also be used to line ceilings. It also facilitates the control of surface and interstitial condensation in walls and ceilings.

NSAI Agrément

Part One / Certification 1

1.1 ASSESSMENT
In the opinion of NSAI Agrément, the Mannok Therm Laminate, if used in accordance with this Detail Sheet, meets the requirements of the Building Regulations 1997 to 2019 as indicated in Section 1.2 of Certificate 05/0223.

1.2 BUILDING REGULATIONS 1997 to 2019
This matter is dealt with in NSAI Agrément Certificate 05/0223.

Part Two / Technical Specification and Control Data 2

2.1 PRODUCT DESCRIPTION
This Detail Sheet relates to Mannok Therm Laminate, a composite insulation board consisting of Polyisocyanurate (PIR) closed cell rigid insulation bonded to square or tapered edge plasterboard for internal applications. The plasterboard is 9.5, 12.5 or 15mm thick manufactured to IS EN 520[18], and accepts dry-jointing materials, plaster skim or direct decoration. The PIR foam core is a thermoset closed cell rigid foam insulation manufactured in accordance with IS EN 13165[6]. During the manufacturing process, liquid raw materials expanded by blowing agents are applied between low emissivity composite foil facings. Mannok Therm Laminate is CFC and HCFC free and therefore has zero ozone depletion potential (zero ODP).

This Detail Sheet certifies compliance with the requirements of the Building Regulations 1997 to 2019.

Length	2400, 2438, 2700, 2743, 3000mm
Width	1200mm
Thickness	20-200mm
Board density	26-32kg/m^3
Area per board	1200x2438 = 2.93m^2 1200x2700 = 3.24m^2 1200x2743 = 3.29m^2 1200x3000 = 3.60m^2
Edge profiles	Butt edged
Thermal conductivity*	0.022W/mK
Water vapour resistivity	>300MNs/gm
Compressive strength*	≥140kPa
Other sizes are available on request	

Table 1: Product Range & Physical Properties

2.2 MANUFACTURE
Mannok Therm Laminate is manufactured from a formulation of chemicals, which is poured onto foil or foil faced kraft paper, with plasterboard subsequently adhesive bonded to the insulation core during manufacture. The plasterboard face provides a durable surface to accept traditional finishing techniques.

2.3 DELIVERY, STORAGE AND MARKING
This matter is dealt with in Section 2.2 of NSAI Agrément Certificate 05/0223.

2.4 INSTALLATION
2.4.1 General
Mannok Therm Laminate is for installation on the internal surface of walls and ceilings of new or existing buildings. The fixing method depends on the substrate. The ceiling lining should be in position before wall lining commences.

Installation should be in accordance with good dry lining practice and the manufacturer's instructions. All installations require careful planning and setting out.

Before fixing the product, sufficient time must be allowed to disperse the solvents contained in wood preservatives and damp proofing treatments where applied.

2.4.2 Thermal Bridging
Walls should be insulated to full height and returned at door/window reveals to prevent cold bridging. The margins of window and door reveals should be sufficient to accommodate the thickness of Mannok Therm Laminate being employed. The possibility of a cold bridge occurring via the window boards should also be considered and provision made to insulate this area. Services

should be fixed in place before drylining commences. The void between the wall and the thermal liner can accommodate certain services, however the PIR insulation should not be chased. The area around any services that penetrate the thermal liner must be sealed to prevent air leakage and thermal looping.

2.4.3 Thermal Looping/Fire Stops

Fire stops must be provided using proprietary methods horizontally at floor and ceiling level.

2.4.4 Plaster Dab Bonding

This method is for application to brick, block or concrete masonry cavity walls and usually involves setting out a continuous ribbon around perimeter wall and ceiling junctions, and around any openings in order to provide a seal. Vertical dabs of the gypsum adhesive are progressively applied to the wall together with a continuous fillet at skirting and ceiling level. The number, size and layout of the dabs will depend on the chosen gypsum adhesive manufacturer's recommendations. Boards are then located against the adhesive dabs and tapped back to align with the predetermined guidelines on the floor and ceiling allowing a 20mm expansion joint at the top and bottom of the panel. Dabs should be applied in accordance with BS 8212[19] and BS 8000-8[20]. Lift the Mannok Therm Laminate board into position using wedges on the floor to position the boards. Apply pressure to the board to level and embed the adhesive. Building regulations may require the provision of vertical cavity barriers in long runs of lining.

Such barriers can be formed using a continuous vertical line running down the centre of the board. Suitable approved mechanical fixings are recommended to complement the plaster dabs bond. These are normally applied at a rate of 2 per board at mid-height, after the plaster dabs have set.

