NSAI Agrément

IRISH AGRÉMENT BOARD
CERTIFICATE NO. 04/0022

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Hytherm Warm-R & Warm-R Premium Insulation Products

Isolation
Wärmedämmung

NSAI Agrément (Irish Agrément Board) is designated by Government to carry out 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:

- Hytherm Warm-R & Warm-R Premium Partial Fill Cavity Wall Insulation (Detail Sheet 1)
- Hytherm Warm-R & Warm-R Premium Underfloor Thermal Insulation Board (Detail Sheet 2)

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

MANUFACTURE AND MARKETING:
The product is manufactured and marketed by:

Xtratherm Ltd.,
Kells Road,
Navan,
Co. Meath,
Ireland
Tel: +353 (46) 90 66000
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NSAI Agrément

Part One / Certification 1

1.1 ASSESSMENT
In the opinion of NSAI Agrément, the Hytherm insulation products described in this Certificate, if used in accordance with this Certificate, meet the requirements of the Building Regulations 1997 - 2017 as indicated in Section 1.2 of this Certificate.

1.2 BUILDING REGULATIONS 1997 to 2019

REQUIREMENT:

Part D – Materials and Workmanship
D3 – The Hytherm insulation products, as certified in this Certificate, are comprised of proper materials fit for their intended use (See Part 4 of this Certificate).

D1 – The Hytherm insulation products, as certified in this Certificate, meet the requirements of the building regulations for workmanship.

Part A – Structure
A1 – Loading
Hytherm Warm-R & Warm-R Premium Underfloor Insulation Boards have adequate strength and stiffness to accept floor loads.

Part B – Fire Safety
B3 – Internal Fire Spread (Structure)
Part B Vol 2 – Fire Safety
B8 – Internal Fire Spread (Structure)
Walls using Hytherm Warm-R & Warm-R Premium Partial Fill Cavity Wall Insulation meet the requirement, provided the completed walls comply with the conditions described in Section 4.1 of Detail Sheet 1.

Hytherm Warm-R & Warm-R Premium Underfloor Insulation Boards shall 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.

Part C – Site Preparation and Resistance to Moisture
C4 – Resistance to Weather and Ground Moisture
The Hytherm insulation products described 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 J – Heat Producing Appliances
J3 – Protection of Building
Hytherm Warm-R & Warm-R Premium Partial Fill Cavity Wall Insulation, if used in accordance with Detail Sheet 1, meets the requirements 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 the Hytherm insulation products described in this Certificate, walls and floors can meet current U-value requirements (see Part 4 of the relevant Detail Sheet).

Part Two / Technical Specification and Control Data 2

2.1 PRODUCT DESCRIPTION
Each of the Hytherm insulation products is given a detailed description in the relevant Detail Sheet.

2.2 MANUFACTURE
The Hytherm insulation products described in this Certificate are manufactured from polystyrene granules from external suppliers. The granules are expanded into blocks of EPS without the use of additional gases and cut to size from the block. Hytherm Warm-R & Warm-R Premium Partial Fill Cavity Wall Insulation boards are both square and T&G on the edges to form an interlocking partial fill cavity wall system. Hytherm Warm-R & Warm-R Premium Underfloor Insulation boards are square edge, T&G and shiplap jointing.

Quality control checks include board dimensions, density, dimensional stability, compressive strength and thermal conductivity.

2.3 DELIVERY, STORAGE AND MARKING
Hytherm insulation boards are supplied in polyethylene shrink-wrapped packs. Each pack carries a label with the product description, product characteristics (λ and R values), manufacturer's name, NSAI Agrément identification mark and NSAI Agrément Certificate number for the system.

Boards must be protected from prolonged exposure to sunlight, should be stored under cover in their original wrapping, not in contact with ground moisture and raised above ground level. If boards are stored outside, they should be raised above ground level and not in contact with ground moisture. Care must be taken to avoid contact with solvents and with materials containing volatile organic components such as coal tar, and newly treated timber.

