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Kingspan® INSULATION

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Fifth Issue March 2003

PITCHED ROOFS
FLAT ROOFS
WALLS
FLOORS

Kingspan Insulation

User Guide

Kingspan Insulation Solutions

Kingspan Insulation...
Building for the Future

Contents

INTRODUCTION

This insulation guide provides comprehensive information on a carefully chosen selection of products available from Kingspan Insulation. For each application in this guide you will find illustrated fixing details, product details and the correct thickness of insulation you will need to achieve the required U–values.

Kingspan Insulation specialise in the solution of insulation problems and offer the widest range of insulants available from any UK or Irish manufacturer:

Kooltherm® premium performance CFC–free rigid phenolic insulation. CFC / HCFC–free also available subject to enquiry.

Therma zero ODP high performance CFC / HCFC–free rigid urethane insulation.

nil*vent*™ premium performance non–micro porous breathable membrane which has unparalleled performance.

zero O.D.P

TECHNICAL ADVISORY SERVICE

Kingspan Insulation offers a free Technical Advisory Service to all their customers. This computer aided service is designed to give fast, accurate answers and is available 5 days a week from 8.30 am to 5.00 pm.

- General application advice.
- Fixing advice.
- U–value calculations.
- Assistance with Building Control approval.
- Product advice.
- Best practice.
- Condensation risk analysis.
- Equivalent specifications.

Please contact our Technical Services Department on the *TECHLINE* numbers below:

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SUSTAINABILITY

It is widely recognised that there are four main global environmental sustainability issues: global warming, non–renewable resource depletion, toxic pollution and ozone depletion, and that these global issues far outweigh any local sustainability issues in their need for immediate attention and potential impact from inaction.

Recent studies have shown that the first three issues are essentially one. The extraction and consumption (burning) of fossil fuels is by far the most significant contributor to global warming, non–renewable resource depletion and toxic pollution.

Therefore, saving energy by specifying the lowest U–value possible and using zero ODP insulation materials are the best actions to take in considering sustainability in the insulation requirements of a building. A ground breaking study "Insulation for Sustainability" has been published by BING on this and related issues. This report, written by XCO2 connisbee is freely available from Kingspan Insulation, see rear cover.

The *Kingspan* **Therma** zero ODP range of products is manufactured without the use of CFCs / HCFCs and has zero Ozone Depletion Potential (ODP). The *Kingspan's* **Kool**therm® K–range of products is also available CFC / HCFC–free with zero Ozone Depletion Potential (ODP) subject to enquiry.

zero O.D.P

In the past, erroneously, the relative sustainability of insulation materials has been compared on the basis on embodied energy. It is now known that the embodied energy of insulation materials is insignificant compared with the energy saved by insulation over the lifetime of a building in which it is used and so is of limited importance. However, it is a matter of social responsibility to state the environmental impact in the manufacture of a product, and a full Life Cycle Analysis (LCA) rather than embodied energy is recognised as the preferred tool to achieve this.

The first of Kingspan's ongoing programme of LCA's, independently certified by the BRE, has been made for *Kingspan* **Therma** zero ODP and a copy is available from Kingspan Insulation, see rear cover. Kingspan Insulation Limited is the first insulation manufacturer to publish openly such information.

BRE Certification Limited

BUILDING REGULATIONS/STANDARDS FOR THE CONSERVATION OF FUEL AND POWER

The requirements for thermal insulation (Conservation of fuel and power) in buildings are detailed in the following Regulations / Standards. The aim of these Regulations is to further promote the energy efficiency of buildings.

England & Wales
The Building Regulations 2001 (England and Wales) Approved Documents L1 & L2 (Conservation of fuel and power). The latest revision to these Regulations came into effect April 1, 2002.

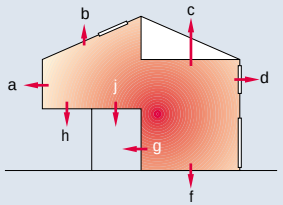
Scotland
The Building Standards (Scotland) Regulations 1990 Technical Standards Part J (Conservation of fuel and power). The latest revision to these Standards came into effect March 4, 2002.

KEY POINTS

U–values have to be calculated using the new Combined Method. All the U–values in this booklet have been calculated using the Combined Method which has been adopted to bring National Standards in line with the European Standard calculation method BS EN ISO 6946: 1997 (Building components and building elements. Thermal resistance and thermal transmittance calculation method) for walls and roofs and BS EN ISO 13370: 1998 (Thermal performance of buildings. Heat transfer via the ground. Calculation method) for floors.

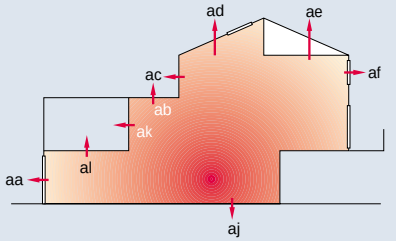
EASY GUIDE TO APPROVED DOCUMENTS L1 & L2 (2001)/ TECHNICAL STANDARDS PART J (2001) BASED ON THE ELEMENTAL METHOD OF COMPLIANCE

Dwellings



	England / Wales	Scotland
a	0.35	0.30 or 0.27***
b	0.20*	0.20 or 0.18***
c	0.16	0.16
d	2.20 / 2.00**	2.20 / 2.00 or 2.00 / 1.80***
f	0.25	0.25 or 0.22***
g	0.35	0.30 or 0.27***
h	0.25	0.25 or 0.22***
j	0.25	0.25 or 0.22***

Buildings other than dwellings



	England / Wales	Scotland
aa	0.70	0.70
ab	0.25	0.25
ac	0.35	0.30
ad	0.20	0.20
ae	0.16	0.16
af	2.20 / 2.00**	2.20 / 2.00**
aj	0.25	0.25
ak	0.35	0.30
al	0.25	0.25

* A U–value of 0.30 W / m².K is allowable for material alterations (e.g. loft conversions).
** Depending on type of frame.
*** Dependent on SEDBUK rating of heating system.

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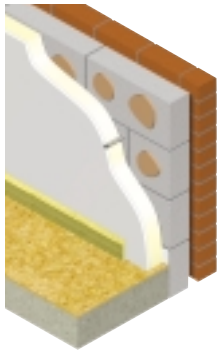
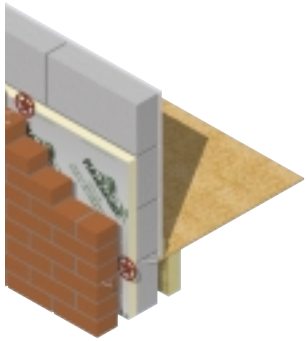


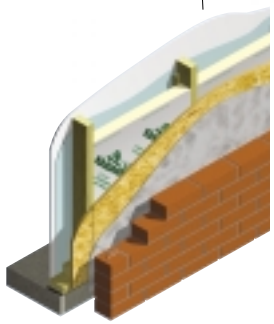
Kingspan **Therma**wall TW52 zero ODP
Insulation / plasterboard composite wall lining for use in internal drylining applications.

Kingspan **Therma**wall TW56 zero ODP
can also be used fixed to timber framing / battens.



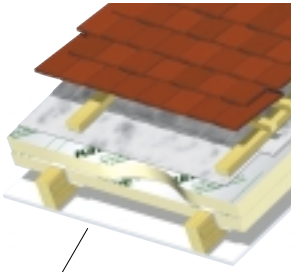
Kingspan **Therma**wall TW50 zero ODP
High performance CFC / HCFC–free rigid urethane partial fill cavity wall insulation for use in traditional cavity wall insulation applications.

Kingspan **Kool**therm® K8 Cavity Board
Premium performance CFC–free rigid phenolic partial fill cavity wall insulation for use in traditional cavity wall insulation applications.



Kingspan **Therma**wall TW55 zero ODP
High performance CFC / HCFC–free rigid urethane insulation for use in timber frame wall constructions.

Kingspan **Kool**therm® K12 Timber Framing Board
Premium performance CFC–free rigid phenolic insulation for use in timber frame wall constructions.

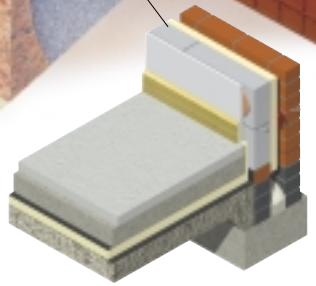


Kingspan **Therma**pitch TP10 zero ODP
High performance CFC / HCFC–free rigid urethane for installation between and / or over the rafters in pitched roof construction.

Kingspan **Kool**therm® K7 Pitched Roof
Premium performance CFC–free rigid phenolic insulation for installation between and / or over the rafters in pitched roof construction.

Kingspan **Therma**pitch TP10 zero ODP and *Kingspan* **Kool**therm® K7 Pitched Roof Board can be used between rafters in conjunction with *Kingspan* **Therma**wall TW56 zero ODP under rafters.

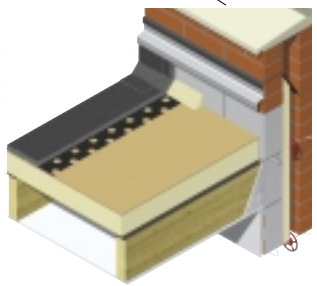
Kingspan **nilvent**™ breathable membrane is completely waterproof and airtight with excellent water vapour permeability.



Kingspan **Therma**floor TF70 zero ODP
High performance CFC / HCFC–free rigid urethane insulation for use in solid and suspended floor construction.

Kingspan **Therma**floor TF73 zero ODP
High performance CFC / HCFC–free rigid extruded polystyrene / chipboard composite for solid floating ground floors and suspended timber floors.

Kingspan **Kool**therm® K3 Floorboard
Premium performance CFC–free rigid phenolic insulation for use in solid and suspended floor construction.



Kingspan **Therma**roof TR31 zero ODP
Insulation / exterior grade plywood composite roof decking for flat roofing applications.

A PRODUCT FOR EVERY APPLICATION

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The Problem

Air Movement and Mineral Fibre Loft Insulation

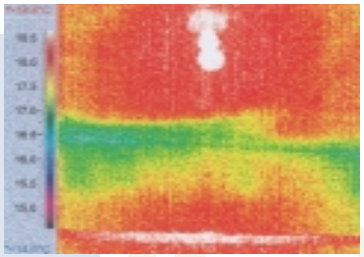
Mineral wool's layered, fibrous construction can allow an unhindered path for air intrusion at all levels. This means that even the minimum air movement in roof areas required by Building Regulations / Standards can dramatically reduce thermal efficiency.

- **Air movement over mineral fibre** as little as 1m/s can lead to increases in heat loss of up to **100%**.
- **Air movement through mineral fibre** can result in increases heat loss of up to **500%**.

Get the facts!

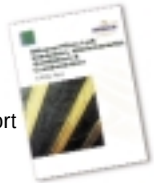
The Kingspan Insulation report 'Mineral Fibre Performance' is available on request.

Air movement can result in increased heating cost and the risk of condensation and mould growth on ceilings.



This image shows a ceiling which has sufficient mineral fibre loft insulation in the centre portion but lacks adequate cover at the boundary. The light blue patches indicate the areas affected by cold infiltrating air.

Get the facts!



The Kingspan Insulation report 'Mineral Fibre Loft Insulation, Workmanship, Ventilation & Condensation' is available on request.

Ventilation paths can be vulnerable to blockage due to overfilling of the eaves with mineral fibre. This can lead directly to creation of condensation and onset of mould growth.

The potential for degradation of roof timbers is extremely high.

An example of overfilling of the eaves with mineral fibre blocking the ventilation paths.

An example of condensation and mould growth.

PITCHED ROOFS – ISSUES TO CONSIDER

The Problem

Workmanship and Missing Mineral Fibre Loft Insulation

Poor installation of loft insulation could be regarded as causing:

- **57%** increase in heat loss from the Britain's roofs; which equates to the unnecessary release of
- **2,560 million kg** of CO_2 equivalent emissions per year;
- **8,937 GWh** (million kWh) of wasted heat loss per annum nationally (the equivalent of nearly three power stations!); and
- **£199 m** per year extra heating costs.

This image shows the additional layer of mineral fibre missing over a substantial portion of the attic.

Get the facts!

The Kingspan Insulation report 'Mineral Fibre Loft Insulation, Compaction, Settlement, Missing Mineral Fibre and Heat Loss' is available on request.

The Solution

Kingspan Pitched Roof Insulation

Kingspan pitched roof insulation boards Thermapitch TP10 zero ODP and Kooltherm K7 Pitched Roof Board:

- can help you to achieve your required U–value with minimal thickness (up to half the thickness of mineral fibre);
- can help eliminate condensation risk;
- can eliminate the need for ventilation;
- are unaffected by air movement; and
- provide the best thermal performance of all commonly available insulants.

Get the facts!

The Kingspan Insulation report 'Pitched Roofing and the use of Rafter Level Insulation' is available on request.

Valuable additional living space (on average 15% or more) can easily be created with pitched roof insulation.

An empty attic has as many possibilities as your imagination can create. Warmth, light and air can breathe new life into a dead space.

For Technical Advice call *TECHLINE* on **0870 850 8555**

PITCHED ROOF INSULATION – DESIGN CONSIDERATION

UNVENTILATED AND VENTILATED CONSTRUCTIONS

Unventilated roofs are characterised by the use of a breathable sarking membrane and have no deliberately introduced ventilation below the membrane.

Ventilated roofs use traditional sarking felt and the Building Regulations / Standards require a 50 mm ventilation air gap between the insulation and the sarking felt, so as to avoid condensation.

There is generally a choice between either approach, except in the case of refurbishment / loft conversions. In these instances, unless the whole roof is to be stripped, it is impossible to use an unventilated roof, because the necessary breathable sarking membrane cannot be installed.

UNVENTILATED ROOF – VENTILATION CONSIDERATIONS

Unventilated roof approaches create a warm pitched roof space, which does not require cross ventilation. Recent research suggests that sealing an unventilated roof, yields a more energy efficient roof as the impacts of ventilation and incidental infiltrating cold air are negated. Therefore, if creating an unventilated roof, it is preferable to fully seal all joints in the breathable sarking membrane with tape. Any water vapour reaching the breathable sarking membrane escapes without condensing. There is then adequate air movement beneath the tiles or slates to dissipate this water vapour to the outside atmosphere.

UNVENTILATED ROOF – POSITION OF BREATHABLE SARKING MEMBRANE

The taping of breathable sarking membrane joints is considerably easier to achieve if the membrane is installed on a continuous surface.

In these cases, the breathable sarking membrane is installed under counter battens, which provide a channel for water drainage, or in situations with a sarking board under a slated roof, directly under the slates (as neither tile battens nor counter battens are used).

Generally, when a continuous surface is available, it will prove easier to install the breathable sarking membrane in horizontal runs, whilst still enabling easy sealing between runs.