2.4.5 Fixing to Timber Frame/Battens

This method is for application to sound, plane concrete or plastered wall surfaces on cavity walls. Adhesive is applied to the wall surface in strips to a pre-determined pattern that coincides with the edges of the board. A further strip is applied horizontally at the mid-point of the board. Suitable approved mechanical fixings are recommended to complement the adhesive bond. These are normally applied at a rate of 3 per board, after the adhesive has set: two fixings positioned at the top of each board and one at the board centre. Allow for expansion at the top and bottom of the panel. The Certificate holder's advice should be sought in relation to the type of adhesive and the choice of fixings.

2.4.6 Metal Frame System

Mannok Therm Laminate can be fixed by the use of proprietary metal framing systems to brick, block or concrete walls. The metal frame should be fixed to the masonry or concrete wall in accordance with the manufacturer's instructions to provide a true and level base for the board. The frames should be set vertically at a maximum of 600mm centres to coincide with the board joints and mid-point of the board. Short lengths of metal framing should be fixed horizontally between the vertical pieces at skirting level, at the mid-point of the board and just below the ceiling or soffit level. Provision for horizontal services behind the board can be made by the use of two pieces of metal framing set no more than 300mm apart. Mannok Therm Laminate should be screw fixed to each metal framing section with self-drilling and tapping, countersunk, surface coated (to avoid corrosion) screws placed at 150mm centres. Screws should not be sited less than 10mm from the edges of the board. The screws should be driven straight until the heads are slightly below the paper surface of the plasterboard facing taking care not to overdrive the screws.

2.4.7 Fixing to Timber Frame/Battens

This method may be used on timber frame constructions or on any dry masonry walls that will support and retain the battens and associated fixings. Mannok Therm Laminate should be fixed to timber framing/battens set at a maximum of 600mm centres and positioned horizontally at floor and ceiling level. The timbers should run vertically and be wide enough to offer a minimum 20mm support to all four edges of the board. Galvanised clout nails, long enough to allow a penetration of 25mm minimum into the timber, should be placed at 150mm centres and not less than 10mm from the edges of the board. They should be driven straight with the heads embedded just below the surface of the board. Care should be taken not to overdrive nails. Timbers should be treated where appropriate.

2.4.8 Mechanical Fixing

This method is for application to fair finished brick, block and concrete cavity walls where Mannok Therm Laminate is to be finished with gypsum plaster. The wall should be sound, dry and level (surface irregularities may impede the fixing of the board). The board should be fully restrained using mechanical fixings. There should be 18 fixings per 2400 x 1200 board, three of which should be type TID-M anchors. Other fixings should be in accordance with the fixing supplier's recommendations, and should be evenly distributed over the whole area of the board. Fixings should not overlap boards' edges.

2.4.9 Ceiling Linings (Horizontal and Sloping)
Mannok Therm Laminate may be used to line ceilings. Insulation is fixed in a similar way to standard plasterboard. Boards must always be placed with the long edge running across the joists, rafters or battens and all edges must be supported. Timbers must offer a minimum 20mm support to all four edges of the board. This will necessitate the use of noggins placed between the joists to coincide with the long edges of the board. Large headed galvanised clout or sheradised nails should be used to fix the board. These must be long enough to allow a minimum 25mm penetration of the supporting timber, and be placed not less than 10mm from the edges of the board and be spaced at 150mm intervals along all supporting timbers.

2.4.10 Cutting
On-site cutting of boards where it is necessary to maintain continuity of insulation around doors, windows or other openings is easily executed using a fine tooth saw or by cutting through the insulation and paper backing of the plasterboard, then snapping the board face down over a straight edge and cutting the paper facing of the plasterboard on the other side.

Good workmanship and appropriate site procedures are necessary to achieve expected thermal and air tightness performance. Ensure accurate trimming to achieve close butting joints and continuity of insulation

2.4.11 Finishing
Mannok Therm Laminate boards are jointed and finished in accordance with standard dry lining procedure, offering a surface suitable for paper hanging and paint finishes. A plaster skim finish can also be applied to the boards. The finishing should be carried out in accordance with the specified manufacturer's instructions, particularly in relation to the need to allow thorough drying of the plaster prior to decoration.

