THERMAL SOLUTIONS FOR
RESIDENTIAL BUILDINGS

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THERMAL SOLUTIONS FOR RESIDENTIAL BUILDINGS

Delivering comfortable, energy-efficient homes that are built to last has never been more important. As regulations evolve and expectations around sustainability increase, housebuilders must design homes that perform better today and remain compliant in the future. This thermal guide from Saint-Gobain has been created to support you in that journey, focusing on fabric performance and practical thermal solutions for walls and roofs in residential construction.

In March 2026, the government published the Future Homes Standard (FHS), representing a significant shift in UK housebuilding. The standard aims to reduce carbon emissions from new homes by around 75–80% compared to current requirements, helping to drive progress towards the UK's net zero target by 2050. It will also ensure that new homes are more thermally efficient, sustainable and future-proof.

For housebuilders, achieving these ambitions will rely on lower-embodied-carbon material choices, improved building fabric standards (including Part L of the Building Regulations), proven on-site performance and the integration of greener technologies. Fabric performance remains fundamental to delivering energy-efficient homes, regardless of heating system.

The FHS will introduce a new calculation methodology, the Home Energy Model (HEM), which will eventually replace SAP and place greater emphasis on the performance of the building envelope.

This guide provides an overview of what to expect and how Saint-Gobain can support you, outlining common thermal solutions to help meet future standards with confidence.

For further information, visit
british-gypsum.com and **isover.co.uk**

Terminology

Understanding the language around thermal performance can make a big difference. It helps you stay on top of Building Regulations and deliver energy-efficient homes for your customers.

Thermal

'Thermal' refers to anything related to heat or temperature changes in building design. The main goal of thermal management is to improve energy efficiency and ensure occupant comfort by controlling how heat moves. Heat can 'move' in three ways:

Conduction: Heat travels through solid materials when objects touch. The hot object warms the cool one. Think of heat moving through a wall.

Convection: Heat moves through liquids and gases. Blowing on hot food cools it down because the heat moves into the air. In houses, leaky windows let warm air out and cool air in.

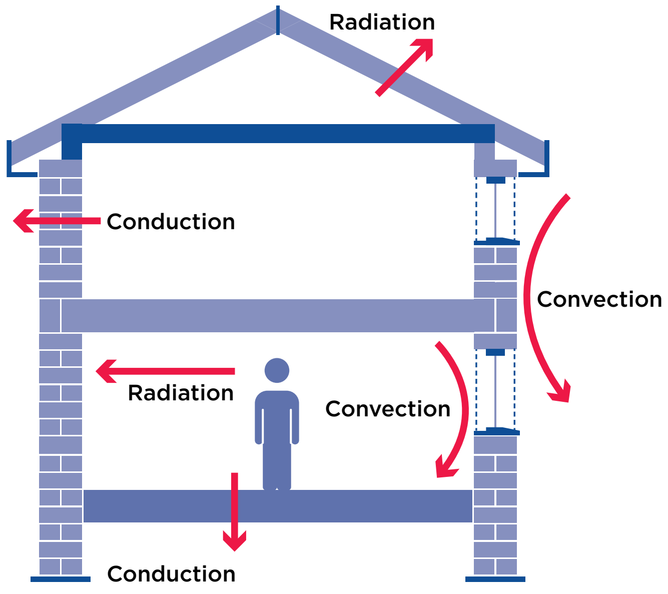
Radiation: Heat travels through space as waves, like the sun's warmth. It doesn't need to touch anything to transfer heat. Thermal radiation can pass through windows to a certain extent, as glass transmits a portion of infrared radiation, which is the primary form of radiation.

Emissivity: This refers to a material's ability to emit infrared radiation, essentially how well a surface radiates heat, measured as a value between 0 (perfect reflector) and 1 (perfect emitter, like a blackbody), and is crucial for understanding heat transfer within a building, particularly when analysing thermal images through infrared thermography. Most building materials have a high emissivity (they give off a lot of heat), except for shiny metals like aluminum foil

Thermal conductivity (λ)

The measure of a material's ability to transmit heat. Thermal conductivity (sometimes called the lambda value) is quantified as the rate of heat transfer through a material per metre thickness for a temperature gradient of one Kelvin per metre. It is expressed as W/m.K. The lambda value uses the λ symbol.

Lightweight materials have low conductivity and can be efficient thermal insulations. The lower the λ value of a material, the better its insulating efficiency.