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

Part Three / Design Data 3

3.1 GENERAL
This matter is dealt with for each product in the relevant Detail Sheet.

3.2 CE MARKING
The manufacturer has taken the responsibility of CE marking the products in accordance with harmonised standard I.S. EN 13163:2012+A2:2016, *Thermal insulation products for buildings -Factory made expanded polystyrene (EPS)products - Specification*. An asterisk (*) appearing in this Certificate indicates that data shown is given in the manufacturer's Declaration of Performance.

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

Part Four / Technical Investigations 4

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

4.2 WATER VAPOUR PENETRATION AND CONDENSATION RISK
Each Detail Sheet contains the relevant information.

4.3 THERMAL INSULATION
Each Detail Sheet contains the relevant information.

4.4 TESTS AND ASSESSMENTS WERE CARRIED OUT TO DETERMINE THE FOLLOWING:
- Density
- Water vapour transmission
- Long term water absorption
- Dimensional accuracy
- Compressive stress
- Bending strength
- Dimensional stability
- Thermal conductivity
- Thermal resistance
- Efficiency of the construction process

4.5 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.

(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.

Part Five / Conditions of Certification 5

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 Agrément are paid.

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

5.3 In granting Certification, the NSAI makes no representation as to;

(a) the absence or presence of patent rights subsisting in the product/process; or

(b) the legal right of the Certificate holder to market, install or maintain the product/process; or

(c) whether individual products have been manufactured or installed by the Certificate holder in accordance with the descriptions and specifications set out in this Certificate.

5.4 This Certificate does not comprise installation instructions and does not replace the manufacturer's directions or any professional or trade advice relating to use and installation which may be appropriate.

5.5 Any recommendations contained in this Certificate relating to the safe use of the certified product/process are preconditions to the validity of the Certificate. However the NSAI does not certify that the manufacture or installation of the certified product or process in accordance with the descriptions and specifications set out in this Certificate will satisfy the requirements of the Safety, Health and Welfare at Work Act 2005, or of any other current or future common law duty of care owed by the manufacturer or by the Certificate holder.

5.6 The NSAI is not responsible to any person or body for loss or damage including personal injury arising as a direct or indirect result of the use of this product or process.

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

NSAI Agrément

This Certificate No. **04/0022** is accordingly granted by the NSAI to **Xtratherm Ltd.** on behalf of NSAI Agrément.

Date of Issue: **August 2004**

Signed

Seán Balfe
Director of NSAI Agrément

Readers may check that the status of this Certificate has not changed by contacting NSAI Agrément , NSAI, 1 Swift Square, Northwood, Santry, Dublin 9, Ireland. Telephone: (01) 807 3800. Fax: (01) 807 3842. www.nsai.ie

Revisions: April 2010

- Inclusion of Underfloor board.

Revision: January 2018

- Product specification updated to reflect manufactures Declaration of Performance.

4th January 2021: General revision.

Hytherm Warm-R & Warm-R Premium Partial Fill Cavity Wall Insulation Board

PRODUCT DESCRIPTION
This Detail Sheet relates to Hytherm Warm-R & Warm-R Premium Partial Fill Cavity Wall Insulation Boards, as defined in NSAI Agrément Certificate 04/0022. Hytherm Warm-R & Warm-R Premium Partial Fill Cavity Wall Insulation Boards consist of rigid polystyrene boards cut from moulded blocks of standard EPS (Warm-R) or with graphite enhancement (Warm-R Premium). The boards are both square edge and T&G to form an interlocking partial fill cavity wall insulation system. The Hytherm Warm-R & Warm-R Premium Partial Fill Cavity Wall Insulation Boards are fixed to the inner leaf of a cavity wall.

USE:
The products are used for the thermal insulation of masonry walls up to 25m in height, subject to the separate conditions applying to walls up to 12m and walls over 12m in height contained in Section 3 of this Detail Sheet. It also facilitates the control of surface and interstitial condensation in walls.