In some cases with a continuous surface, (when counter battens, tiling battens and tiles replace slates nailed directly into the sarking board) the breathable sarking membrane can be installed over the counter battens. This yields a marginally better design U–value but it may be more difficult to seal the breathable sarking membrane joints effectively, as the membrane must be draped over the counter battens in horizontal runs so as to provide a water drainage channel. The air movement allowed by the unsealed membrane may negate the benefit of putting the membrane above the counter battens.

In situations where there is no continuous surface, the breathable sarking membrane can be draped over the rafters in horizontal runs to provide a channel for water drainage. In this situation, sealing of the breathable sarking membrane joints will prove difficult. It is preferable, though more difficult, to install the breathable sarking membrane in vertical runs with junctions between runs sealed by counter battens placed over the laps in rafter positions. The breathable sarking membrane is installed taut as the counter batten provides a space for water drainage.

POSITION OF INSULATION

Dependent on the designed insulation value of the construction and the available rafter depth and headroom, different approaches can be taken. The choice of approach may be influenced concerns over the depth of bargeboards, pattern staining and available headroom.

Approaches with a layer of insulation over rafter are likely to yield very large fascia boards.

Pattern staining in the position of rafters can be caused if rafters are left as uninterrupted cold bridges. For this reason, solutions relying solely on insulation between rafters should be avoided. All solutions shown in this guide minimise the risk of pattern staining.

Because of the above two issues, between and under rafter insulation approaches are probably more desirable.

Headroom reduction can be minimised by placing most of the required insulation between rafters and a minimum amount below the rafters.

RECOMMENDED SOLUTIONS FOR NEW BUILD / RE–ROOFING

The ideal solution for new build or re–roofing projects is, therefore, between and under rafter insulation with a continuous surface for the breathable sarking membrane so that it can be installed in horizontal runs under counter battens with laps sealed (pages 12–13 & 15 [figure 2] and 22–23).

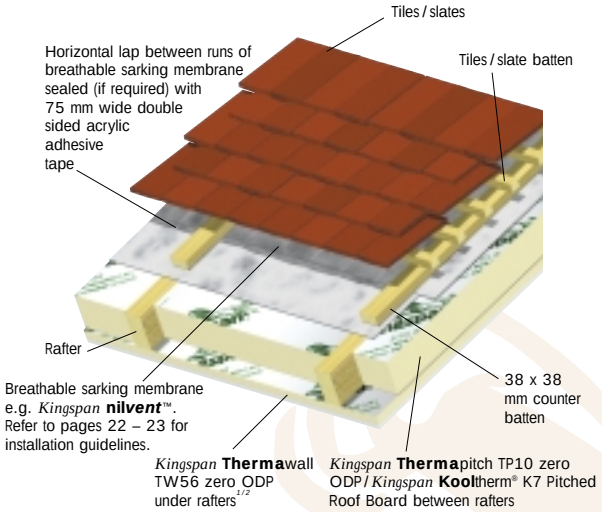
The next best solution is, therefore, between and under rafter insulation with no continuous surface for the breathable sarking membrane, and the breathable sarking membrane installed in vertical runs with laps sealed under counter battens (pages 14 [figure 1] and 24–25).

NEW BUILD – UNVENTILATED – FULL FILL BETWEEN AND UNDER RAFTER INSULATION

INTRODUCTION

This method of insulating is also suitable for existing buildings where the tiles / slates need replacing. For this application we recommend the use of either *Kingspan* **Therma**pitch TP10 zero ODP (high performance CFC / HCFC–free rigid urethane insulation) or *Kingspan* **Kool**therm® K7 Pitched Roof Board (premium performance CFC–free rigid phenolic insulation) with *Kingspan* **Therma**wall TW56 zero ODP beneath the rafters (see page 36 for details of *Kingspan* **Therma**wall TW56 zero ODP. Refer to pages 8 to 11 for Design Considerations and Issues to Consider.

Figure 1



PRODUCT DATA

	Kingspan **Therma**pitch TP10 zero ODP	*Kingspan* **Kool**therm® K7 Pitched Roof Board
Board Size	2.4 x 1.2	2.4 x 1.2
Insulant Thickness (mm)	50, 55, 60, 65, 70, 75, 80, 90, 95, 100, 105, 110, 120, 125, 130, 140, 150	50, 55, 60, 70, 75, 80, 90, 100, 110, 120, 125, 130, 140, 150
Facings	Composite foil	Composite foil
Core	CFC / HCFC–free rigid urethane	CFC–free rigid phenolic

ACHIEVING U–VALUES[3]

	U–value (W / m².K)	
Thickness (mm)	*Kingspan* **Therma**pitch TP10 zero ODP	*Kingspan* **Kool**therm® K7 Pitched Roof Board
75	0.25	0.24
100	0.21	0.20
125	0.18	0.17
150	0.15	0.15
Thermal Conductivity (λ–value) – TP10[4]	0.023 W / m.K	
Thermal Conductivity (λ–value) – K7[4]	≥ 45 mm 0.022 W / m.K	

1 The requirement for a vapour control layer and / or under tile ventilation should be assessed to BS 5250: 1989 (1995). Vapour check plasterboard or a separate vapour control layer can be used as preferred.
2 Kingspan Thermawall TW56 zero ODP contains an integral vapour control layer.
3 Calculations based on rafters being underlined with Kingspan Thermawall TW56 zero ODP comprising 12.5 mm plasterboard and 25 mm insulation of thermal conductivity 0.022 W / m.K. Thickness shown is between rafter component. All examples are based on 50 mm wide rafters at 600 mm centres. For the purposes of these calculations the standard of workmanship has been assumed good and the correction factor for air–gaps ignored.
4 The λ–value quoted is in accordance with the Harmonised European Standard BS EN 13165 (urethane) and BS EN 13166 (phenolic) using so called 90 / 90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.
5 If tiles are to be used then this normally necessitates the use of counter battens and tiling battens over the breathable sarking membrane to allow for water drainage and attachment of the tiles.

FIXING DETAILS

Between Rafter Insulation

- Boards cut individually to fit the rafter spacings and simply install the correct thickness of insulation in such a manner that it is flush with the bottom of the rafters.
- Measure the space between the rafters before cutting the boards as spacings vary. In all cases ensure that insulation boards between rafters are fitted tightly. Fill any gaps with expanding urethane sealant.

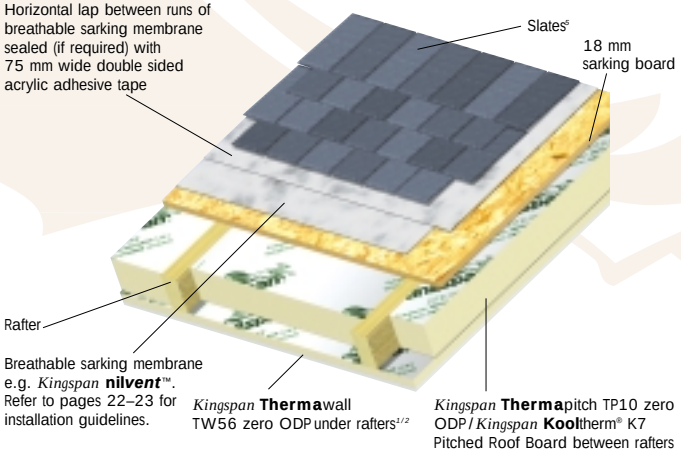
Under Rafter Insulation

- Fix the *Kingspan* **Therma**wall TW56 zero ODP at right angles to the underside of the rafters. Boards should be fixed with galvanised clout nails, long enough to allow 25 mm penetration of timber. These should be placed at 150 mm centres and not less than 10 mm from the edges of the board along all supporting edges.
- All edges of *Kingspan* **Therma**wall TW56 zero ODP must be supported. This will necessitate the use of noggings placed between rafters to correspond with the long edges of the boards.

General

- Ensure accurate trimming to achieve close butting joints and continuity of insulation.
- Ensure the continuity of the insulation at the ridge.
- To prevent a cold bridge, tightly pack flexible insulation material between the rafters and the cavity closer.
- Boards should be cut using a sharp knife or a fine toothed saw.

Figure 2 (Alternative – Scottish Style Detail)



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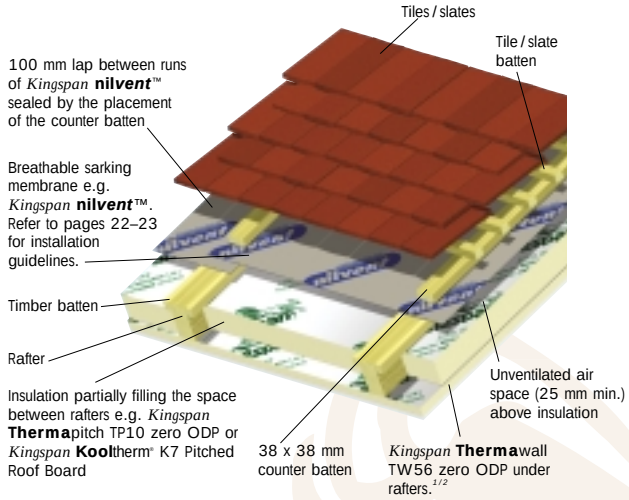
NEW BUILD – UNVENTILATED – PARTIALLY FILLED BETWEEN AND UNDER RAFTER INSULATION

INTRODUCTION

This method of insulating is also suitable for existing buildings where the tiles / slates need replacing. For this application we recommend the use of either *Kingspan* **Therma**pitch TP10 zero ODP (high performance CFC / HCFC–free rigid urethane insulation) or *Kingspan* **Kool**therm® K7 Pitched Roof Board (premium performance CFC–free rigid phenolic insulation) with *Kingspan* **Therma**wall TW56 zero ODP beneath the rafters.
(see page 36 for details of *Kingspan* **Therma**wall TW56 zero ODP)

Figure 1



PRODUCT DATA

	Kingspan **Therma**pitch TP10 zero ODP	*Kingspan* **Kool**therm® K7 Pitched Roof Board
Board Size	2.4 x 1.2	2.4 x 1.2
Insulant Thickness (mm)	50, 55, 60, 65, 70, 75, 80, 90, 95, 100, 105, 110, 120, 125, 130, 140, 150	50, 55, 60, 70, 75, 80, 90, 100, 110, 120, 125, 130, 140, 150
Facings	Composite foil	Composite foil
Core	CFC / HCFC–free rigid urethane	CFC–free rigid phenolic

ACHIEVING U–VALUES[3]

U–value (W / m².K)	*Kingspan* **Therma**pitch TP10 zero ODP (mm)	*Kingspan* **Kool**therm® K7 Pitched Roof Board (mm)
0.20	95	90
0.18	110	110
Thermal Conductivity (λ–value) – TP10[4]	0.023 W / m.K	
Thermal Conductivity (λ–value) – K7[4]	≥ 45 mm 0.022 W / m.K	

1 The requirement for a vapour control layer and / or under tile ventilation should be assessed to BS 5250: 1989 (1995). Vapour check plasterboard or a separate vapour control layer can be used as preferred.
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4 The λ–value quoted is in accordance with the Harmonised European Standard BS EN 13165 (urethane) and BS EN 13166 (phenolic) using so called 90 / 90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.

FIXING DETAILS

Between Rafter Insulation

- Boards cut individually to fit the rafter spacings and simply install the correct thickness of insulation in such a manner that it is 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.
- Measure the space between the rafters before cutting the boards as spacings vary. In all cases insure that insulation boards between rafters are fitted tightly. Fill any gaps with expanding urethane sealant.

Under Rafter Insulation

- Fix the *Kingspan* **Therma**wall TW56 zero ODP at right angles to the underside of the rafters. Boards should be fixed with galvanised clout nails, long enough to allow 25 mm penetration of the timber. These should be placed at 150 mm centres and not less than 10 mm from the edges of the board along all supporting edges.
- All edges of *Kingspan* **Therma**wall TW56 zero ODP must be supported. This will necessitate the use of noggings placed between rafters to correspond with the long edges of the boards.

General

- Ensure accurate trimming to achieve close butting joints and continuity of insulation.
- Ensure the continuity of the insulation at the ridge.
- To prevent a cold bridge, tightly pack flexible insulation material between the rafters and the cavity closer.
- Boards should be cut using a sharp knife or fine toothed saw.

Figure 2 (Alternative – Scottish Style Detail)

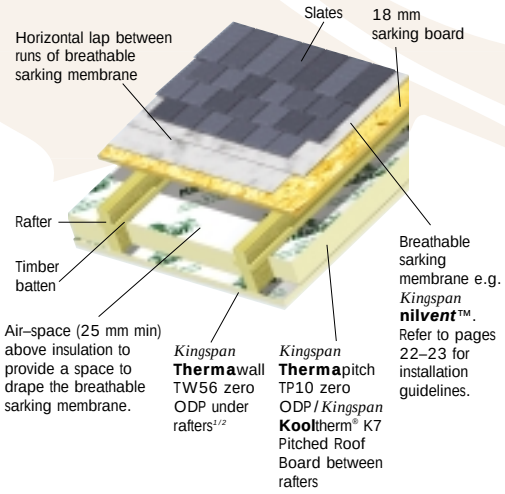
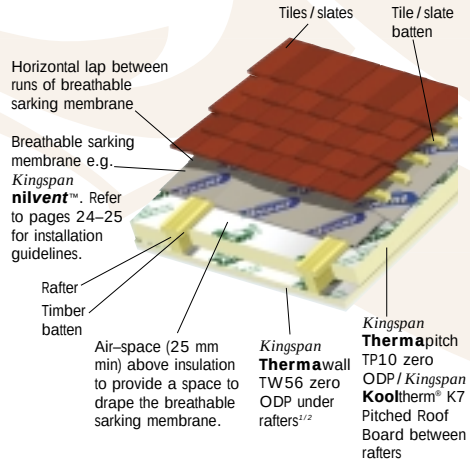


Figure 3 (Alternative – Breathable Membrane Installed Horizontally)

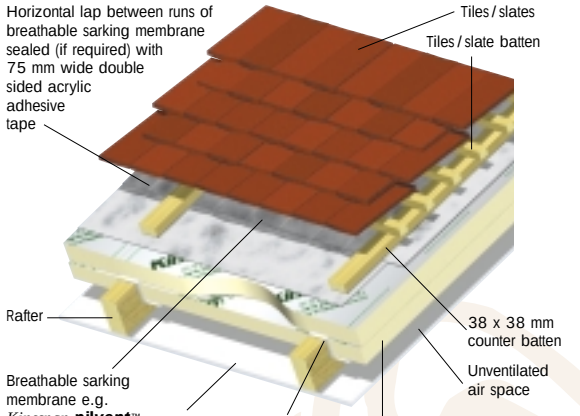


NEW BUILD – UNVENTILATED – BETWEEN AND OVER RAFTER SARKING INSULATION

INTRODUCTION

This method of insulating is also suitable for existing buildings where the tiles / slates need replacing. For this application we recommend the use of either *Kingspan* **Therma**pitch TP10 zero ODP (high performance CFC / HCFC–free rigid urethane insulation) or *Kingspan* **Kool**therm® K7 Pitched Roof Board (premium performance CFC–free rigid phenolic insulation).