Thermal transmittance (U-value)

A property of the whole wall or roof build-up, including air spaces, and is a measure of its ability to transmit heat under steady state conditions. Heat flows through walls and roofs from warmer to cooler areas. The U-value indicates how readily heat is transferred through a construction. It is measured in W/m²K (Watts per square metre per degree Kelvin).

A lower U-value indicates an improved thermal performance, meaning less heat is transmitted through the wall or roof. Calculating the U-value is a bit like adding up all the 'obstacles' to heat flow. These obstacles are called thermal resistances (R-values, see below).

You will need to consider:

- the materials the wall is made of (brick, wood, insulation, etc.)
- the surfaces of the wall (inside and outside)
- any air gaps or cavities within the wall

U-value calculations can be complex as different materials have different thermal resistances and any bridging, framing and fixings, etc., will have an effect on the overall performance of the construction. It is essential you add up all the R-values and then take the reciprocal (1 divided by the total). This gives you the U-value. Remember, a lower U-value is the goal for good insulation.

Thermal resistance (R)

The measure of the resistance to the passage of heat offered by the thickness of a material. Thermal resistance is expressed as m²K/W. The thermal resistance of a material is obtained by the following calculation:

$$R = \frac{t}{\lambda}$$

Where t = thickness in (m) and λ = thermal conductivity (W/m.K).

Thermal bridging

A thermal bridge in a residential house refers to a specific area within the building envelope where heat can easily escape due to a material with higher thermal conductivity interrupting the insulation layer. This essentially creates a 'bridge' that allows heat to flow more readily from the interior to the exterior. Thermal bridging (sometimes known as a cold bridging) often results in cold spots and increased energy loss in the home. Furthermore there is a high chance of condensation on the inner surfaces, which could lead to mould growth.

The principles of good thermal insulation

Reducing heat loss

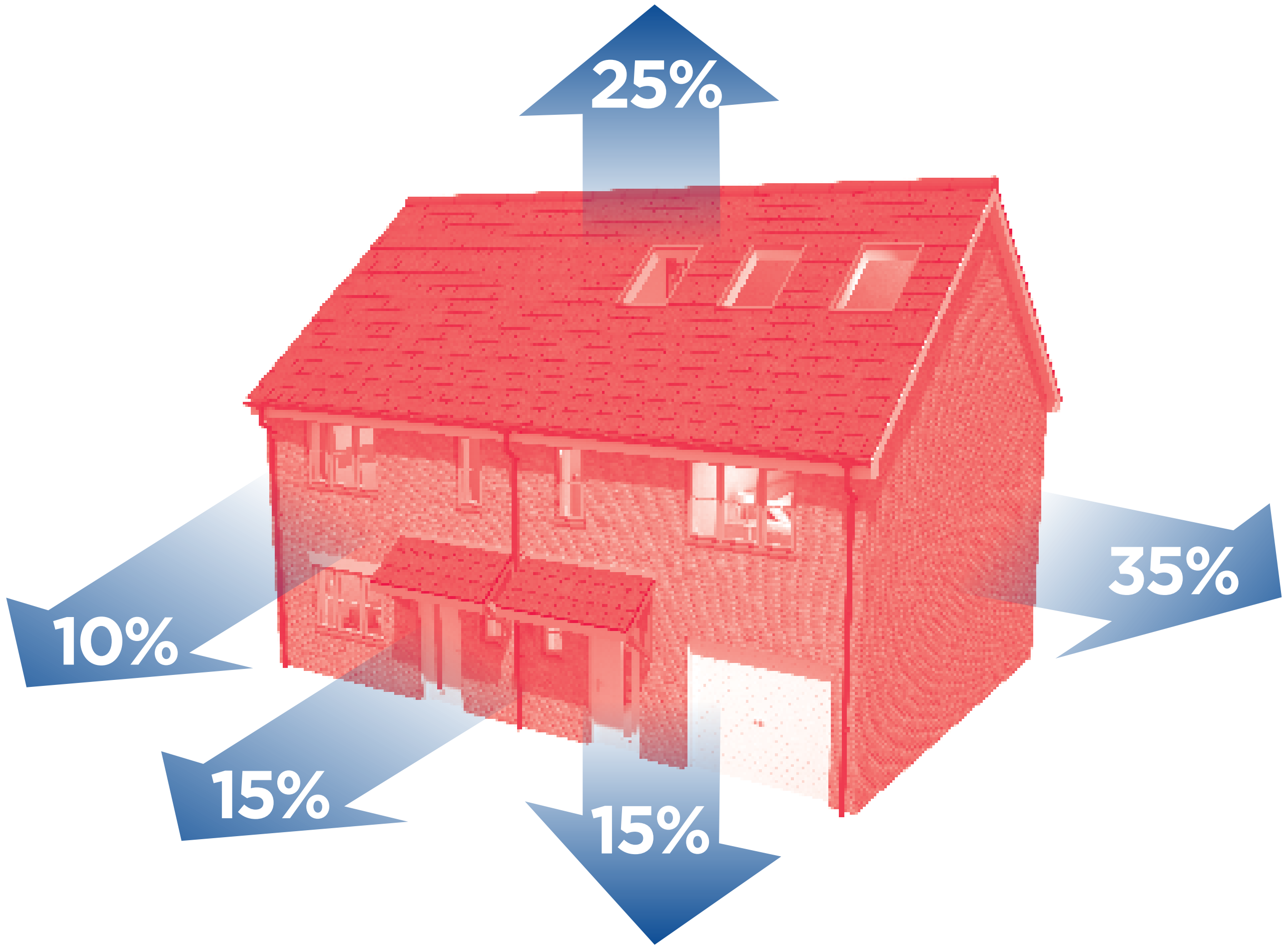
Any building with an internal temperature higher than the external temperature will lose heat. Thermal insulation reduces this heat loss and helps to conserve energy and reduce heating costs.