Part One / Certification 1

1.1 ASSESSMENT
In the opinion of NSAI Agrément, Hytherm Warm-R & Warm-R Premium Partial Fill Cavity Wall Insulation Boards if used in accordance with this Detail Sheet, meets the requirements of the Building Regulations 1997 - 2008 as indicated in Section 1.2 of Certificate 04/0022.

1.2 BUILDING REGULATIONS 1997 to 2008
This matter is dealt with in NSAI Agrément Certificate 04/0022.

Part Two / Technical Specification and Control Data 2

2.1 PRODUCT DESCRIPTION
The Hytherm Warm-R & Warm-R Premium Partial Fill Cavity Wall Insulation Boards consist of rigid polystyrene boards cut from moulded blocks of EPS. The boards are both square edge and T&G to form an interlocking partial fill cavity wall insulation system. The Hytherm Warm-R & Warm-R Premium Partial Fill Cavity Wall Insulation Boards are fixed to the inner leaf of a cavity wall.

The system is used with certified double drip stainless steel wall ties designed to I.S. EN 845-1:2013+A1:2016, *Specification for ancillary components for masonry - Part 1: Wall ties, tension straps, hangers and brackets*. Each tie has a plastic retaining clip to ensure they are held against the outer surface of the inner leaf during installation. Other NSAI Agrément approved wall ties may also be used with the system. The Hytherm Warm-R & Warm-R Premium Partial Fill Cavity Wall Insulation Boards do not contain CFCs of HCFC gases and have zero Ozone Depletion Potential.

Table 1 shows the Hytherm Warm-R & Warm-R Premium Partial Fill Cavity Wall Insulation Boards product range.

Square Edge	
Length	1200mm
Width	400, 450 and 600mm
Thickness	65 and 95mm
T&G Edge	
Length	1200mm
Width	400, 450 and 600mm
Thickness	65 and 95mm
Grade	SD/HD/EHD for Warm-R EPS 70/EPS 100 for Warm-R Premium
Other thicknesses are available subject to quantity	

Table 1: Product Range

2.2 INSTALLATION
A section of the inner leaf is built with the first row of ties at not greater than 600mm horizontal centres. This first row of insulation boards should be commenced 1 block below DPC level to provide improved edge insulation for the floor, as required by TGD to Part L of the Building Regulations 1997 to 2019. It is recommended that the wall ties are not placed directly on the DPC. The mortar fill below DPC level must be considered and it is also necessary to ensure that any installed radon barrier is not damaged. The walls are constructed by raising each section of the leading leaf securing the Hytherm Warm-R or Warm-R Premium Partial Fill Cavity Wall Insulation

Board tight against the cavity face of the inner leaf with adjustable retaining clips on the wall ties. 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.

Wall tie spacings are not to exceed 750mm horizontally and 450mm vertically. Each board should be secured by a minimum of 3 retaining clips. Additional wall ties at unbonded openings should be located at a maximum of 225mm vertical centre and within 150mm of the opening. All wall ties should be installed correctly, clear of all mortar and sloped downwards towards the outer leaf and conform to structural design requirements. In sever exposure zones, Hytherm Warm-R & Warm-R Premium Partial Fill Cavity Wall Insulation Boards should be installed in walls whilst maintaining a 40mm cavity width. Only certified wall ties should be used in conjunction with this system.

Table 2 shows typical wall tie spacing.

Cavity Width	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 Spacing of Wall Ties

Successive sections of wall fixed by certified stainless steel wall ties are constructed and Hytherm Warm-R or Warm-R Premium Partial Fill Cavity Wall Insulation 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 a cavity board or similar is recommended to protect installed boards and keep the cavity mortar free. Penetration of damp across the cavity will be prevented with good practice.

Proprietary reveal closers should be used to close cavities at openings (see Figure 1). Where the use of wall ties is inappropriate, e.g. under window sills, use Hyclips to hold the cavity boards tightly in place (see Figure 2). Jamb details must incorporate a vertical DPC, positioned between the Hytherm Warm-R or Warm-R Premium Partial Fill Cavtiy Wall Insulation Board and the external leaf, returning a minimum of 150mm.