Figure 1



PRODUCT DATA

	Kingspan **Therma**pitch TP10 zero ODP	*Kingspan* **Kool**therm® K7 Pitched Roof Board
Board Size	2.4 x 1.2	2.4 x 1.2
Insulant Thickness (mm)	50, 55, 60, 65, 70, 75, 80, 90, 95, 100, 105, 110, 120, 125, 130, 140, 150	50, 55, 60, 70, 75, 80, 90, 100, 110, 120, 125, 130, 140, 150
Facings	Composite foil	Composite foil
Core	CFC / HCFC–free rigid urethane	CFC–free rigid phenolic

ACHIEVING U–VALUES[2]

U–value (W / m².K)	*Kingspan* **Therma**pitch TP10 zero ODP (mm)	*Kingspan* **Kool**therm® K7 Pitched Roof Board (mm)
0.20	50+60[3]	50+55[3]
0.18	65+65[3]	60+60[3]
Thermal Conductivity (λ–value) – TP10[4]	0.023 W / m.K	
Thermal Conductivity (λ–value) – K7[4]	≥ 45 mm 0.022 W / m.K	

1 The requirement for a vapour control layer and / or under tile ventilation should be assessed to BS 5250: 1989 (1995). Vapour check plasterboard or a separate vapour control layer can be used as preferred.

2 For the purposes of these calculations all examples are based on 50 mm wide rafters at 600 mm centres. For the purposes of these calculations the standard of workmanship has been assumed good and therefore the correction factor for air–gaps ignored. Calculations take account for the effect of using a stainless steel fixing at 6 mm diameter, giving a cross–sectional area of 7.45 mm².

3 The first thickness refers to thickness between rafters, second thickness over rafters. The thermal resistance of the over rafter layer must be ≥ that of between rafter layer so as to avoid condensation.

4 The λ–value quoted is in accordance with the Harmonised European Standard BS EN 13165 (urethane) and BS EN 13166 (phenolic) using so called 90 / 90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.

FIXING DETAILS

Over Rafter Insulation

- A preservative treated stop rail, the thickness of the insulation should be fixed at eaves level.
- Lay boards either following the rafters or across rafters. The boards should be tightly butted with staggered joints to improve racking performance.
- All joints between the boards running from eaves to ridge must occur over the rafters. There is no necessity to tape board joints.
- Boards can be held in position with counter battens (38 x 38 mm). Secured with Helifix In–Skew, Target Skewfast, Wallfast Timfix or similar fixings in accordance with manufacturers guidelines;

Helifix Limited	+44 (0) 20 8735 5222
Target Fixings Limited	+44 (0) 1344 777 189
Wallfast Limited	+44 (0) 23 9265 3330

- Alternatively a sarking board can be overlaid and fixed as above. (See figure 2)

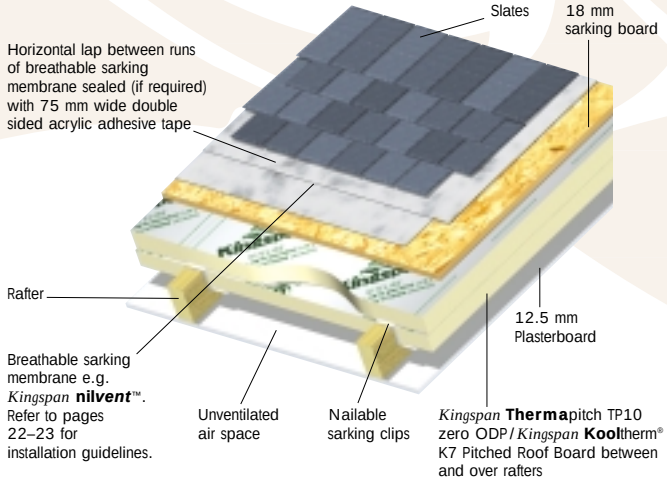
Between rafter insulation fitting flush to top of rafter.

- Use nailable sarking clips driven into the upper surface of each rafter at 1 metre centres up the roof slope. The insulation board is then suitably trimmed to size and placed between the rafters using the clips for support.
- In all cases insure that insulation boards are fitted tightly between rafters. Fill any gaps with expanding urethane sealant.

General

- To prevent a cold bridge, tightly pack flexible insulation material between the rafters and the cavity closer.
- Boards should be cut using a sharp knife or a fine toothed saw.

Figure 2 (Alternative – Scottish Style Detail)

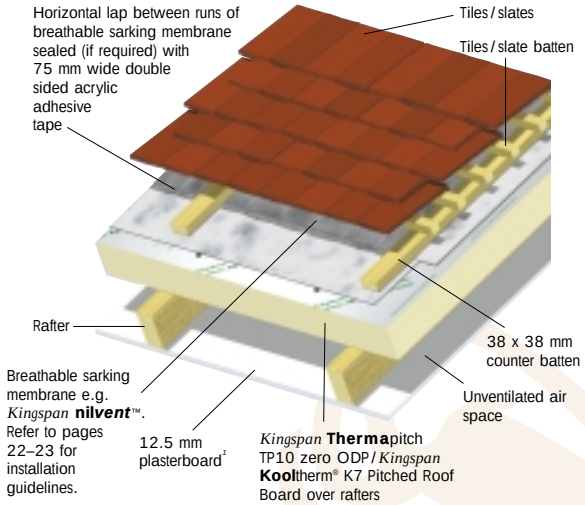


NEW BUILD – UNVENTILATED – OVER RAFTER INSULATION

INTRODUCTION

This method of insulating is also suitable for existing buildings where the tiles / slates need replacing. For this application we recommend the use of either *Kingspan* **Therma**pitch TP10 zero ODP (high performance CFC / HCFC–free rigid urethane insulation) or *Kingspan* **Kool**therm® K7 Pitched Roof Board (premium performance CFC–free rigid phenolic insulation).

Figure 1



PRODUCT DATA

	Kingspan **Therma**pitch TP10 zero ODP	*Kingspan* **Kool**therm® K7 Pitched Roof Board
Board Size	2.4 x 1.2	2.4 x 1.2
Insulant Thickness (mm)	50, 55, 60, 65, 70, 75, 80, 90, 95, 100, 105, 110, 120, 125, 130, 140, 150	50, 55, 60, 70, 75, 80, 90, 100, 110, 120, 125, 130, 140, 150
Facings	Composite foil	Composite foil
Core	CFC / HCFC–free rigid urethane	CFC–free rigid phenolic

ACHIEVING U–VALUES[2]

U–value (W / m².K)	*Kingspan* **Therma**pitch TP10 zero ODP (mm)	*Kingspan* **Kool**therm® K7 Pitched Roof Board (mm)
0.20	100[3]	100[3]
0.18	120[3]	110[3]
Thermal Conductivity (λ–value) – TP10[4]	0.023 W / m.K	
Thermal Conductivity (λ–value) – K7[4]	≥ 45 mm 0.022 W / m.K	

1 The requirement for a vapour control layer and / or under tile ventilation should be assessed to BS 5250: 1989 (1995). Vapour check plasterboard or a separate vapour control layer can be used as preferred.
2 For the purposes of these calculations the standards of workmanship has been assumed good and therefore the correction factor for air–gaps has been ignored. Calculations take account for the effect of using stainless steel fixing at 6 mm diameter, giving a cross–sectional area of 7.45 mm².
3 Whilst in theory, it is possible to install insulation over rafter to meet these U–values we would recommend that over and between rafters would provide a more practical solution (see pages 16 and 17) should an over rafter layer be required.
4 The λ–value quoted is in accordance with the Harmonised European Standard BS EN 13165 (urethane) and BS EN 13166 (phenolic) using so called 90 / 90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.

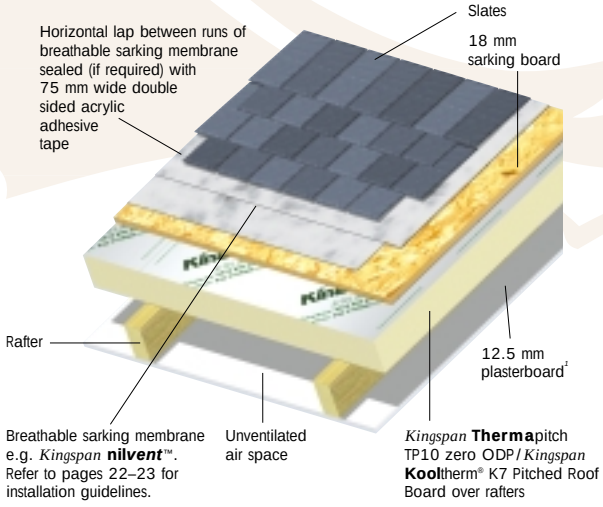
FIXING DETAILS

- A preservative treated stop rail, the thickness of the insulation should be fixed at eaves level.
- Lay boards either following the rafters or across rafters. The boards should be tightly butted with staggered joints to improve racking performance.
- All joints between the boards running from eaves to ridge must occur over the rafters. There is no necessity to tape board joints.
- Boards can be held in position with counter battens (38 x 38 mm). Secured with Helifix In–Skew, Target Skewfast, Wallfast Timfix or similar fixings in accordance with manufacturers guidelines;

  Helifix Limited +44 (0) 20 8735 5222
  Target Fixings Limited +44 (0) 1344 777 189
  Wallfast Limited +44 (0) 23 9265 3330

- Alternatively a sarking board can be overlaid and fixed as above. (See figure 2)
- If exposed rafters are required inside the building, plasterboard can be laid over the rafters before the insulation is fixed. Alternatively *Kingspan* **Therma**wall TW56 zero ODP could be used, allowing the thickness of over–rafter insulation to be reduced. The length of the fixings should be increased accordingly.
- Where a greater thickness of insulation is required, or to reduce the roof build up height a layer of insulation can be used between the rafters, see pages 16–17.
- To prevent a cold bridge, tightly pack flexible insulation material between the rafters and the cavity closer.
- Boards should be cut using a sharp knife or a fine toothed saw.

Figure 2 (Alternative – Scottish Style Detail)

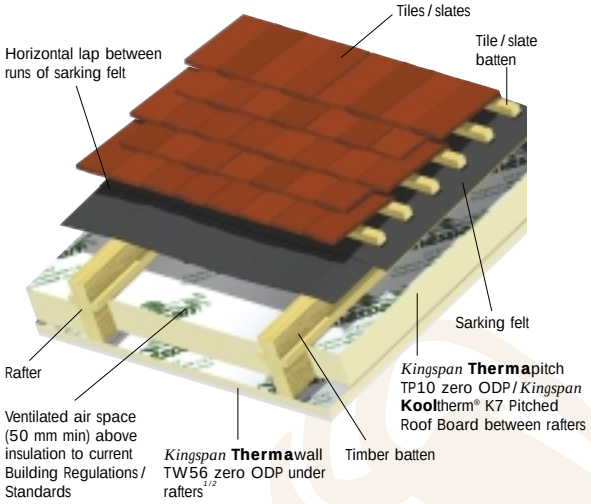


REFURBISHMENT – VENTILATED – BETWEEN AND UNDER RAFTER INSULATION

INTRODUCTION

For this application we recommend the use of either *Kingspan* **Therma**pitch TP10 zero ODP (high performance CFC / HCFC–free rigid urethane insulation) or *Kingspan* **Kool**therm® K7 Pitched Roof Board (premium performance CFC–free rigid phenolic insulation) with *Kingspan* **Therma**wall TW56 zero ODP beneath the rafters. (see page 36 for details of *Kingspan* **Therma**wall TW56 zero ODP)

Figure 1



PRODUCT DATA

	Kingspan **Therma**pitch TP10 zero ODP	*Kingspan* **Kool**therm® K7 Pitched Roof Board
Board Size	2.4 x 1.2	2.4 x 1.2
Insulant Thickness (mm)	50, 55, 60, 65, 70, 75, 80, 90, 95, 100, 105, 110, 120, 125, 130, 140, 150	50, 55, 60, 70, 75, 80, 90, 100, 110, 120, 125, 130, 140, 150
Facings	Composite foil	Composite foil
Core	CFC / HCFC–free rigid urethane	CFC–free rigid phenolic

ACHIEVING U–VALUES[3]

U–value (W / m².K)	*Kingspan* **Therma**pitch TP10 zero ODP (mm)		*Kingspan* **Kool**therm® K7 Pitched Roof Board (mm)	
	600 ctrs	400 ctrs	600 ctrs	400 ctrs
0.30	55	60	55	60
0.20	105	115	100	110
0.18	120	130	120	130

Thermal Conductivity (λ–value) – TP10[4] 0.023 W / m.K
Thermal Conductivity (λ–value) – K7[4] ≥ 45 mm 0.022 W / m.K

1 The requirement for a vapour control layer and / or under tile ventilation should be assessed to BS 5250: 1989 (1995). Vapour check plasterboard or a separate vapour control layer can be used as preferred.
2 Kingspan Thermawall TW56 zero ODP contains an integral vapour control layer.
3 Calculation based on rafters being underlined with Kingspan Thermawall TW56 zero ODP comprising 12.5 mm plasterboard and 25 mm insulation of thermal conductivity 0.022 W / m.K. Thickness shown in the table above is only the between rafter component. Calculations are based on 50 mm wide rafters, assuming a 50 mm ventilated airspace between the rafters above the insulation layer installed between them.
4 The λ–value quoted is in accordance with the Harmonised European Standard BS EN 13165 (urethane) and BS EN 13166 (phenolic) using so called 90 / 90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.
5 If tiles are to be used then this normally necessitates the use of counter battens and tiling battens over the breathable sarking membrane to allow for water drainage and attachment of the tiles.

FIXING DETAILS

Between Rafter Insulation

- To maintain a 50 mm ventilated void above the insulation and to ensure the boards are flush with the bottom of the rafters, side nail battens to the rafters in the appropriate position to provide a 'stop'.
- Boards cut individually to fit the rafter spacings and simply install the correct thickness of insulation in such a manner that it is flush with the bottom of the rafters but does not fill the rafter depth.
- Measure the space between the rafters before cutting the boards as spacings vary. In all cases insure that insulation boards between rafters are fitted tightly. Fill any gaps with expanding urethane sealant.

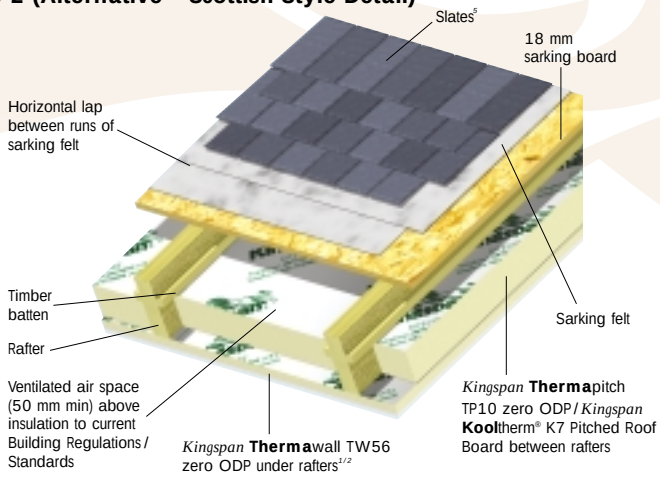
Under Rafter Insulation

- Fix the *Kingspan* **Therma**wall TW56 zero ODP at right angles to the underside of the rafters. Boards should be fixed with galvanised clout nails, long enough to allow 25 mm penetration of the timber. These should be placed at 150 mm centres and not less than 10 mm from the edges of the board along all supporting edges.
- All edges of *Kingspan* **Therma**wall TW56 zero ODP must be supported. This will necessitate the use of noggings placed between rafters to correspond with the long edges of the boards.