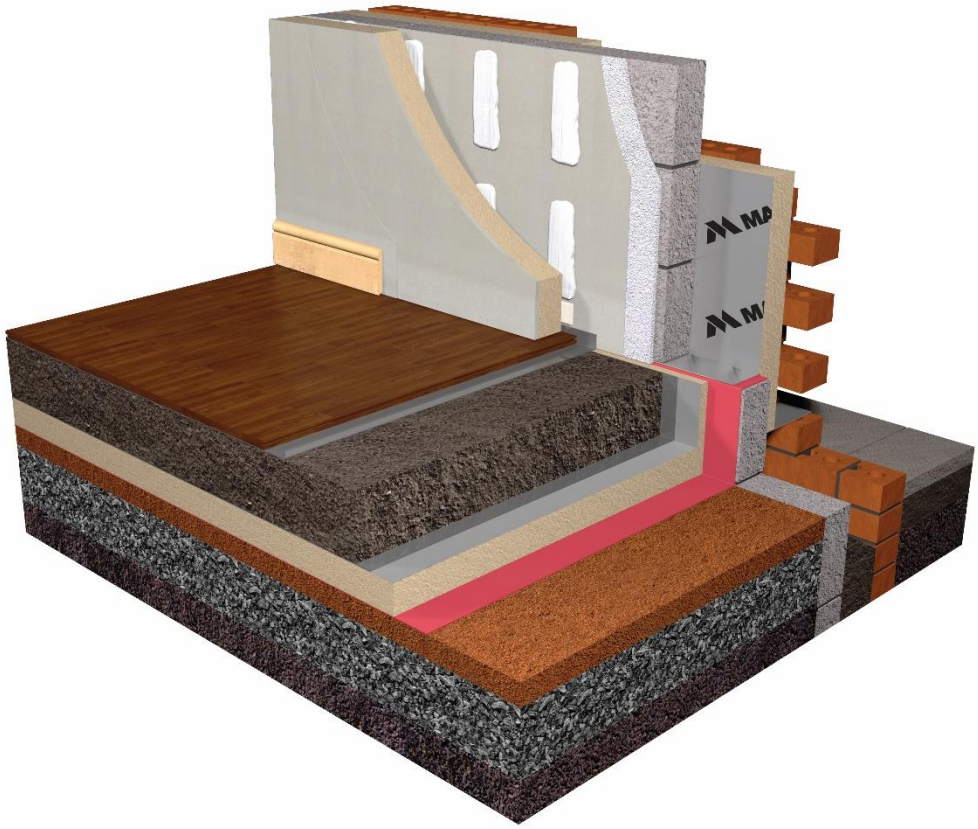


Figure 1: Internal insulation of masonry wall with plasterboard laminate

Part Three / Design Data 3

3. GENERAL

3.1 Mannok Therm Laminate, when installed in accordance with this Detail Sheet, is effective in reducing the U-value (thermal transmittance) of new and existing walls and ceilings.

Mannok Therm Laminate may be used to insulate clay or calcium silicate bricks, concrete blocks, or natural and reconstituted stone blocks. It is essential that such walls are designed and constructed to prevent moisture penetration having regard to the Driving Rain Index.

3.2 Buildings subject to the relevant requirements of the Building Regulations 1997 to 2019 should be constructed in accordance with should be constructed in accordance with IS EN 1996-1-1[7], IS EN 1996-1-2[8], IS EN 1996-2[9] and IS EN 1996-3[10]. The relevant recommendations of these standards should be followed where the wall incorporates stone or cast stone.

construction appropriate to the local wind driven rain index, paying due regard to the design detailing, workmanship and materials to be used.

3.3 With dry lining installations forming a void of 20mm or more, services can be incorporated behind the dry lining, making the chasing of the wall unnecessary. When using adhesive systems, or where the services have a greater depth than the void, the wall should be chased rather than the insulation.

3.4 All mould or fungal growth should be treated prior to the application of product.

3.5 When bonding is by adhesive, it is essential that a satisfactory bond is achieved between the walling material and the adhesive. Backgrounds of high suction will behave differently to those of low suction. The Certificate holder's advice should be sought in case of difficulty.

Part Four / Technical Investigations 4

4.1 BEHAVIOUR IN FIRE

The plasterboard using in Mannok Therm Laminate is deemed to be Class 0 in accordance with the Building Regulations 1997 to 2019, and so the insulated board qualifies as the highest product performance classification as defined in TGD to Part B of the Building Regulations 1997 to 2019. The insulation component of the board should be isolated from possible sources of combustion. To achieve this Mannok Therm Laminate should be installed in accordance with the following:

(i) Combustible material shall be separated by solid non-combustible material not less than 200mm thick from a flue pipe to an oil, solid fuel or gas heating appliance as indicated in TGD to Part J of the Building Regulations 1997 to 2019.

(ii) Mannok Therm Laminate should be separated by a minimum distance of 150mm from an oil, solid fuel or gas heating appliance as indicated in TGD to Part J of the Building Regulations 1997 to 2019.