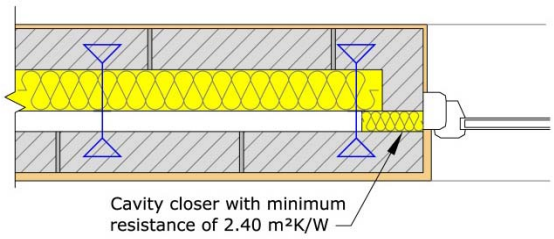

Figure 1: Use of Reveal Closers

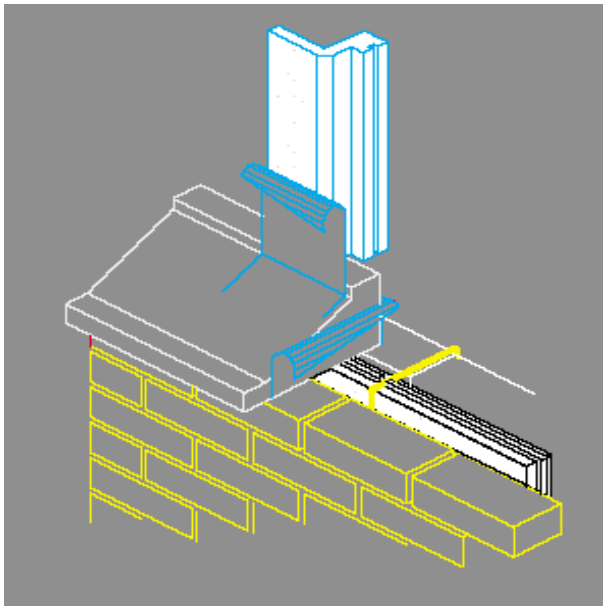

Figure 2: Use of Hyclips

On-site trimming of boards where necessary to maintain continuity of insulation around doors, windows or other opes is easily executed using a fine tooth saw or builder's knife.

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 heads.
- Ensure the correct fitting of ties. Avoid sloping wall ties which could be caused by the difference in level between the outer and inner leaf of the cavity wall.
- Hytherm Warm-R or Warm-R Premium Partial Fill Cavity Wall Insulation Board is placed against the inner leaf properly, i.e. as specified in this Detail Sheet and the manufacturer's instructions.
- Once the Hytherm Warm-R or Warm-R Premium Partial Fill Cavity Wall Insulation Board is installed in the cavity wall, ensure that there are no gaps in the insulation, as this will reduce the risk of cold bridging.

Good workmanship and appropriate site procedures are necessary to achieve expected thermal and air tightness performance.

3. GENERAL

Hytherm Warm-R & Warm-R Premium Partial Fill Cavity Wall Insulation Boards, when installed in accordance with this Detail Sheet, are 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.

Buildings subject to the relevant requirements of the Building Regulations 1997 to 2019 should be constructed from masonry units designed in accordance with I.S. EN 1996-1-1:2005+A1:2012, *Eurocode 6 - Design of masonry structures - Part 1-1: General rules for reinforced and unreinforced masonry structures,* I.S. EN 1996-2:2006+NA:2010, *Design of masonry structures - Part 2: Design considerations, selection of materials and execution of masonry (Including Irish National Annex)* and S.R. 325:2013+A1:2014 *Recommendations for the design of masonry structures in Ireland to Eurocode 6*.

The use of a cavity board or cavity during construction is recommended to prevent accumulation of mortar droppings on the top edge of the Hytherm Warm-R & Warm-R Premium Partial Fill Cavity Wall Insulation Boards and to prevent bridging of cavity by mortar droppings.

As with all cavity wall insulation, the construction detailing should comply with good practice.

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.

Where a nominal residual cavity width of 40mm is maintained, Hytherm Warm-R & Warm-R Premium Partial Fill Cavity Wall Insulation Boards are suitable for use in any exposure conditions, in building up to 12m in height. For buildings over 12m and up to 25m in height the exposure factor should be considered by the designer.