General

- Ensure accurate trimming to achieve close butting joints and continuity of insulation.
- Ensure the continuity of the insulation at the ridge.
- Ventilation should be provided in accordance with Approved Document F, F2 (Condensation in Roofs) or the Building Regulations or Technical Standard K (Ventilation of Buildings, Regulation 23) of the Building Standards (Scotland).
- To prevent a cold bridge, tightly pack flexible insulation material between the rafters and the cavity closer.
- Boards should be cut using a sharp knife or fine toothed saw.

Figure 2 (Alternative – Scottish Style Detail)

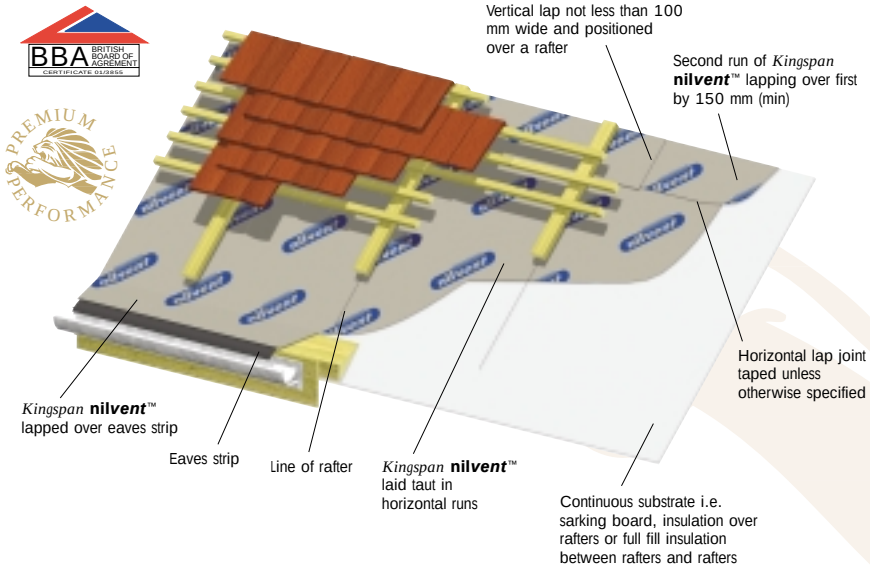


KINGSPAN NILVENT BREATHABLE MEMBRANE – HORIZONTAL INSTALLATION ON A CONTINUOUS SUBSTRATE

INTRODUCTION

Typical continuous substrates would be full fill between rafter insulation (see page 12) over rafter (see pages 16 and 18) and application where a sarking board has been used. *Kingspan* **nilvent**™ is either installed under counter battens (see figures 1and 2) which provide a channel for water drainage or in situations with a sarking board under a natural slate roof, directly under the slates (as neither slate battens or counter battens are used). This latter construction is more typically used in Scotland. (See figure 3)

Figure 1 (Eaves Detail)



PRODUCT DATA

Roll Length	50 m
Roll Width	1.5 m
Thickness	0.47 mm
Area per Roll	75 m²
Weight	0.15 kg / m²
Weight per Roll	11.25 kg
Water Vapour Resistance	0.11 MN.s / g
Liquid Water Penetration	>2 m
Air Permeability	100% airtight
Tensile Strength	400 N / 5 cm

FIXING DETAILS

- Fit an eaves strip of UV–resistant material to overhang the eaves / fascia by 50–60 mm.
- Start laying *Kingspan* **nilvent**™ at eaves in horizontal runs.
- Lap the *Kingspan* **nilvent**™ logo–up over the eaves strip (if required) with the bottom edge of the *Kingspan* **nilvent**™ in line with the top of the fascia.
- *Kingspan* **nilvent**™ should be laid taught.
- Temporarily tack in place with staples or clout nails and cut to length with a sharp bladed knife.
- The second run of *Kingspan* **nilvent**™ should lap over the first by 150 mm.
- The printed tramlines on the top surface of *Kingspan* **nilvent**™ indicate 150 mm.
- Use 75 mm wide double sided acrylic adhesive tape to seal horizontal laps.
- Vertical laps of *Kingspan* **nilvent**™ should be at least 100 mm and positioned to coincide with a rafter position, and be sealed by the fixings of the counter battens.
- In constructions with a sarking board under a slated roof with no counter battens or slate battens, the vertical laps are taped with 75 mm wide double sided acrylic adhesive tape and tacked in place with staples or clout nails.
- Continue installation up the roof in the same manner to the ridge.
- Lap over the ridge by not less than 150 mm each side (total overlap of 300 mm).

Figure 2 (Ridge Detail)

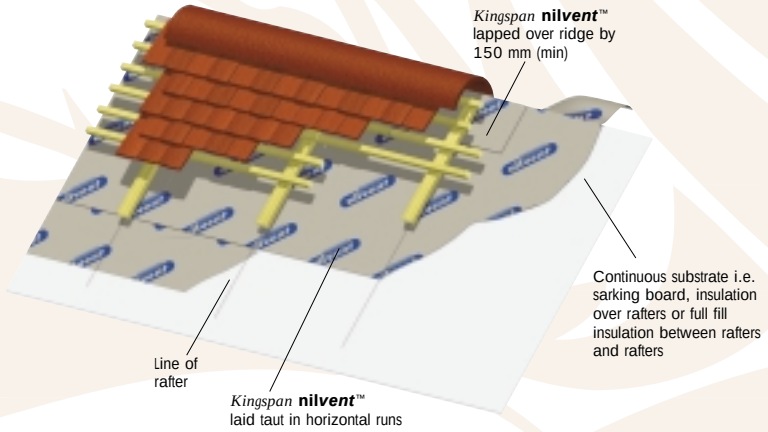
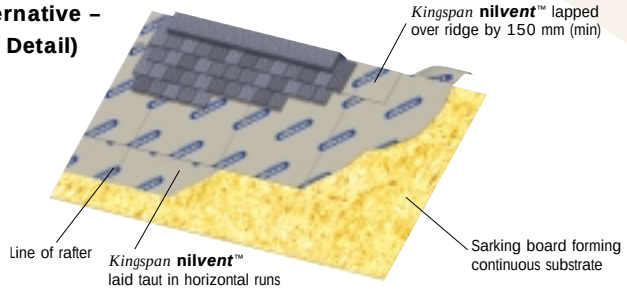


Figure 3 (Alternative – Scottish Style Detail)



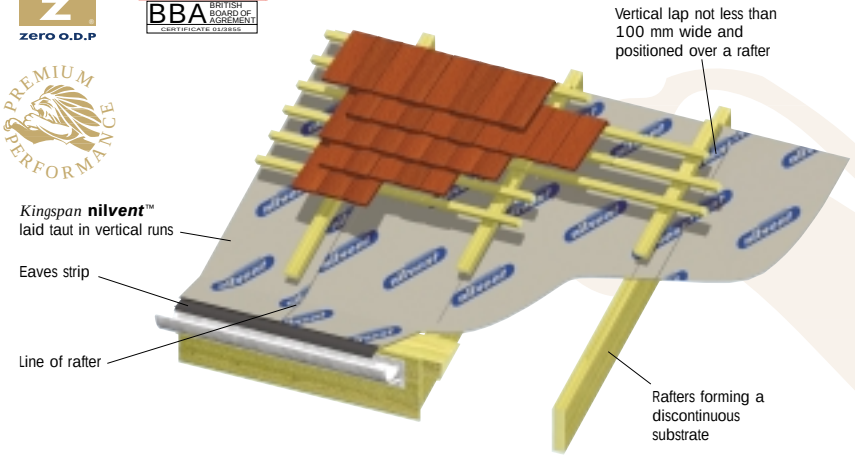
KINGSPAN NILVENT BREATHABLE MEMBRANE – VERTICAL INSTALLATION ON A DISCONTINUOUS SUBSTRATE

INTRODUCTION

Typical discontinuous substrates would be partial fill insulation between rafters. (See page 14).

In roofs with a discontinuous substrate and a horizontally installed breathable membrane (see figure 3), it is not at all practical to seal the laps between the runs of *Kingspan* **nilvent**™ and the roof should be considered as being unsealed. It would be preferable for *Kingspan* **nilvent**™ to be installed taught it is not at all practical to seal the laps between the run of *Kingspan* **nilvent**™ and the roof should be considered as being unsealed. *Kingspan* **nilvent**™ can be installed taught in vertical runs from eaves to eaves, in one length, under counter–battens. If used in this way there will be no laps along the length of a run and laps between runs can be formed over a rafter where the counter–battens can secure and make an airtight joint. This method of installation can be less practical than the more traditional horizontal application, but it will yield a more energy efficient roof.

Figure 1 (Eaves Detail)



PRODUCT DATA

Roll Length	50 m
Roll Width	1.5 m
Thickness	0.47 mm
Area per Roll	75 m²
Weight	0.15 kg / m²
Weight per Roll	11.25 kg
Water Vapour Resistance	0.11 MN.s / g
Liquid Water Penetration	>2 m
Air Permeability	100% airtight
Tensile Strength	400 N / 5 cm

FIXING DETAILS

- For ease of installation, thread a wood or metal bar through the core of the roll and set it on bearers on the scaffold platform.
- Fit an eaves strip of UV–resistant material to overhang the eaves / fascia by 50–60 mm.
- Lap the *Kingspan* **nilvent**™ logo–up over the eaves strip (if required) with the bottom edge of the *Kingspan* **nilvent**™ in line with the top of the fascia.
- *Kingspan* **nilvent**™ should be laid taught.
- Each run of *Kingspan* **nilvent**™ should be installed in a single piece from eaves to eaves.
- Temporarily tack in place with staples or clout nails and cut to length with a sharp blade.
- Move sideways and repeat the process.
- The second run of *Kingspan* **nilvent**™ should lap over the first by 100 mm with the joint positioned as to coincide with a rafter position.
- The printed tramlines on the top surface of *Kingspan* **nilvent**™ indicate 150 mm.
- Laps should be sealed by counter battens fixed at 300 mm.
- Continue installation across the roof in the same manner, then install slate / tile battens over the whole area installed.

Figure 2 (Ridge Detail)

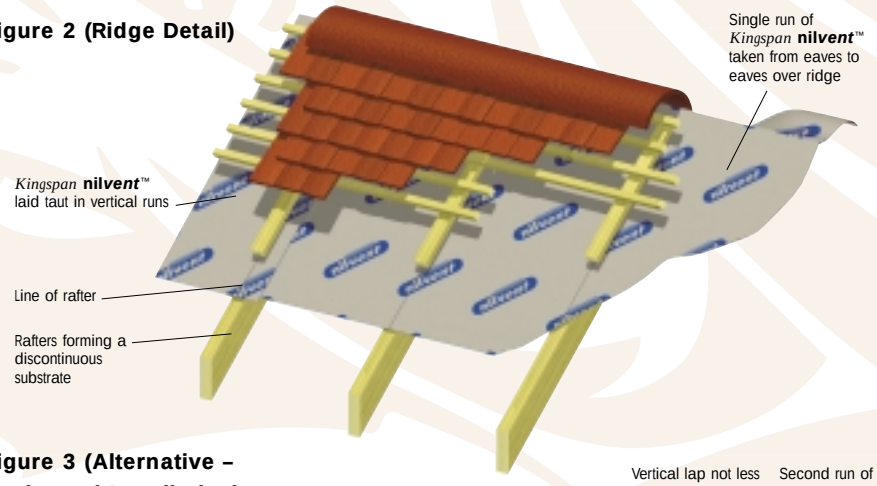
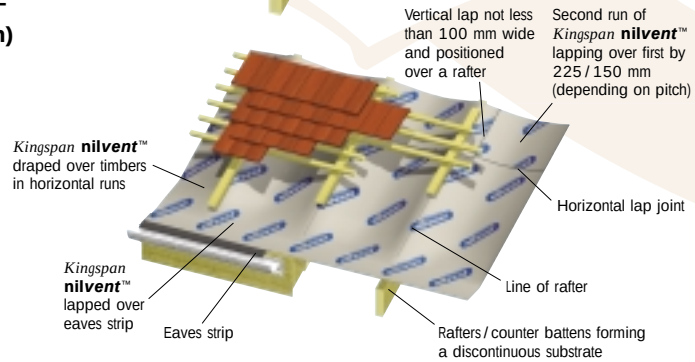


Figure 3 (Alternative – Horizontal Installation)



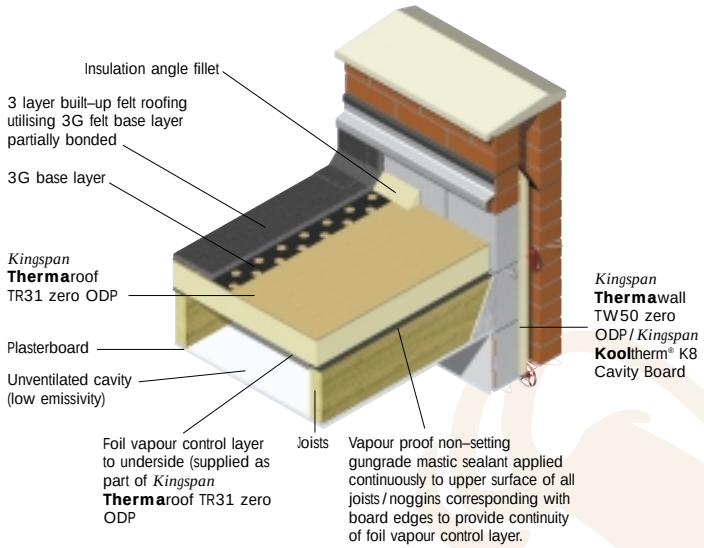
NB

For horizontal installation on a discontinuous substrate install the Kingspan **nilvent**™ *so that a valley is created between the rafters for rainwater drainage making sure that the horizontal overlap is 150 mm except for pitches of between 12.5 and 14.5 degrees where 225 mm is required.*

FLAT ROOF INSULATION – COMPOSITE ROOF DECK

INTRODUCTION

For insulating directly over timber joists we recommend the use of *Kingspan* **Therma**roof TR31 zero ODP. Incorporating a 6 mm WBP plywood upper surface and a foil underside, *Kingspan* **Therma**roof TR31 zero ODP combines decking, insulation and vapour control layer in a single product. Suitable for use beneath built–up felt roofing systems this offers all the benefits of a warm roof construction whilst being quick and simple to install. Ideal for both newbuild and refurbishment.