To comply with Building Regulations, levels of thermal performance are required for the external walls, roof and floors of almost all building types. Adequate insulation must also be provided for hot water heating services, pipes, warm air ducts and hot water storage vessels.

Savings are maximised where insulation is supported by other measures such as automatic controls, which govern the operation and output of heating systems and the temperature of stored water.

Airtightness

Airtightness describes the air leakage characteristics of a building. This determines the uncontrolled background ventilation or leakage rate of a building.



Airtightness is expressed in terms of a whole building leakage rate at an artificially induced pressure (usually 50 Pa). The lower the air leakage rate, the greater the airtightness. For example, within AD L1A an upper limit on air permeability of 8 $m^3/hour/m^2$ is required. In practice, most designs will need to be significantly better than this. Improving a building's airtightness is crucial to improving the energy performance of a building.

Although air leakage can occur directly, the majority of leaks occur indirectly. Air leakage paths are often complicated and therefore air leakage can be difficult to trace and seal effectively. However, the following is a list of some example air leakage paths:

- Cracks, gaps and joints in the structure
- Timber floors
- Joist penetrations of external walls
- Windows and doors
- Loft hatches
- Skirting boards
- Chimney and flues
- Service entries, ducts and electrical components
- Areas of un-plastered walls.

Overheating

With rising temperatures and more frequent heatwaves, overheating in homes poses serious risks to health and comfort—especially for vulnerable occupants. Effective design and ventilation are essential to prevent indoor temperatures from reaching unsafe levels.

Approved Document O (2021) for England ADO for Wales 2025 and Standard 3.28 for Scotland 2023 set out requirements to reduce overheating through two main strategies: limiting solar gains and removing excess heat. Measures vary based on whether a building allows cross-ventilation and if it's in a high-risk area, such as urban centres like London and Manchester. Glazing limits are defined by room orientation and ventilation type, and mandatory shading is required in high-risk zones.

Ventilation standards specify minimum openable areas to release heat, with stricter rules for buildings without cross-ventilation. For more detailed assessments, the simulation method using CIBSE's TM59 offers a more accurate overheating risk analysis than the simple method, making it better suited for complex developments.

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Building Regulations – Part L and guidance documents for residential buildings

Building Regulations (England and Wales)

Minimum energy efficiency requirements in England and Wales are set out in Building Regulations Approved Document L (AD L), Conservation of fuel and power.

New homes must meet energy efficiency targets based on both overall carbon emissions and the insulation of the building's structure (fabric). These targets are calculated using the Standard Assessment Procedure (SAP). While specific U-values (measuring thermal performance or thermal transmittance) aren't enough on their own to prove compliance, they are a key part of the SAP calculation.

AD L provides limiting fabric U-values, but there is a limit as to what can be achieved by fabric alone, however it provides examples based on a model home inclusive of low carbon technologies and it gives example U-values for a model home. Airtightness is also considered in the SAP calculation. See Table 1.