It is important to ensure during installation that:

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

Data obtained by NSAI Agrément confirms that a masonry wall incorporating Hytherm Warm-R or Warm-R Premium Partial Fill Cavity Wall Insulation Board will not transmit water to the inner leaf.

Data obtained by NSAI Agrément also demonstrates that Hytherm Warm-R & Warm-R Premium Partial Fill Cavity Wall Insulation Boards do not absorb water by capillary action. When the products are 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.

A minimum residual cavity width of 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 must be avoided in high exposure areas.

4.1 BEHAVIOUR IN FIRE

Hytherm Warm-R & Warm-R Premium Partial Fill Cavity Wall Insulation Boards 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 Part B3, Diagram 17 (Cavity walls excluded from provisions for cavity barriers) of the TGD Part B, Building Regulations 1997 to 2019 or Diagram 12 of TGD to Part B Volume 2 of the Building Regulations 1997 to 2019, 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
   - meter boxes which require an opening in the outer leaf of not greater than 800 x 500mm and do not penetrate the inner leaf except through a sleeve of not more than 80 x 80mm which is fire stopped where it passes through the inner leaf.

Hytherm Warm-R achieves Class F and Warm-R Premium achieves Class E in accordance with IS EN 13501-1. 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.

As Hytherm Warm-R & Warm-R Premium Partial Fill Cavity Wall Insulation Boards are manufactured without the use of CFCs or HCFCs, 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 Part J to the Building Regulations 1997 to 2019. It should also be separated by 40mm from the external surface of a masonry chimney. For chimneys separation between this product and the external surface of the chimney shall be determined in accordance with TGD Part J to the Building Regulations 1997 to 2019.

4.2 WATER PENETRATION

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

Hytherm Warm-R & Warm-R Premium Partial Fill Cavity Wall Insulation Boards, when used in accordance with this Detail Sheet, present no significant risk of water penetration.

4.3 WATER VAPOUR PENETRATION AND CONDENSATION RISK

Hytherm Warm-R & Warm-R Premium Partial Fill Cavity Wall Insulation Boards have a water vapour diffusion resistivity factor 'μ' of 20 to 40. They have significant resistance to the passage of water vapour when used in conventional masonry cavity wall construction. This obviates the risk of interstitial condensation.

4.4 THERMAL INSULATION

The aged thermal conductivity 'λ' value of Hytherm Warm-R Partial Fill Cavity Wall Insulation Board, when measured in accordance with IS EN 12667:2001, is 0.037* W/mK for Warm-R and 0.031* W/mK for Warm-R Premium. The high thermal resistance of Hytherm Warm-R & Warm-R Premium Partial Fill Cavity Wall Insulation Boards ensures that cold bridging and extra heat loss around the edges of openings can be avoided. A minimum thickness of 25mm of Hytherm Warm-R or Warm-R Premium Partial Fill Cavity Wall Insulation Board will be suitable.

Lintel jamb and cill designs similar to those shown in Diagram 3 of TGD to Part L of the Building Regulations 1997 to 2008 will be satisfactory to limit thermal bridging.

The DoEHLG publication *Limiting Thermal Bridging & Air Infiltration – Acceptable Construction Details* gives guidance on limiting cold bridging and should be referred to.

The required U-values for external walls can be obtained with Hytherm Warm-R & Warm-R Premium Partial Fill Cavity Wall Insulation Board. The backstop elemental U-value for a wall as outlined in TGD Part L is 0.21 W/m^{2}K. when superior U-values are required specifiers should contact the certificate holder for guidance in this regard.

4.5 DURABILITY

Hytherm Warm-R & Warm-R Premium Partial Fill Cavity Wall Insulation Boards are rot proof and durable. As cavity wall insulation, Hytherm Warm-R & Warm-R Premium Partial Fill Cavity Wall Insulation Boards 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.