PRODUCT DATA

Kingspan **Therma**roof TR31 zero ODP	
Board Size (m)	2.4 x 1.2
Insulant Thickness[1] (mm)	45, 50, 55, 60, 70, 75, 80, 85,
Upper Facing	6 mm WBP plywood
Core	CFC / HCFC–free rigid urethane
Lower Facing	Composite foil
Fire Performance[2] – FAA rating – Class 1	 BS 476: Part 3: 1975 BS 476: Part 7: 1997

ACHIEVING U–VALUES[3]

Typical U–values	*Kingspan* **Therma**roof TR31 zero ODP (mm)[4]	
U–value (W / m².K)	Joists @ 400 centres	Joists @ 600 centres
0.45	56	56
0.35	61	61
0.25	91	91
0.22	96+20[5]	96+20[5]
Thermal Conductivity (λ–value) – Ply	0.140 W / m.K	
Thermal Conductivity (λ–value) – Core[6]	0.023 W / m.K	

1 Thickness does not include 6 mm WBP Plywood.
2 With appropriate waterproofing and chippings.
3 Based on 3 layers of partially bonded built up felt with the surface covered in mineral chippings, a Kingspan Thermaroof TR31 zero ODP board is laid over the timber joists with a skim coated single layer of 12.5 mm plasterboard fixed to the underside. For the purpose of these calculations the standard of workmanship has been assumed good and therefore the correction factor for air gaps has been ignored.
4 Product thickness = insulant thickness + 6 mm ply.
5 Due to limited lengths of fixings, 96 mm overall depth of Kingspan Thermaroof TR31 zero ODP is the maximum practical thickness. In order to achieve 0.22 W / m².K 20 mm Kingspan Thermapitch TP10 zero ODP is required between rafters. (See page 12 for details of Kingspan Thermapitch TP10 zero ODP.)
6 The λ–value quoted is in accordance with the Harmonised European Standard BS EN 13165 (urethane) and BS EN 13166 (phenolic) using so called 90 / 90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.

FIXING DETAILS

- Suitable for use over joists at 400 mm and 600 mm centres.
- Lay boards, plywood facing upwards with long edges following joists and with board joints staggered see figure 2.

Insulant thickness 45–50 mm

- *Kingspan* **Therma**roof TR31 zero ODP should be fixed with suitable galvanised ring shank nails. These are to be placed at 100 mm centres around the board edges and at 300 mm centres along any intermediate supporting timbers.

Insulant thickness over 50 mm

- *Kingspan* **Therma**roof TR31 zero ODP should be fixed with low profile oval head screw fixings. These are to be placed at 200 mm centres around the board edges and at 300 mm centres along any intermediate supporting timbers.

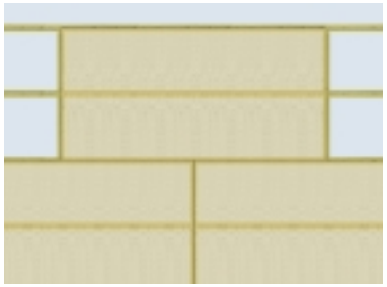
Refer: Fixfast 01306 880299
SFS Intec Limited 01132 085500

General

- All edges of the board should be supported. The use of 50 x 50 mm cross–noggins will ensure this along the boards shorter edges and where boards may be cut at openings or details.
- A wide bead of non–setting gun–grade mastic sealant, applied along the centre of the joists and cross–noggins will ensure a continuous vapour control layer on the foil underside of the boards. The mastic sealant must be wide enough to accommodate two board edges butted together see figure 3.

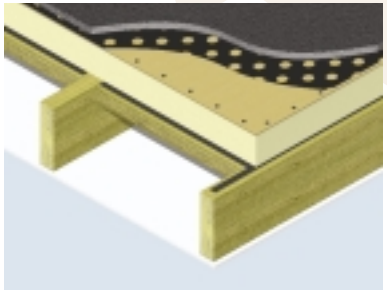
  Refer: Adshead Ratcliffe & Co Ltd 01773 826661, C M Sealants 0208 519 6358.
- Sheets should be lightly butted (approx. 2 mm gap) whilst maintaining a 20 mm bearing at edges over supporting timbers.
- Fixings should not be positioned within 10 mm of the board edges or within 50 mm of the corners.
- Care should be taken to keep the decking dry prior to waterproofing. Always utilise a type 3G felt as the base layer to a 3 layer felt system.
- To avoid cold bridging ensure the wall insulation around the roof perimeter is carried up 300 mm (min) above to the underside of the insulated deck.
- This creates a warm roof construction, therefore ventilation is not necessary.
- Cutting should be carried out using a fine toothed saw.

Figure 2



Staggered board joints over roof joists

Figure 3



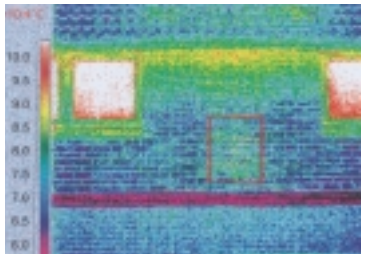
Boards laid into non setting mastic

For Technical Advice call *TECHLINE* on **0870 850 8555**

The Problem

Mineral Fibre Partial Fill Slabs and Air Movement

Air movement over unfaced mineral fibre within cavity walls can lead to a **100%** increase in heat loss.



The highlighted red box shown here indicates exacerbated heat loss, probably caused by air movement within the cavity.

Get the facts!

The Kingspan Insulation report 'Mineral Fibre Performance' is available on request.

The Problem

Injected Mineral Fibre Full Fill and Voids

Effective installation of this material can be compromised by a variety of common occurrences. These include dirty ties and mortar snots, too narrow or variable width cavities, penetrations such as soil pipes or cables and unsuitable injection hole patterns.

The results can lead to significantly increased thermal losses.

This boroscope image shows the mineral fibre as a band running vertically in the centre of the image. The mineral fibre is 500mm away. This is a large void.

This image shows heat loss occurring below the upper window in in the form of a red triangular area.

Get the facts!

The Kingspan Insulation report 'Injected Mineral Fibre Full Fill Cavity Wall Insulation, Workmanship, Void sand Heat Loss' is available on request.

Taken nationally, injected mineral fibre full fill cavity wall insulation could be regarded as wasting:

- **1,651GWh** (million KWh) of heat per year;
- **£37.2 m** a year extra heating costs, and causing the unnecessary release of
- **473 million kg** of CO_2 equivalent emissions per year.

The Problem

Mineral Fibre Full Fill Batts, Workmanship and Water

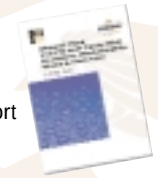
Due to their open fibrous structure, poor site practice can encourage water penetration into mineral fibre full fill batt cavity wall insulation.

1% moisture by volume in man–made mineral fibre insulants can reduce thermal performance by between **75%** and **105%**.

This image shows the accumulation of mortar on the top surface of mineral fibre full fill batts amongst other elements of poor workmanship.

It is reasonable to expect that this situation is prevalent for 9 months of the year in the UK.

Get the facts!



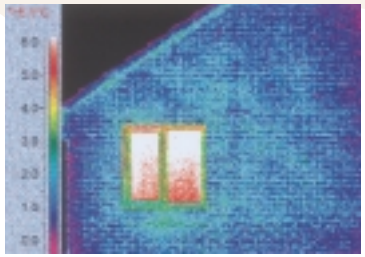
The Kingspan Insulation report 'Mineral Fibre Full Fill Batt Cavity Wall Insulation,Workmanship, Water & Heat Loss' is available on request.

The Solution

Kingspan Partial Fill Cavity Wall Insulation

Kingspan partial fill cavity wall insulation Thermawall TW50 zero ODP and Kooltherm K8 Cavity Board:

- can help you to achieve your required U–value with minimal thickness (up to half the thickness of mineral fibre);
- are resistant to moisture penetration;
- are unaffected by air movement; and
- provide the best thermal performance of all commonly available insulants.



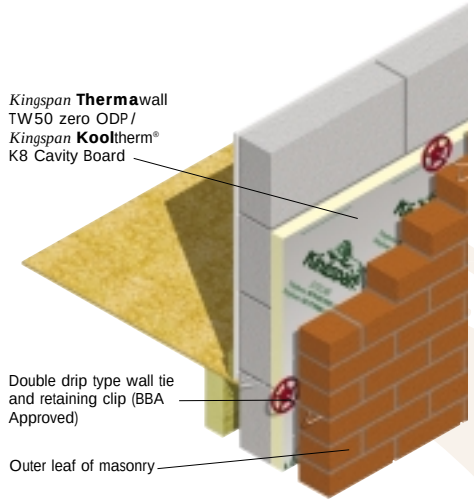
Thermographic image of building with Kingspan Insulation showing 100% reliable thermal performance.

WALLS – PARTIAL FILL CAVITY WALL INSULATION

INTRODUCTION

A partial fill cavity wall application provides the most effective barrier to rain penetration by allowing the traditional wall cavity to be maintained. The insulation is fixed to the inner leaf of the wall construction, maintaining a clear cavity which avoids the problems associated with full cavity fill. For this application we recommend the use of either *Kingspan* **Therma**wall TW50 zero ODP (high performance CFC / HCFC–free rigid urethane insulation) or *Kingspan* **Kool**therm® K8 Cavity Board (premium performance CFC–free rigid phenolic insulation).

Figure 1



PRODUCT DATA

	Kingspan **Therma**wall TW50 zero ODP	*Kingspan* **Kool**therm® K8 Cavity Board
Board Size	1.2 x 0.45 (0.6)	1.2 x 0.45 (0.6)
Insulant Thickness (mm)	25, 30, 35, 40, 45, 50, 55, 60	20, 25, 30, 35 40, 45, 50
Facing	Composite foil	Composite foil
Core	CFC / HCFC–free rigid urethane	CFC–free rigid phenolic

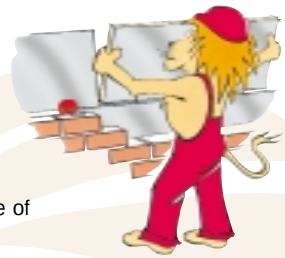
ACHIEVING U–VALUES

To select the correct thickness of insulation to achieve a relevant U–value please turn to pages 32–33.

Thermal Conductivity (λ–value) – TW50[1]	≥ 30 mm 0.022 W / m.K
Thermal Conductivity (λ–value) – K8[1]	25–44 mm 0.023 W / m.K ≥ 45 mm 0.022 W / m.K

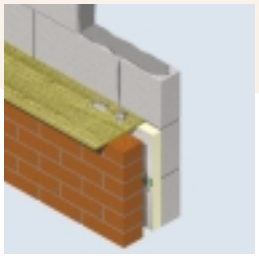
1 The λ–value quoted is in accordance with the Harmonised European Standard BS EN 13165 (urethane) and BS EN 13166 (phenolic) using so called 90 / 90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.

FIXING DETAILS



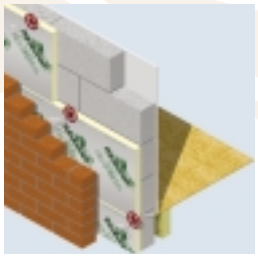
- Determine the overall cavity width by adding the thickness of insulation required to the residual cavity width (50 mm minimum).
- Install the first row of wall ties at 600 mm horizontal centres to the inner leaf, one course of blockwork below the d.p.c. Install the next course of blockwork to secure the ties.
- Wall ties should include a retaining disc / clip and be of double drip type, installed drip downward.
- Continue constructing the inner leaf up to the next wall tie course (450 mm above the first – usually 2 block courses). Position the next course of wall ties at the usual 900 mm horizontal centres and install the next course of blockwork to secure the ties.
- The first row of insulation boards should now be installed, ensuring each insulation board is retained tight against the inner leaf at three points (this includes cut boards at details), see figure 3.
- Repeat the process described in the previous 2 bullet points.
- Take care to remove excess mortar and protect the insulation board edges from mortar snots by using a cavity board. (See figure 2).
- Always ensure accurate trimming to achieve close butting joints and continuity of insulation.
- A vertical damp proof course should be installed at window and door openings. The insulation boards can be used to prevent a cold bridge at details. Refer to 'Limiting thermal bridging and air leakage: Robust construction details for dwellings and similar buildings', available from the Stationery Office.
- When insulating to ceiling height at a gable, wall boards should be continued 250 mm beyond the ceiling and a cavity tray installed above the insulation.
- Boards should be cut using a sharp knife or a fine toothed saw.

Figure 2



Use of a cavity board to protect the cavity

Figure 3



Boards are installed as work proceeds

WALLS – PARTIAL FILL CAVITY WALL INSULATION

Easily achieve your required thermal performance using *Kingspan* **Therma**wall TW50 zero ODP or *Kingspan* **Kool**therm® K8 Cavity Board with any type of block.

For reasons of comparison the internal finish is taken as both 9.5 mm or 12.5 mm plasterboard on dabs and alternatively an internal finish of lightweight plaster. See footnotes 1 and 2.

The table below, lists all the main block manufacturers in the UK and the blocks they manufacture. To determine the thickness of insulation you will need to achieve your required U–value, select the appropriate block type and the corresponding thickness of insulation listed.

Dependent on the U–value required, the construction used for the purposes of these calculations a 100 mm block inner (of thermal conductivity shown in the table below), a minimum 50 mm cavity with either rendered dense blockwork outer leaf for Scotland or a brickwork outer leaf for England and Wales.