Scottish Building Standards (Section 6)

In Scotland, the Technical Handbooks provide guidance on how to meet the energy efficiency requirements for residential buildings contained in Section 6 (Energy) of the Scottish Building Standards. See Table 2.

Northern Ireland Building Regulations (Technical Booklet F1)

In Northern Ireland, the equivalent of Part L of the Building Regulations is found in Technical Booklet F1 – Conservation of fuel and power in dwellings. These documents provide guidance on meeting the energy efficiency requirements under the Building Regulations (Northern Ireland) 2012. See Table 3.

The following tables summarise the key regulatory requirements into practical, measurable targets for housebuulders and designers. By meeting the values in these tables, you can ensure your projects meet the minimum energy efficiency standards mandated by Part L, contributing to reduced energy consumption and lower carbon emissions.

Table 1 – AD L New dwellings

	England		Wales	
	Limiting fabric parameters (U-value W/m²K)	Notional dwelling specification (U-value W/m²K)	Worst acceptable fabric performance (U-value W/m²K)	Elemental specification (U-value W/m²K)
Wall	0.26	0.18	0.18*	0.13
Floor	0.18	0.13	0.15	0.11
Roof	0.16	0.11	0.13	0.11
Party Wall	0.20	0.00	0.20	0.00

* U-value of 0.18 applies to dwelling houses; flats are permitted 0.22 under Welsh Building Regulations.

Table 2 – Technical Handbook Section 6 (Domestic) New buildings

	Scotland	
	Maximum (U-value W/m²K)	Notional dwelling, package of measure (U-value W/m²K)
Wall	0.17	0.15
Floor	0.15	0.12
Roof	0.12	0.09
Cavity separating wall	0.00	0.00

Table 3 – Technical Booklet F1

	Northern Ireland	
	Maximum U-Value at any point (U-value W/m²K)	Area-weighted average (U-value W/m²K)
Wall	0.60	0.18
Floor**	0.60	0.18
Roof	0.30	0.16
Party wall	0.60	0.00

** Where the source of space heating is underfloor heating, the maximum floor U-value should be 0.15 W/m²K.

The Future Homes Standard

What is the Future Homes Standard?

In a bid to tackle the UK's climate warming emissions, the UK Government is committed to delivering zero-carbon new homes from 2027 through their Future Homes Standard, which was announced by the Government in its 2019 spring statement and launched in March 2026.

The aim of the Standard is to improve the performance of new homes, prepare them for zero carbon energy supply and to change the calculation method used to determine the performance of a building by considering the performance of the building as a whole.

As part of this drive to a zero-carbon future, new homes in England will no longer be built with fossil fuel heating, such as a natural gas boiler. It is expected that heat pumps will become the primary heating technology, insulation and airtightness will be enhanced.

Core elements of the standard

The core elements of the standard are three new Approved documents:

- Approved Document L (Energy & GHG Emissions) - Dwellings
- Approved Document L (Energy & GHG Emissions) Buildings other than dwellings
- Approved Document F (Ventilation) Dwellings.

In addition, new modelling/calculation software will be introduced (HEM) which will adopt a more holistic view of a home's performance.

Future Homes Standard Timeline

2019
Government announced in the spring budget that all new homes form 2025 would need to be zero carbon ready.

2021
New part L regulations come into force as a stepping stone to the future homes standard covering minimum energy efficiency performance targets. Airtightness requirements and improved minimum insulation standards.

2021
New part F regulations also come into force – setting standards for ventilation for new buildings.

2021
New part O regulations. Setting out how to mitigate overheating in new homes come into force in England.

2023
Government launch consultation on technical specification for the future homes and building standard.

2026
Future home standards regulations launched.

2027
Future home standard (low-risk builds) come into force: March 2027

2027
Future home standards (Higher-risk builds) come into force: September 2027

2028
Transitionary arrangements enable buildings to be built under the old regulations if submitted by the 24th March 2028.

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Future Homes Standard – The Detail

Building Fabric

- Currently, the Standard Assessment Procedure (SAP) model is used to evaluate building energy performance. This is being replaced by a new system called the Home Energy Model (HEM). While the base requirements for building elements like walls, floors, and roofs (measured by U-values) won't fundamentally change, this is only the minimum standard. To meet the stricter performance levels set by HEM, you'll likely need to improve these elements beyond the minimum U-values. In other words, while the fundamentals might seem the same, achieving good performance under HEM will require going above and beyond.
- Improved air-tightness requirement

Home Heat Sources

- Air Source Heat Pumps and 4th generation heat networks such as local district / community heat systems delivering lower temperature water (~65°C) distribution to a local area via renewable energy
- No practical use of fossil fuel boilers
- Wood and solid fuel heating systems will not be allowed as a primary heating solution. They will be permitted as a secondary source subject to certain requirements.