I.S. EN 13163 Essential characteristics for Hytherm Warm-R (EPS 70)		
Property	**Declared Value**	**Test Method**
Thermal conductivity	0.037*	EN 12667
Reaction to fire	Euroclass F*	EN 13501-1
Thickness	T2*	EN 823
Length	L2*	EN 822
Width	W2*	EN 822
Squareness	S2*	EN 824
Flatness	P3*	EN 824
Compressive Strength	CS (10/Y) 70*	EN 826

Table 3: Physical Properties of Hytherm Warm-R Partial Fill Cavity Wall Boards

I.S. EN 13163 Essential characteristics for Hytherm Warm-R Premium		
Property	**Declared Value**	**Test Method**
Thermal conductivity	0.031*	EN 12667
Reaction to fire	Euroclass E*	EN 13501-1
Thickness	T2*	EN 823
Length	L2*	EN 822
Width	W2*	EN 822
Squareness	S2*	EN 824
Flatness	P3*	EN 824
Compressive Strength	CS (10/Y) 70*	EN 826

Table 4: Physical Properties of Hytherm Warm-R Premium Partial Fill Cavity Wall Boards

Hytherm Warm-R & Warm-R Premium Underfloor Insulation Board

PRODUCT DESCRIPTION:
This Detail Sheet relates to Hytherm Warm-R & Warm-R Premium Underfloor Insulation Boards, as defined in NSAI Agrément Certificate 04/0022. Hytherm Warm-R & Warm-R Premium Underfloor Insulation Board consists of rigid polystyrene boards cut from moulded blocks of standard EPS (Warm-R) or with graphite enhancement (Warm-R Premium). The boards are manufactured in square edge, T&G and shiplap jointing. Hytherm Warm-R & Warm-R Premium Underfloor Insulation Boards are installed during construction and is used as a thermal insulation in ground supported floors.

USE:
The products are used for the thermal insulation in ground supported and suspended floors and may be installed:

- Below a concrete floor slab;
- Below a cement based floor screed on a concrete slab with a hardcore base;
- Above a suspended concrete floor (e.g. block and beam) with cement based screed;
- Between the joists of a suspended timber floor.
- Under OSB or chipboard.

Part One / Certification 1

1.1 ASSESSMENT
In the opinion of NSAI Agrément, Hytherm Warm-R & Warm-R Premium Underfloor Insulation Boards if used in accordance with this Detail Sheet, meet the requirements of the Building Regulations 1997 - 2017 as indicated in Section 1.2 of Certificate 08/0324.

1.2 BUILDING REGULATIONS 1997 to 2019
This matter is dealt with in NSAI Agrément Certificate 04/0022.

Part Two / Technical Specification and Control Data 2

2.1 PRODUCT DESCRIPTION
Hytherm Warm-R & Warm-R Premium Underfloor Insulation Boards consist of rigid polystyrene boards cut from moulded blocks of EPS manufactured in accordance with I.S. EN 13163:2012+A2:2016. The boards are plain edge boards, T&G and shiplap jointing and should be laid closely butting each other.

Hytherm Warm-R & Warm-R Premium Underfloor Insulation Boards have been tested to ensure compliance with the requirements for compressive strength, water vapour transmission, thermal conductivity, thermal resistance and dimensional stability.

Length	1200, 1800 and 2400mm
Width	600 and 1200mm
Thickness	25 to 150mm
Grade	SD/HD/EHD for Warm-R EPS 70/EPS 100 for Warm-R Premium

Table 1: Product Range

The boards do not contain CFC or HCFC gases and have zero Ozone Depletion Potential.

Table 1 shows the Hytherm Warm-R & Warm-R Premium Underfloor Insulation Boards product range.

2.2 INSTALLATION
2.2.1 Laying Below the Floor Slab
Where Hytherm Warm-R or Warm-R Premium Underfloor Insulation Boards are used below the floor slab, lay the hardcore in layers (150mm minimum – 225mm maximum) which should be well-compacted, with the surface blinded with quarry dust or sand to provide a suitable surface for laying a DPM. The DPM (minimum 1200 gauge polythene) should be laid over the blinding with joints taped to prevent the passage of ground moisture. The DPM should be carried up the wall until it meets and seals with the DPC.