Inner Leaf Block Type	Inner Leaf Block Lambda (λ)	Thickness (mm) to Achieve Specified U–value					
		Kingspan **Therma**wall TW50 zero ODP Insulant (mm)			*Kingspan* **Kool**therm® K8 Cavity Board (mm)		
U–value Required (W/m².K)		0.27[3]	0.3[3]	0.35[4]	0.27[3]	0.3[3]	0.35[4]
ARC Conbloc Eurolite Standard	0.16	50[2]	45	35	50[1]	45	35
ARC Conbloc Eurolite Super	0.09	45	35[1]	25[1]	45	35[1]	25[1]
ARC Conbloc Fenlite	0.48	60	50[1]	40[1]	60	50	40[1]
ARC Conbloc Standard Dense	1.12	65	55	45	60	50[2]	45
ARC Conbloc Superlite	0.35	60	50[1]	40	55[1]	50	40
ARC Conbloc Ultralite	0.205	55[2]	45[1]	35[1]	55	45	35[1]
Besblock Bescrete	0.99	65	55	45	60	50[1]	45
Besblock Insulite	0.48	60	50[1]	40[1]	60	50	40[1]
Besblock Pumice	0.22	55[1]	45[2]	35[1]	55	45[1]	35[1]
Boral Edenhall Boralite	0.22	55[1]	45[2]	35[1]	55	45[1]	35[1]
Boral Edenhall Evalast	1.13	65	55	45	60	50[2]	45
Boral Edenhall Evalite	0.51	60[1]	55[2]	40[1]	60	50	40[1]
Boral Edenhall Pumice	0.35	60	50[1]	40	55[1]	50	40
Boral Edenhall Solo	0.81	60[1]	55	45	60	50[1]	45
Brand & Rae Albacrete	0.99	65	55	45	60	50[1]	45
Brand & Rae Albertherm	0.26	55[1]	50	40	55	45[1]	40
Brand & Rae Eden Dense	0.99	65	55	45	60	50[1]	45
Camas Blockmaster Dense	1.10	65	55	45	60	50[2]	45
Camas Lightweight	0.51	60[1]	50[2]	40[1]	60	50	40[1]
Celcon Hi-Seven	0.19	55	45[1]	35[1]	50[1]	45	35[1]
Celcon Standard	0.15	50[1]	45	35	45[2]	45	35
Celcon Super Solar	0.10	45	40	30	45	40	30
David Gordon Dense	1.13	65	55	45	60	50[2]	45
David Gordon Fibotherm	0.32	60	50	40	55[1]	50	40
Durox Supabloc 4	0.16	50[2]	45	35	50[1]	45	35
Durox Supabloc 400	0.10	45	40	30	45	40	30
Durox Superbloc 7	0.17	55	45	35	45[2]	45	35
Ensor Dense	1.13	65	55	45	60	50[2]	45
Ensor Modulite	0.52	60[1]	50[2]	40[1]	60	50	40[1]
Forticrete Common Block	0.99	65	55	45	60	50[1]	45
Forticrete High Strength	1.28	65	55	45	60[1]	55	45
Hillhouse Blocks Carrickcrete	1.23	65	55	45	60[1]	55	45
Hillhouse Blocks Kylite	0.51	60[1]	50[2]	40[1]	60	50	40[1]
Humberside Blocks Dense Concrete	1.15	65	55	45	60	50[2]	45
Humberside Blocks Lightweight (solid)	0.40	60	50[1]	40[1]	55[1]	50	40[1]
Interfuse Fibotherm	0.25	55[1]	50	40	55	45	40
Interfuse Intercrete	1.05	65	55	45	60	50[2]	45
Interfuse Interlyte (3.5 N)	0.44	60	50[1]	40[1]	55[2]	50	40[1]
John Fyfe Fyfecrete Standard	1.20	65	55	45	60[1]	55	45
John Fyfe Pumalite (7.0 N)	0.38	60	50[1]	40[1]	55[1]	50	40[1]
Lignacite Lignacite (3.5 N)	0.51	60[1]	50[2]	40[1]	60	50	40[1]
Lignacite Lignacite (7 N)	0.55	60[1]	55	40[1]	60	50[1]	40[1]
Lignacite Lignacrete	1.00	65	55	45	60	50[1]	45
Mona Fibotherm	0.25	55[1]	50	40	55	45	40
Mona GP1	0.52	60[1]	50[2]	40[1]	60	50	40[1]
Mona Monacrete 100	0.59	60[1]	55	40[2]	60	50[1]	40[2]
Mona Monalight 100S	0.50	60[1]	50[1]	40[1]	60	50	40[1]
Newlay Newcon	0.99	65	55	45	60	50[1]	45
Newlay Newlite	0.42	60	50[1]	40[1]	55[2]	50	40[1]
Patersons High Strength	1.36	65	55	45	60[1]	55	45
Patersons Lightweight	0.38	60	50[1]	40[1]	55[1]	50	40[1]
Patersons Standard	1.28	65	55	45	60[1]	55	45
Plasmor Aglite	0.32	60	50	40	55[1]	50	40
Plasmor Fibolite	0.25	55[1]	50	40	55	45[1]	40
Plasmor Plascon	1.06	65	55	45	60[1]	50[2]	45
Plasmor Stranlite	0.42	60	50[1]	40[1]	55[2]	50	40[1]
Pocklington Teclite	0.51	60[1]	50[2]	40[1]	60	50	40[1]
Pocklington Tecrete	1.13	65	55	45	60	50[2]	45
Redland Aggregates Stronglite	0.38	60	50[1]	40[1]	55[1]	50	40[1]
Redland Aggregates Stronglite	0.51	60[1]	50[2]	40[1]	60	50	40[1]
RMC Readybloc 1100	0.35	60	50[1]	40	55[2]	50	40
RMC Readyblock 1400	0.59	60[1]	55	40[2]	60	50[1]	40[2]
RMC Readyblock Dense	1.13	65	55	45	60	50[2]	45
Sellilte 3.5 N Block	0.36	60	50[1]	40	55[1]	50	40
Sellite 7 N Block	0.51	60[1]	50[2]	40[1]	60	50	40[1]
Stocks Blocks Dense	0.99	65	55	45	60	50[1]	45
Stocks Blocks Insulite	0.40	60	50[1]	40[1]	55[1]	50	40[1]
Tarmac Topblock Hemelite 3.5	0.47	60	50[1]	40[1]	60	50	40[1]
Tarmac Topblock Hemelite 7.0	0.51	60[1]	50[2]	40[1]	60	50	40[1]
Tarmac Topblock Lignacite 3.5	0.51	60[1]	50[2]	40[1]	60	50	40[1]
Tarmac Topblock Topcrete	1.13	65	55	45	60	50[2]	45
Tarmac Topblock Toplite 7	0.19	55	45[1]	35[1]	50[1]	45	35[1]
Tarmac Topblock Toplite GTI Ultra	0.10	45	40	30	45	40	30
Tarmac Topblock Toplite Standard	0.16	50[2]	45	35	50[1]	45	35
Thermalite Hi-Strength 7	0.19	55	45[1]	35[1]	50[1]	45	35[1]
Thermalite Shield 2000	0.14	50[1]	45	30[2]	50	45	30[2]
Thomas Armstrong Dense	1.13	65	55	45	60	50[2]	45
Thomas Armstrong Standard	0.44	60	50[1]	40[1]	55[2]	50	40[1]
Tilcon Trublock	1.13	65	55	45	60	50[2]	45
W Rainsford Dense	0.99	65	55	45	60	50[1]	45
W Rainsford Lightweight	0.42	60	50[1]	40[1]	55[2]	50	40[1]

1 Add 5 mm to thickness of insulation if using a 13 mm layer of lightweight plaster as a substitute for the assumed 9.5 or 12.5 mm layer of plasterboard on dabs.
2 Add 5 mm to thickness of insulation if using a 13 mm layer of lightweight plaster or 9.5 mm plasterboard on dabs as a substitute for 12.5 mm layer of plasterboard on dabs.
3 For the purpose of these U–values we have assumed a rendered dense blockwork outer leaf.
4 For the purpose of these U–values we have assumed a brickwork outer leaf.
5 When calculating U–values to BS EN ISO 6946: 1997 the type of wall tie used may change the thickness of insulation required. These calculations assume a stainless steel double triangle tie 3.7 mm diameter, giving a cross sectional area of 10.75 mm² . Contact Kingspan Technical Services for project calculations.
6 For the purposes of these calculations the standard of workmanship has been assumed good and therefore the correction factor for air gaps ignored.

For Technical Advice call *TECHLINE* on **0870 850 8555**

WALLS – INSULATED DRY–LINING PLASTERBOARD

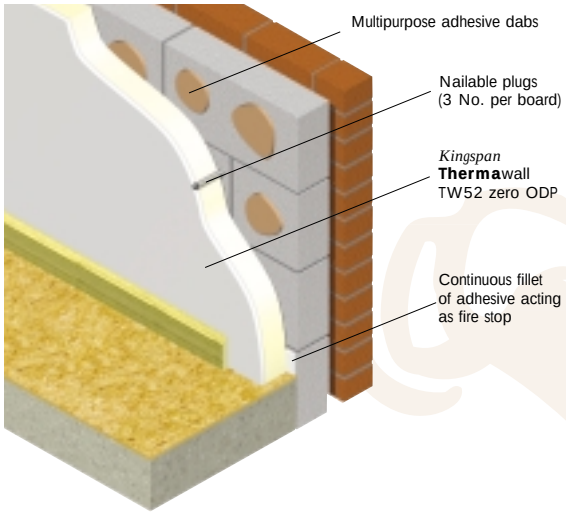
Plaster Dab Bonding to Brick, Block and Concrete Masonry Cavity Walls

INTRODUCTION

For internal dry–lining applications, we recommend the use of *Kingspan* **Therma**wall TW52 zero ODP, an insulated plasterboard laminate ideal for use in plaster dab bonded dry–lining applications. It is suitable for use with some solid walls and all cavity masonry wall constructions as well as timber frame walls. The boards are as easy to handle as standard plasterboard and are fixed using similar methods.

This method of wall insulation combines insulation, dry–lining and vapour control in one board.

Figure 1



PRODUCT DATA

Kingspan **Therma**wall TW52 zero ODP	
Board Size (m)	2.4 x 1.2
Insulant Thickness[1] (mm)	55, 60, 65, 70, 75
Inner Facing	12.5 mm plasterboard
Core	CFC / HCFC–free rigid urethane
Outer Facing	Wet lay coated glass fibre tissue

ACHIEVING U–VALUES

U–value (W / m².K)	*Kingspan* **Therma**wall TW52 zero ODP (mm)[4]
0.35[2]	67.5
0.30[3]	82.5
0.27[3]	92.5
Thermal Conductivity (λ–value) – Plasterboard	0.18 W / m.K
Thermal Conductivity (λ–value) – Core[5]	< 80 mm 0.027 W / m.K 80–120 mm 0.026 W / m.K ≥ 120 mm 0.025 W / m.K

1 Insulant thickness only, does not include plasterboard.
2 U–values calculated assuming a Brick / Block or concrete masonry cavity wall. For the purposes of these calculations the standard of workmanship has been assumed good and therefore the correction factor for air gaps ignored.
3 U–values calculated assuming a render finished dense block, cavity, dense block wall. For the purposes of these calculations the standard of workmanship has been assumed good and therefore the correction factor for air gaps ignored.
4 Product thickness = insulant thickness + 12.5 mm plasterboard.
5 λ–value quoted is based on the procedures for the determination of the aged values of thermal resistance and thermal conductivity, laid down by the harmonised European standard BS EN 13165, using so called 90 / 90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.

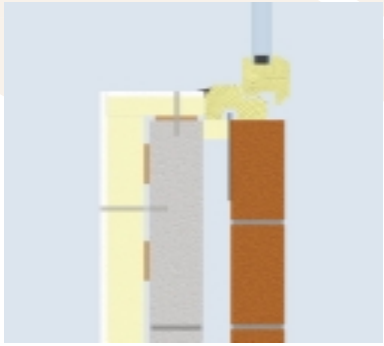
FIXING DETAILS

- A continuous fillet of Gypsum adhesive is applied at skirting and ceiling level, as well as at openings to provide a continuous seal.
- Apply further dabs of Gypsum adhesive in accordance with adhesive manufacturers' specification.
- Cut the boards to the height of the room, and place against the adhesive dabs and tap back into correct position.
- Once plaster dabs have set, Gyproc nailable plugs are recommended to be fixed at a rate of 3 per board. Two near the top of the board and one centrally.
- At window, door reveals and soffits, narrow widths of board should be cut to allow a plasterboard / plasterboard joint at an angle to prevent cold bridging. These should be fixed in the same way as for wall areas (see figure 2).
- Suitable mechanical fixings should be used for internal fittings such as kitchen units, shelving etc… so that the load is applied direct to the supporting wall and not the *Kingspan* **Therma**wall TW52 zero ODP.
- When refurbishing it is important to ensure all existing decoration is removed on existing walls so that the plaster dab can form a permanent bond.
- Cutting should be carried out using a fine toothed saw.

Kingspan **Therma**wall TW52 zero ODP is available in two plasterboard finishes, tapered edge boards provide a flat seamless surface ready for decoration, once the correct jointing procedures have been undertaken. Square edged boards allow a plaster skim coat to be applied prior to decoration.

Boards may also be fixed using, adhesive bonding pads, please consult our Technical Services Department for details.

Figure 2



Insulated reveal detail

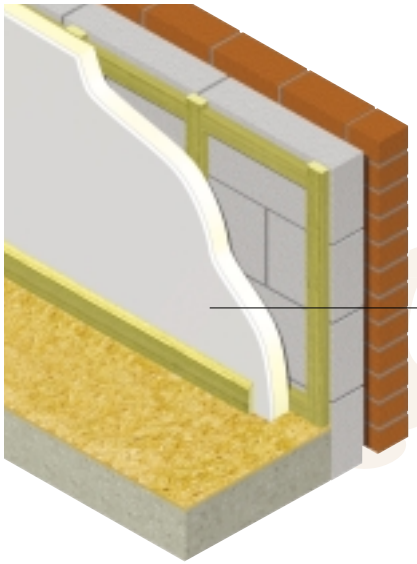
WALLS – INSULATED DRY–LINING PLASTERBOARD

Mechanical Fixing to Timber Framing / Battens / Metal Furrings

INTRODUCTION

This method of internal dry–lining is suitable for use on timber frame constructions or on any dry masonry walls that will support and retain the battens / furrings and associated fixings. This method should be used when fixing to solid wall constructions that are susceptible to rain water penetration. This method of wall insulation combines insulation, dry–lining and vapour control in one board.

Figure 1



PRODUCT DATA

Kingspan **Therma**wall TW56 zero ODP	
Board Size (m)	2.4 x 1.2
Insulant Thickness[1] (mm)	25, 30, 40, 50, 60, 65
Inner Facing	12.5 mm plasterboard
Core	CFC / HCFC–free rigid urethane
Outer Facing	Composite foil

ACHIEVING U–VALUES

U–value (W / m².K)	*Kingspan* **Therma**wall TW56 zero ODP (mm)
0.35[3,6]	62.5[2]
0.30[4,6]	72.5[2]
0.27[4,6]	82.5[2]
Thermal Conductivity (λ–value) – Plasterboard	0.18 W / m.K
Thermal Conductivity (λ–value) – Core[5]	< 30 mm 0.022 W / m.K > 30 mm 0.023 W / m.K

1 Insulant thickness only, does not include plasterboard.
2 Product thickness = insulant thickness + 12.5 mm plasterboard.
3 For the purposes of these calculations all examples are based on a brick, cavity, brick wall.
4 For the purposes of these calculations all examples are based on a render finished dense block, cavity, dense block wall.
5 The λ–value quoted is in accordance with the Harmonised European Standard BS EN 13165 (urethane) and BS EN 13166 (phenolic) using so called 90 / 90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.
6 For the purposes of these calculations the standard of workmanship has been assumed good and therefore the correction factor for air gaps ignored.

FIXING DETAILS

- The boards should be fixed to timber framing / battens set at a maximum of 600 mm centres and positioned horizontally at floor and ceiling level.
- The timbers should run vertically and be wide enough to give a minimum of 20 mm support to all four edges of the board.
- The boards should be fixed with galvanised clout nails, long enough to allow 25 mm penetration of the timber. These should be placed at 150 mm centres and not less than 10 mm from the edges of the board.
- The galvanised clout nails should be driven straight with the heads embedded just below the surface of the board.
- Take care not to overdrive nails.
- Treat timbers where appropriate.
- Cutting should be carried out using a fine toothed saw.
- Boards may also be fixed using metal furring systems, please consult our Technical Services Department for details.