Particular attention should be paid to the exclusion of moisture in that the designer should select a

(iii) Mannok Therm Laminate when installed with a residual cavity between the board and the wall, will require the provision of cavity barriers and may be used in buildings of any purpose group provided:
  (a) Cavity barriers in walls are provided at maximum distances apart of 10m unless a Class 1 material is exposed to the cavity when a spacing of 20m may be adopted.
  (b) Every such cavity shall be closed by a cavity barrier around the whole perimeter of the wall or ceiling element and around the perimeter of any opening through such elements.
  (c) Cavity barriers in spaces between a floor and ceiling are provided at maximum distances of 20m for any class of surface exposed to the cavity.
  (d) Where any wall or ceiling containing a cavity meets another such element, the cavities shall be closed so that they do not communicate with one another.
  (e) Direction on the provision and spacing of cavity barriers is given in TGD to Part B of the Building Regulations 1997 to 2019.

4.2 WATER PENETRATION

Capillary action – The closed cell structure does not allow water uptake by capillary action.

Mannok Therm Laminate, when used in accordance with this Certificate, presents no significant risk of water penetration.

4.3 THERMAL INSULATION

The aged/design thermal conductivity '$\lambda_{90/90}$' value of Mannok Therm Laminate when measured in accordance with IS EN 12667[1] is 0.022W/mK. The high thermal resistance of Mannok Therm Laminate ensures that cold bridging and extra heat loss around the edges of openings can be avoided. A minimum thickness of 25mm of Mannok Therm Laminate would be suitable.

Uncontrolled leakage of air through the fabric of a building and/or cracks in and around door and window frames, sills, jambs etc, air movement due to thermal effects or due to wind pressure can occur. Details of how to avoid infiltration of cold air are given in TGD to Part L of the Building Regulations 1997 to 2019.

Lintel jamb and sill designs similar to those shown in TGD to Part L of the Building Regulations 1997 to 2019 will be satisfactory to limit thermal bridging.

The required maximum U-values for external walls can be obtained with Mannok Therm Cavity / MC constructions as indicated in Table 3. For the purpose of the calculations below all examples are based on masonry (as shown), 15mm plaster, 25mm cavity and 12.5mm plasterboard. The thickness specified for Laminate is the thickness of insulation only – allow 12.5mm for thickness of plasterboard.

4.4 CONDENSATION RISK

Mannok Therm Laminate has a high vapour resistance and is therefore unlikely to be affected by surface or interstitial condensation, provided the correct thickness of Mannok Therm Laminate is chosen and all joints between boards are filled and taped in accordance with standard dry lining practice. Correct use of the heating and ventilation system is important. Interstitial condensation analysis for average winter environmental conditions for cavity wall constructions indicate no condensation risk. When insulating buildings the recommendations of BS 5250[5] should be followed to minimise the risk of condensation within the building elements and structures.

4.5 RESISTANCE TO SOLVENTS, FUNGI AND RODENTS

Mannok Therm Laminate boards do not promote infestation, as there is no food value in the materials used. They also resist attack by mould and microbial growth. The insulation is not resistant to some solvent-based adhesive systems, particularly those containing methyl ethyl keytone. Adhesives containing such solvents should not be used in association with the boards. Boards which have been in contact with harsh solvents, petrol, mineral oil or acids, or boards that have been damaged in any other way should not be used.

4.6 WALL MOUNTED FITTINGS

The recommendations of the manufacturer should be followed. Any object fixed to the wall, other than lightweight items, e.g. framed pictures, should be fixed through the lining board into the wall behind using proprietary fixings.

4.7 MAINTENANCE

Damaged boards can be easily replaced and no maintenance of the insulation will be required provided that the plasterboard layer remains intact.

4.8 DURABILITY

Mannok Therm Laminate is judged to be stable and will remain effective as an insulation system for the life of the building, so long as it is installed in accordance with this Detail Sheet. Its durability depends upon the supporting structure and the conditions of use.

4.9 LIMITATIONS

Mannok Therm Laminate has a gypsum plasterboard face, and should therefore not be used to isolate dampness or be used in continuously damp or humid conditions.

4.10 OTHER INVESTIGATIONS

(i) Existing data on product properties in relation to fire, toxicity, environmental impact and the effect on mechanical strength/stability and durability were assessed. Mannok Therm Laminate does not contain CFC or HCFC gas and has zero ODP.

(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.

(iii) Site visits were conducted to assess the practicability of installation and the history of performance in use of the product.

(iv) A condensation risk analysis was performed.