Hytherm Warm-R & Warm-R Premium Underfloor Insulation Boards should be laid with closely butted joints, laid staggered with a break bonded pattern and fitted tightly at the edges and around any service penetrations.

Vertical upstands of insulation 25mm thick should be placed at the floor perimeter, party walls and internal rising walls to minimise thermal bridging.

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

2.2.2 Laying Below the Floor Screed
Where Hytherm Warm-R & Warm-R Premium Underfloor Insulation Boards are used below the floor screed, the same procedure should be followed ensuring that the floor slab onto which the insulation is being laid is level.

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 8203:2017.

The minimum thickness of sand and cement screed is 65mm for domestic construction and 75mm for most other buildings. However, architectural specifications should be consulted.

2.2.3 Laying on Precast Block and Beam Floors
The floor surface should be smooth and flat, any irregularities should be removed. Lay a DPM to ensure that it is correctly positioned and turned up to meet the seal with the DPC.

Hytherm Warm-R & Warm-R Premium Underfloor Insulation Boards should be laid with tightly butted and staggered joints. During construction, the Hytherm Warm-R & Warm-R Premium Underfloor Insulation 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. Hytherm Warm-R & Warm-R Premium Underfloor Insulation Bards should be laid over 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.

All surfaces should be level to accept the Hytherm Warm-R & Warm-R Premium Underfloor Insulation Boards. Uneven surfaces should be levelled prior to the laying of the floor.

2.2.4 Laying in Suspended Timber Floors
Hytherm Warm-R & Warm-R Premium Underfloor Insulation Boards should be cut to fit between the timber joists and be supported by carriers. These may be nails part driven into the side of the joists at selected levels, timber battens or proprietary saddle clips.

Where services need to be accommodated below the floor, Hytherm Warm-R & Warm-R Premium Underfloor Insulation Boards can be lowered to provide an insulated duct.

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.

2.2.5 Cutting
On-site trimming of boards where necessary to maintain continuity of insulation around opes is easily executed using a fine tooth saw or builder's knife.

Part Three / Design Data 3

3.1 GENERAL
Hytherm Warm-R & Warm-R Premium Underfloor Insulation Boards, when installed in accordance with this Detail Sheet, are effective in reducing the 'U' value (thermal transmittance) of new and existing floor constructions.

Ground supported floors incorporating Hytherm Warm-R & Warm-R Premium Underfloor Insulation Boards must include a suitable damp proof membrane laid in accordance with BS 8215:1991 and BS 8102:2009.

Suspended concrete ground floors incorporating Hytherm Warm-R or Warm-R Premium Underfloor Insulation Boards must include suitable ventilation and void should remain inaccessible.

The overlay to Hytherm Warm-R & Warm-R Premium Underfloor Insulation Boards should be:
- A cement based floor,
- A concrete slab or,
- Timber, OSB, particleboard.

3.2 FLOOR LOADING
The design imposed loadings sould be taken from I.S. EN 1991-1-1:2002/NA: 2013, Eurocode 1: Actions on structures - Part 1-1: General actions - Densities, self-weight, imposed loads for buildings.

Hytherm Warm-R & Warm-R Premium Underfloor Insulation Boards supported by chipboard or OSB laid over joists or a screed can support these design loadings without undue deflection.

Where Hytherm Warm-R & Warm-R Premium Underfloor Insulation Boards are used under a concrete slab, resistance to concentrated and distributed loads is a function of the slab specification.

3.3 UNDERFLOOR HEATING SYSTEMS
The maximum continuous working temperature of EPS is 80°C. Where underfloor heating systems are to be used, advice of the Certificate holder should be sought.

3.4 WATERPROOFING
If an overlay of chipboard, OSB or similar material is to be used in bathrooms or kitchens, a continuous waterproof finish (e.g. vinyl) must be provided to protect it.

Part Four / Technical Investigations 4

4.1 BEHAVIOUR IN FIRE
Hytherm Warm-R achieves Class F and Warm-R Premium achieves Class E in accordance with IS EN 13501-1. The boards are combustible and must be protected from naked flames and other ignition sources during and after installation. The boards when in proximity to a constructional hearth must be protected by 250mm of solid concrete or as detailed in TGD Part J (Heat Producing Appliances) to the Building Regulations.