Kingspan **Therma**wall TW56 zero ODP is available in two plasterboard finishes, tapered edge boards provide a flat seamless surface ready for decoration, once the correct jointing procedures have been undertaken. Square edged boards allow a plaster skim coat to be applied prior to decoration.

For Technical Advice call *TECHLINE* on **0870 850 8555**

The Problem

Traditional Practice & the Thickness of Mineral Fibre

Timber frame walls as traditionally constructed typically comprise 89 mm deep studs filled with 90 mm mineral fibre quilt / batts.

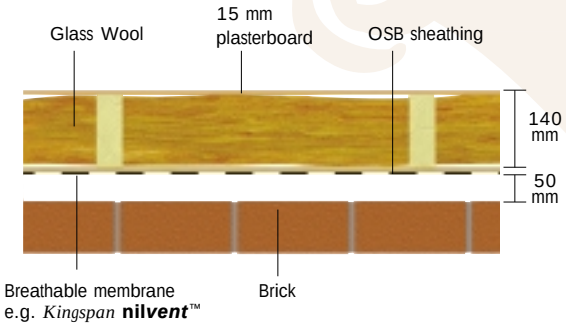
This construction achieved a U–value of 0.41 W / m².K* and thus achieves the requirements (0.45 W / m².K) of the old Building Regulations and Standards in all of the UK and Ireland.

The new Technical Standards Part J (Scotland) requires a U–value of 0.27 / 0.30 W / m².K (dependant on SEDBUK rating) and the Building Regulations (England & Wales). Approved Documents L1 & L2 require 0.35 W / m².K for walls to comply with the elemental method of compliance.

The change in U–values for walls provides an opportunity for specifiers to rethink the way they insulate timber frame walls.

In order to achieve U–values of 0.30 and 0.35 W / m².K, 125 / 130 mm and 100 / 110 mm respectively of mineral fibre quilt / batts of the type currently used may be required. This would require an increase in stud depths to accommodate the insulation. In reality a standard size like 140 mm nominal would be used.

Mineral fibre in timber frames relies on friction to hold it vertical and so a slight over–thickness is normally used. Therefore, a standard thickness of insulation, say 150 mm, would most likely be used.



* Assumes that 15% of the wall area is made up of timber bridging insulation.

The Solution

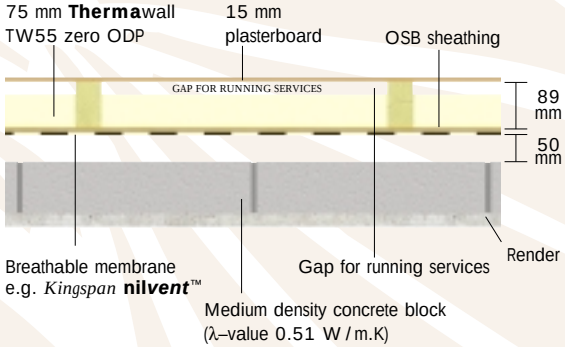
Kingspan Timber Frame Wall Insulation

There is a compelling alternative that specifiers would do well to consider.

Scotland

75 mm of *Kingspan* **Therma**wall TW55 zero ODP between 95 mm deep studs will achieve a U–value of 0.30 W / m².K.

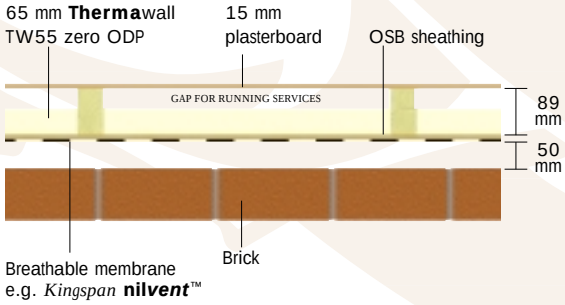
The additional cost of the 65 mm *Kingspan* **Therma**wall TW55 zero ODP option is **11%** lower than that for 150 mm deep mineral fibre.



England and Wales

65 mm of *Kingspan* **Therma**wall TW55 zero ODP between 89 mm deep studs will achieve a U–value of 0.35 W / m².K.

The additional cost of the 50 mm *Kingspan* **Therma**wall TW55 zero ODP option is **30%** lower than that for 150 mm deep mineral fibre.



- These alternatives clearly require less timber offering saving on timber costs.
- No need to modify building design, just insulation specification.
- No extra transport or handling costs.
- No reduction of habitable space due to thickness walls.

Get the facts!

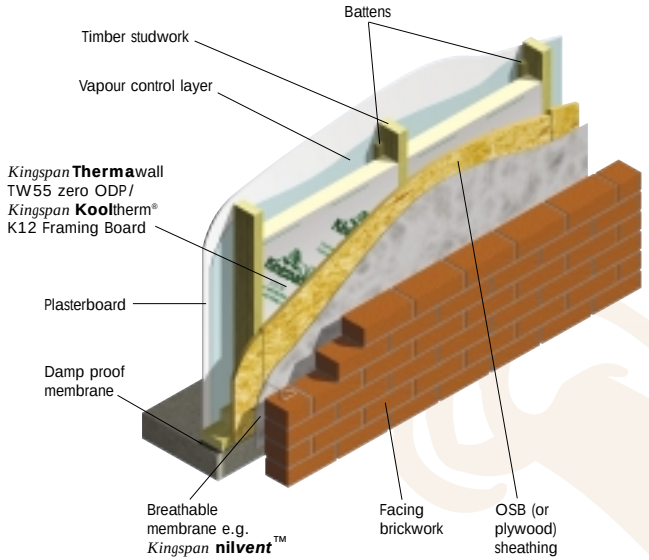
The Kingspan Insulation report 'Timber Frame Walls – Rethinking Construction' is available on request. Separate versions are available for Scotland and England & Wales.

WALLS – TIMBER FRAME INSULATION

INTRODUCTION

For timber frame wall constructions we recommend the use of either *Kingspan* **Therma**wall TW55 zero ODP (high performance CFC / HCFC–free rigid urethane insulation) or *Kingspan* **Kool**therm® K12 Framing Board (premium performance CFC–free rigid phenolic insulation). The boards can be used between studs or alternatively as an insulating sheathing to eliminate cold bridging. Ideal for both newbuild or refurbishment.

Figure 1



PRODUCT DATA

	Kingspan **Therma**wall TW55 zero ODP	*Kingspan* **Kool**therm® K12 Framing Board
Board Size (m)	2.4 x 1.2	2.4 x 1.2
Insulant Thickness (mm)	50, 60, 65, 70, 75, 80, 95, 100	35, 40, 50, 60, 70, 75, 80, 85, 90
Facing	Composite foil	Composite foil
Core	CFC / HCFC–free rigid urethane	CFC–free rigid phenolic

ACHIEVING U–VALUES

U–value (W / m².K)	*Kingspan* **Therma**wall TW55 zero ODP (mm)	*Kingspan* **Kool**therm® K12 Timber Framing Board (mm)
0.35[1,5]	60	60
0.30[2,5]	75	75
0.27[2,5]	85	85
Thermal Conductivity (λ–value) – TW55[4]		< 30 mm 0.022 W / m.K > 30 mm 0.023 W / m.K
Thermal Conductivity (λ–value) – K12[4]		≥ 45 mm 0.022 W / m.K

1 Based on insulation between timber studs 89 x 38 mm at 600 mm centres. 115 mm plasterboard internal lining, 9 mm OSB sheathing, cavity, brickwork and a 15% framing factor.
2 Assumes minimum 25 mm cavity between insulation and plasterboard. 115 mm plasterboard internal lining, 9 mm OSB sheathing, cavity, blockwork (λ–value 0.51W / m.k), render finish and a 15% framing factor.
3 Multiple layers required as maximum thickness exceeded. First thickness refers to inner layer, second thickness outer layer. The thermal resistance of the outer layer must be ≥ that of the inner layer to avoid condensation.
4 The λ–value quoted is in accordance with the Harmonised European Standard BS EN 13165 (urethane) and BS EN 13166 (phenolic) using so called 90 / 90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.
5 For the purposes of these calculations the standard of workmanship has been assumed good and therefore the correction factor for air gaps ignored.

FIXING DETAILS

Between Studwork

- Measure the space between the rafters before cutting the boards as spacings can vary.
- Ensure accurate trimming to achieve close butting joints and continuity of insulation.
- In all cases ensure that insulation boards between studs are fitted tightly. Fill any gaps with expanding urethane sealant.
- To prevent the insulation moving within the timber stud cavity, side nail battens to the studs to provide a 'stop' (should coincide with board thickness).
- Boards should be cut using a sharp knife or a fine toothed saw.
- To avoid thermal bridging through the timber studs a thermal sheathing specification can be considered (see below).

Insulating Sheathing

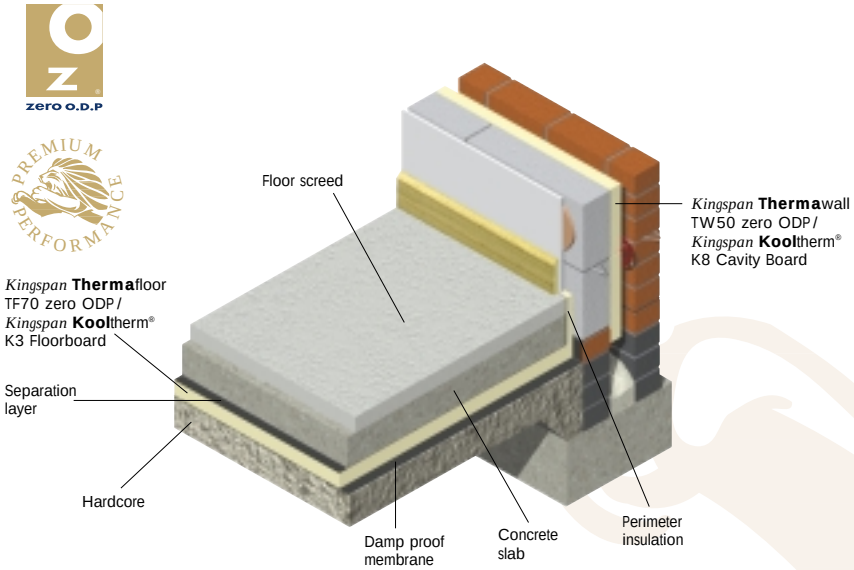
- Insulation boards should be fixed to the external surface of the timber frame structure (outside of the plywood sheathing) restrained in accordance with the timber frame manufacturers recommendations. Please contact our Technical Services Department for further information.
- Always ensure that fixings are in line with the underlying timber studs, head rails and sole plates.
- Always ensure boards are close butted and accurately trimmed to achieve continuity of insulation.
- The foil taping of the board joints is not recommended in this application.
- Boards should be cut using a sharp knife or a fine toothed saw.

FLOORS – SOLID GROUND FLOOR INSULATION

INTRODUCTION

For the insulation of solid ground floor constructions we recommend the use of either *Kingspan* **Therma**floor TF70 zero ODP (high performance CFC / HCFC–free rigid urethane insulation) or *Kingspan* **Kool**therm® K3 Floorboard (premium performance CFC–free rigid phenolic insulation) positioned below the floor slab or beneath a floor screed. It can be used over whole floor areas or as an edge insulant at the floor perimeter. Ideal for both newbuild and refurbishment.

Figure 1 **Below the floor slab**



ACHIEVING U–VALUES

The table below details typical thickness of *Kingspan* **Therma**floor TF70 zero ODP and *Kingspan* **Kool**therm® K3 Floorboard required to achieve the various U–values to satisfy Building Regulation / Standards.

	Perimeter / Area Ratios									
U–value (W / m²K)	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
	Thickness of *Kingspan* **Therma**floor TF70 zero ODP (mm)									
0.25	–	25	40	50	55	60	65	65	70	70
0.22	–	30	50	60	65	70	75	80	80	80
U–value (W / m²K)	Thickness of *Kingspan* **Kool**therm® K3 Floorboard (mm)									
0.25	–	25	40	50	55	55	60	65	65	65
0.22	–	35	50	60	65	70	70	75	75	80

Thermal Conductivity (λ–value) – TF70[1] 0.023 W / m.K

Thermal Conductivity (λ–value) – K3 15 to <24 mm thickness 0.024 W / m².K
25 to <44 mm thickness 0.023 W / m².K
≥45 mm thickness 0.022 W / m².K

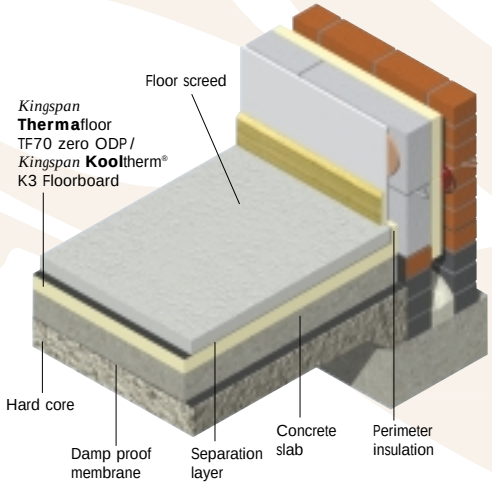
1 The λ–value quoted is based on the procedures for the determination of the aged values of thermal resistance and thermal conductivity, laid down by the harmonised European standard BS EN 13165, using so called 90 / 90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.

2 For the purposes of these calculations using the method as detailed in BS EN ISO 13370: 1998, the soil has been assumed to be clay or silt, the wall insulation is assumed to overlap the floor insulation by 200 mm minimum and the standard of workmanship has been assumed good and therefore the correction factor for air gaps ignored.

FIXING DETAILS

- Ensure boards are laid above the damp proof membrane, and that the d.p.m. maintains continuity with the damp proof course installed in the surrounding walls.
- The boards must be continuously supported over a level surface free from projections. A thin sand blinding may be used to achieve this over tamped slabs or rolled hardcore.
- A 20 mm thickness of *Kingspan* **Therma**floor TF70 zero ODP should be used to insulate the perimeter of the floor. By insulating the full depth of the screed / screed and slab, cold bridging will be eliminated.
- Lay boards with butted, staggered joints and overlay with a polythene sheet (min 500 gauge) to act as a vapour control layer and to prevent wet screeds penetrating the board joints.
- For domestic constructions complete the floor with a 65 mm min thickness sand / cement screed laid over the polythene sheet (75 mm thickness in other buildings).
- Alternatively the floor slab can be cast over the boards / polythene.
- Ensure boards are protected during installation from wheeled / foot traffic by using scaffold planks etc.
- Boards may be cut using a sharp knife or fine toothed saw.

Figure 2 **Below the Floor Screed**



PRODUCT DATA

	Kingspan **Therma**floor TF70 zero ODP	*Kingspan* **Kool**therm® K3 Floorboard
Board Size (m)	2.4 x 1.2	2.4 (1.2) x 1.2 (0.6)
Insulant Thickness (mm)	25, 30, 40, 50, 55, 60, 65, 70, 75, 80	25, 30, 35, 40, 50, 55, 60, 65, 70, 75, 80
Facing	Composite foil	Coated glass tissue
Core	CFC / HCFC–free rigid urethane	CFC–free rigid phenolic

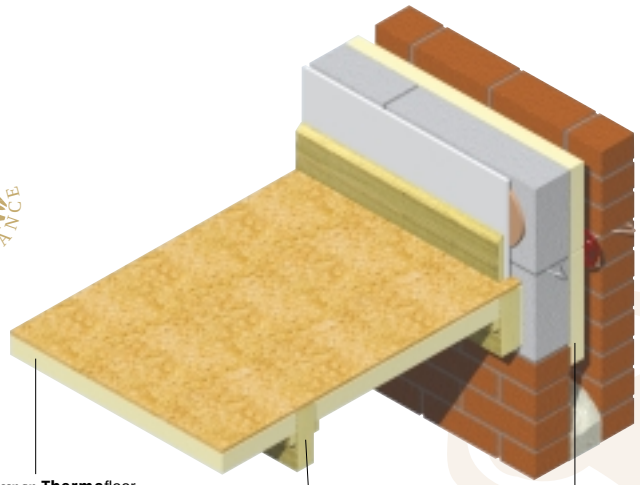
For Technical Advice call *TECHLINE* on **0870 850 8555**

FLOORS – SUSPENDED TIMBER FLOOR INSULATION BETWEEN FLOOR JOISTS

INTRODUCTION

For the insulation of suspended timber floors we recommend the use of either *Kingspan* **Therma**floor TF70 zero ODP (high performance CFC / HCFC–free rigid urethane insulation) or *Kingspan* **Kool**therm® K3 Floorboard (premium performance CFC–free rigid phenolic insulation). The boards are easily cut to fit between the joists at any centres. Ideal for both newbuild and refurbishment.

Figure 1



PRODUCT DATA

	Kingspan **Therma**floor TF70 zero ODP	*Kingspan* **Kool**therm® K3 Floorboard
Board Size (m)	2.4 x 1.2	2.4 (1.2) x 1.2 (0.6)
Insulant Thickness (mm)	25, 30, 40, 50, 55, 60, 65, 70, 75, 80	25, 30, 40, 45, 50, 55, 60, 65
Facing	Composite foil	Coated glass tissue
Core	CFC / HCFC–free rigid urethane	CFC–free rigid phenolic

ACHIEVING U–VALUES

Thermal Conductivity (λ–value) – TF70[1]	0.023 W / m.K
Thermal Conductivity (λ–value) K3	25 to <44 mm thickness 0.023 W / m².K ≥ 45mm thickness 0.022 W / m².K

For specific project U–value calculations please call our Technical Services Department.

1 The λ–value quoted is based on the procedures for the determination of the aged values of thermal resistance and thermal conductivity, laid down by the harmonised European standard BS EN 13165, using so called 90 / 90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.

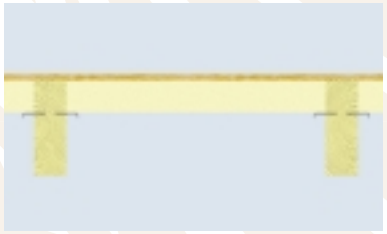
FIXING DETAILS

- The insulation should be installed between the floor joists prior to the installation of the floor boards.
- Cut boards to snugly fit joist spacings and support using either timber battens, proprietory galvanised steel saddle clips or galvanised nails partially 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 40 mm proud of the joist, see figures 2 and 3.
- Lay the boards between the joists so they are supported by the battens / nails.
- Insulate any narrow gaps between a joist and the perimeter wall with specially cut pieces of board. Support these on blocks nailed to the underside of the joists.
- Boards may be cut using a sharp knife or fine toothed saw.

Figure 2

Suspended between floor joists on timber battens

Figure 3



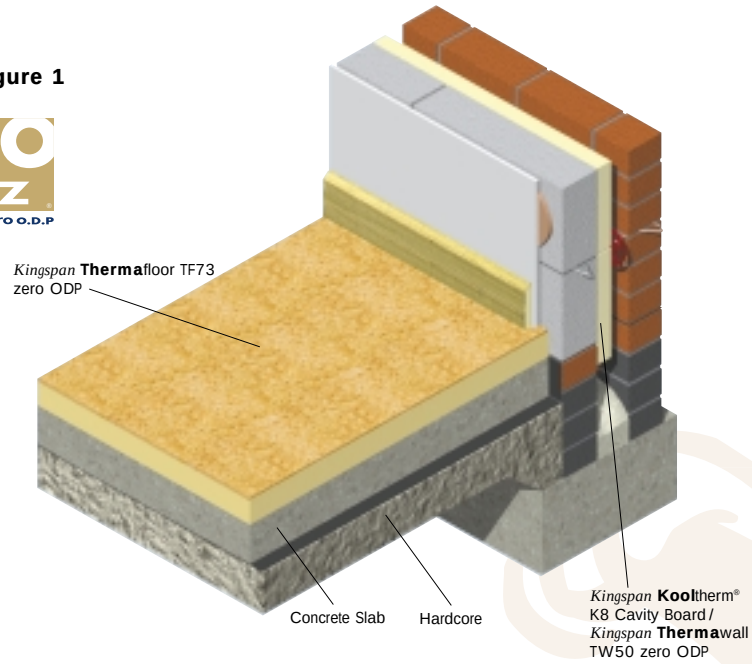
Suspended between floor joists on nails

SOLID FLOATING GROUND FLOOR INSULATION

INTRODUCTION

For solid floating ground floors we recommend the use of *Kingspan* **Therma**floor TF73 zero ODP composite floor insulation. A separate vapour control layer is not required and the boards promote quick response heating. Ideal for both newbuild and refurbishment.

Figure 1



ACHIEVING U–VALUES

The table below details typical thickness of *Kingspan* **Therma**floor TF73 zero ODP required to achieve the various U–values to satisfy Building Regulations / Standards.

	Perimeter / Area Ratios									
U–value	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
(W/m^2K)	Product Thickness[1] of *Kingspan* **Therma**floor TF73 zero ODP (mm)									
0.25	0	43	68	78	83	88	93	98	98	103
0.22	0	58	78	93	98	103	108	113	113	118

Thermal Conductivity (λ–value) – Chipboard 0.14 W / m.K
Thermal Conductivity (λ–value) – Core[2] 0.029 W / m.K

1 Product Thickness = insulant thickness + 18 mm chipboard.
2 The λ–value quoted is based on the procedures for the determination of the aged values of thermal resistance and thermal conductivity, laid down by the harmonised European standard BS EN 13164, using so called 90 / 90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.
3 For the purposes of these calculations using the method as detailed in BS EN ISO 13370: 1998, the soil has been assumed to be clay or silt, the wall insulation is assumed to overlap the floor insulation by 200 mm minimum and the standard of workmanship has been assumed good and the correction factor for air gaps ignored.
4 Insulant thickness only, does not include chipboard.

Note:
In the case of a non–ground floor, please refer to our Technical Services Department.

FIXING DETAILS

- Ensure floor surface is smooth and flat. Sand blinding may be used to achieve this.
- Lay boards in a "brick pattern" and glue the chipboard using joints PVA adhesive applied to the top and bottom of the tongue and groove.
- Insert wedges between the wall and floor to maintain tight joints whilst the adhesive sets. Replace the wedges with *Kingspan* **Styr**ozone™ to act as a compressible filler.
- An allowance of 10 mm or 2 mm per metre run of floor, whichever greater, should be left against all walls and abutments. Over a large run of floor, intermediate expansion gaps may be required (please contact our Technical Services Department for further details).
- Ensure the building is weather tight before fixing floors incorporating this product.
- Cutting should be carried out using a fine toothed saw.

PRODUCT DATA

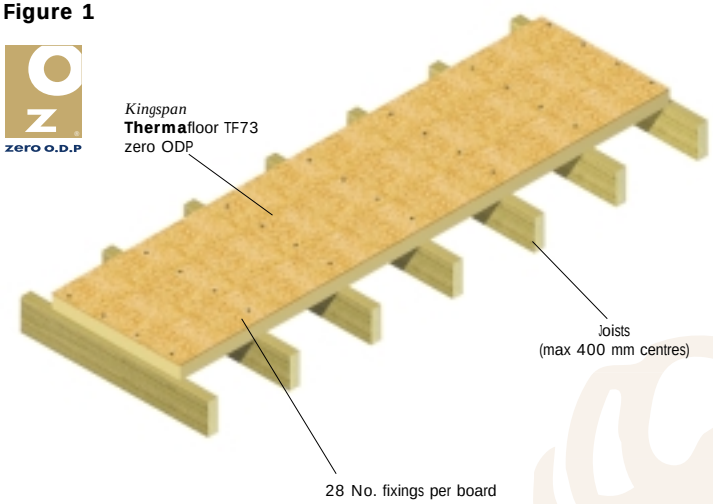
Kingspan **Therma**floor TF73 zero ODP	
Board Size (m)	2.4 x 0.6
Insulant Thickness (mm)[4]	25, 30, 35, 40, 45, 50, 60, 65, 70, 75, 80, 85 90, 95, 100
Upper Facing	18 mm T & G chipboard
Core	CFC / HCFC–free rigid extruded polystyrene

FLOORS – SUSPENDED TIMBER GROUND FLOOR INSULATION OVER FLOOR JOISTS

INTRODUCTION

For suspended timber floors over joists we recommend the use of *Kingspan* **Therma**floor TF73 zero ODP composite floor insulation. A separate vapour control layer is not required and the boards promote quick response heating. Ideal for both newbuild and refurbishment.

Figure 1



PRODUCT DATA

Kingspan **Therma**floor TF73 zero ODP	
Board Size (m)	2.4 x 0.6
Insulant Thickness (mm)[1]	25, 30, 35, 40, 45, 50, 60, 65, 70, 75, 80, 85, 90, 95, 100
Upper Facing	18 mm T & G chipboard
Core	CFC / HCFC–free rigid extruded polystyrene

ACHIEVING U–VALUES

For specific project U–value calculations please call Kingspan Technical Services Department.

Thermal Conductivity (λ–value) – Chipboard	0.14 W / m.K
Thermal Conductivity (λ–value) – Core[2]	0.029 W / m.K

1 Insulant thickness only, does not include chipboard.

2 The λ–value quoted is based on the procedures for the determination of the aged values of thermal resistance and thermal conductivity, laid down by the harmonised European standard BS EN 13164, using so called 90 / 90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.

FIXING DETAILS

- Lay the boards at right angles to the floor joists at 400 mm centres.
- Ensure cross noggins are provided for unsupported board edges overhanging a joist.
- Boards should be fixed with nails / screws at 400 centres into all joists, providing a 25 mm penetration into the 50 mm wide joist.
- Use a minimum of 28 fixings per board. Do not nail within 25 mm of board corners.
- Leave adequate expansion gaps so the boards do not buckle if the chipboard absorbs atmospheric moisture and expands.
- Ensure the building is weather tight before fixing floors incorporating this product.
- Cutting should be carried out using a fine toothed saw.

KINGSPAN INSULATION

Kingspan Insulation offers an extensive range of premium and high performance insulation products for the construction industry. Following an extensive investment programme, Kingspan Insulation is continuing to lead the insulation industry by manufacturing the majority of its insulation products with zero Ozone Depletion Potential (ODP) and quoting thermal performance data in accordance with the new harmonised European Standard.

Kingspan Insulation Limited specialise in the solution of insulation problems. Our range of insulation products which meet the exacting requirements of the construction industry are produced to the highest standards, including BS EN ISO 9002: 1994 and IS EN ISO 9001: 2000. Each product has been designed to fulfil a specific need and has been manufactured to precise standards and tolerances.

INSULATION FOR:

- PITCHED ROOFS
- FLAT ROOFS
- CAVITY WALLS
- TIMBER AND STEEL FRAMING
- EXTERNALLY INSULATED CLADDING SYSTEMS
- FLOORS
- SOFFITS

INSULATED DRY LINING

TAPERED ROOFING SYSTEMS

Kingspan **Kool**Duct® PRE–INSULATED DUCTING

Kingspan **nil*vent***™ BREATHABLE MEMBRANES

Kingspan **TEK**™ BUILDING SYSTEM

THE KINGSPAN INSULATION PRODUCT RANGE

THE KINGSPAN KOOLTHERM® K–RANGE

- With a thermal conductivity of 0.022 – 0.024 W / m.K rigid phenolic insulation is the most thermally efficient insulation product commonly available.
- Utilises the thinnest possible insulation board to achieve required U–values.
- Fire performance can be equivalent to mineral fibre.
- Achieves a Class O fire rating to the Building Regulations.
- Achieves the best possible rating of <5% smoke emission when tested to BS 5111: Part 1: 1974.
- CFC–free / available CFC / HCFC–free with zero Ozone Depletion Potential subject to enquiry.

THE KINGSPAN THERMA ZERO ODP RANGE

- With a thermal conductivity of 0.022–0.028 W / m.K zero ODP rigid urethane insulation is one of the most thermally efficient insulation products commonly available.
- Easily achieves required U–values with minimum board thickness.
- Achieves the required fire performance for the intended application.
- CFC / HCFC–free with zero Ozone Depletion Potential (ODP).

THE KINGSPAN STYROZONE™ & PURLCRETE ZERO ODP RANGES

- Rigid extruded polystyrene insulation (XPS) has the highest compressive strength of any commonly available insulant.
- Ideal for specialist applications such as inverted roofing and heavy–duty flooring.
- Easily achieves required U–values with minimum board thickness.
- Achieves the required fire performance for the intended application.
- CFC / HCFC–free with zero Ozone Depletion Potential (ODP).

ALL PRODUCTS

- Their closed cell structure resists both moisture and water vapour ingress – problems which can be associated with open cell materials such as mineral fibre and which can result in reduced thermal performance.
- Unaffected by air movement – problems that can be experienced with mineral fibre and which can reduce thermal performance.
- Safe and easy to install – masks are not required, as Kingspan Insulation products do not produce loose dust or irritable fibres.
- Provide reliable long term thermal performance over the lifetime of the building.

NB

Kingspan Insulation reserve the right to amend product specifications without prior notice. The information, technical details and fixing instructions etc. included in this literature are given in good faith and apply to uses described. Recommendations for use should be verified as to the suitability and compliance with actual requirements, specifications and any applicable laws and regulations. For other applications or conditions of use, Kingspan Insulation offers a free Technical Advisory Service (see left) whose advice should be sought for uses of Kingspan Insulation products that are not specifically described herein. Please check that your copy of the literature is current by contacting our Marketing Department (see above).

For Technical Advice call *TECHLINE* on **0870 850 8555**