Toxicity – Negligible when used in a ground floor construction.

Hytherm Warm-R & Warm-R Premium Underfloor Insulation Boards are manufactured without the use of CFCs or HCFCs; there is no release of such gas on burning.

4.2 STRENGTH
Hytherm Warm-R & Warm-R Premium Underfloor Insulation Boards 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 MOISTURE
Hytherm Warm-R & Warm-R Premium Underfloor Insulation Boards will not allow moisture to cross the floor construction provided it is installed in accordance with this Detail Sheet.

4.4 WATER VAPOUR PENETRATION AND CONDENSATION RISK
Hytherm Warm-R & Warm-R Premium Underfloor Insulation Boards have a water vapour diffusion resistivity factor 'μ' of 20 to 40. It has a significant resistance to the passage of water vapour

4.5 THERMAL INSULATION
The aged thermal conductivity 'λ' value of Hytherm Warm-R & Warm-R Premium Underfloor Insulation Boards, when measured in accordance with IS EN 12667:2001, is 0.037* W/mK for Warm-R and 0.031* W/mK for Warm-R Premium.

Backstop ground floor elemental U-values as described in TGD Part L to the Building Regulations can be obtained with Hytherm Warm-R & Warm-R Premium Underfloor Insulation Board constructions. Superior elemental ground floor U-value can often be required to achieve energy performance coefficient (EPC) and carbon performance coefficient (CPC) compliance.

The DoEHLG publication *Limiting Thermal Bridging & Air Infiltration – Acceptable Construction Details* gives guidance on limiting cold bridging and should be referred to. When insulation is provided below a concrete slab, perimeter insulation having a minimum thermal resistance of 1.0 m^2K/W must be provided to limit heat loss due to thermal bridging. Where superior performances at thermally bridged locations are required, designers should engage the services of a NSAI registered thermal modeller.

4.6 DURABILITY
Hytherm Warm-R & Warm-R Premium Underfloor Insulation Boards are rot proof and durable. As floor insulation, Hytherm Warm-R & Warm-R Premium Underfloor Insulation Boards 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 Detail Sheet.

	Concrete Slab on Ground Floor	Suspended Beam & Block Concrete Floor (including 65mm screed)	Timber Suspended Floor (joists @ 400mm c/c)
P/A Ratio	U=0.25	U=0.25	U=0.25
1	100	90	130
0.9	95	90	125
0.8	95	90	125
0.7	95	90	125
0.6	90	85	120
0.5	85	80	115
0.4	75	80	110
0.3	70	70	100
0.2	50	60	85
0.1	10	-	35

P/A = Perimeter/Area

Table 2: Ground Floor Construction Typical U Values (with Warm-R Premium)

I.S. EN 13163 Essential characteristics for Hytherm Warm-R (EPS 100)		
Property	**Declared Value**	**Test Method**
Thermal conductivity	0.037*	EN 12667
Reaction to fire	Euroclass F*	EN 13501-1
Thickness	T2*	EN 823
Length	L2*	EN 822
Width	W2*	EN 822
Squareness	S2*	EN 824
Flatness	P3*	EN 824
Compressive Strength	CS (10/Y) 100*	EN 826

Table 3: Physical Properties of Hytherm Warm-R Underfloor Insulation Boards

I.S. EN 13163 Essential characteristics for Hytherm Warm-R Premium		
Property	**Declared Value**	**Test Method**
Thermal conductivity	0.031*	EN 12667
Reaction to fire	Euroclass E*	EN 13501-1
Thickness	T2*	EN 823
Length	L2*	EN 822
Width	W2*	EN 822
Squareness	S2*	EN 824
Flatness	P3*	EN 824
Compressive Strength	CS (10/Y) 70*	EN 826

Table 4: Physical Properties of Hytherm Warm-R Underfloor Insulation Boards