Ventilation

- Approved Document F - Ventilation has been updated making ventilation more critical as homes become more airtight. Background air leakage is no longer to be relied upon for indoor air quality - ventilation must be deliberately designed, installed and verified. Mechanical Ventilation is likely to be the effective default for new homes.

Solar PV

- Solar panels are required (except for buildings above 18metres or on sites where 720kWh/year cannot be achieved) with PV (the conversion of solar energy to electricity) or without (solar panels purely for hot water)

Real-World Building Performance

- Greater emphasis is placed on how the building performs once constructed, how services and technology is installed and how the home owner is helped to understand how their home works. Key topics being consulted on include:

- The introduction of a voluntary scheme to test the performance of a home before a new property is sold
- Changes to how fixed building services are commissioned. These include systems such as: mechanical ventilation and On-site electricity storage systems.
- New routes to certifying these installations and enforcing where necessary how such certification will be enforced is also being planned in line with wider industry changes as part of the introduction of a single Building Safety Regulator.
- The introduction of Home User Guides

Additional Points

AP / HEM Transition

Under transitionary arrangements SAP 10.3 will be the only approved calculation method at the launch of the standard. After 3 months+ HEM will be introduced and there will be a minimum period of 24 months where both calculations method will be acceptable.

New Metric

A new metric is being introduced for Homes and Non-Domestic Buildings. This will measure the amount of energy delivered to the home. Full details are yet to be released.

The Existing 'Dwelling Fabric Energy Efficiency Rate' (FEE) will be maintained. This measurement looks at how energy-Efficient the physical fabric of a home is, before any heating systems or renewables are added. In simple terms, how much energy does this home need to stay comfortable because of the way it is built?

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Insulation by application

Cold roofs

A **Isover Spacesaver:** A glass mineral wool roll which is pre-perforated to fit between common joist spacing at ceiling level. It is supplied in longer-length rolls to increase efficiency by reducing the number of rolls required to be delivered, stored and opened during installation.

B **Isover Spacesaver Plus:** With improved thermal performance compared to Isover Spacesaver.

See page 20.

Traditional external walls

C **Isover Cavity Wall Slab (CWS) 32:** A glass mineral wool slab providing thermal performance in external masonry cavity walls. Manufactured with a water repellent binder, the strong, resilient and flexible slabs are 455 mm wide to fit between standard wall tie spacing.

D **Gyproc ThermaLine PIR 38 mm:** An insulated plasterboard that can improve thermal performance and help reduce energy bills. It can also help keep rooms cooler in the summer.

E **Gyproc WallBoard:** A 12.5 mm thick plasterboard, used in single or multiple layers, this board offers drylining solutions for new and existing backgrounds in a wide range of buildings and applications.

See page 14.

Warm roofs (Room-In-Roof)

F **Isover Timber Frame Batt:** A glass mineral wool batt that can be used in timber frame constructions. The resilient and flexible batts can be friction fitted between standard timber studs, ensuring straightforward installation and helping to minimise gaps and therefore maximise thermal performance.

G **Gyproc ThermaLine PIR 78 mm:** An insulated plasterboard that can improve thermal performance and help reduce energy bills. It can also help keep rooms cooler in the summer.

See page 18.

Timber external walls

Isover Timber Frame Batt/Rolls: A glass mineral wool batt or roll that can be used in timber frame walls. Resilient and flexible they can be friction fitted between standard timber studs, ensuring straightforward installation and helping to minimise gaps and therefore maximise thermal performance.

Gyproc ThermaLine PIR 63 mm: An insulated plasterboard that can improve thermal performance and help reduce energy bills. It can also help keep rooms cooler in the summer.

See page 16.

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Solutions for traditional external walls

Notional U-value required = 0.18 W/m²K

The U-values listed in the left hand column of the table are examples of what can be achieved using various build-ups for traditional external (masonry or brick and block) walls, which include either full or partial-fill cavity wall insulation.

Typical specifications for traditional external walls

- Brick outer leaf
- Cavity partially or fully filled with Isover CWS insulation
- Aerated or solid concrete block inner leaf
- Gyproc WallBoard or Gyproc ThermaLine PIR internal lining on dabs

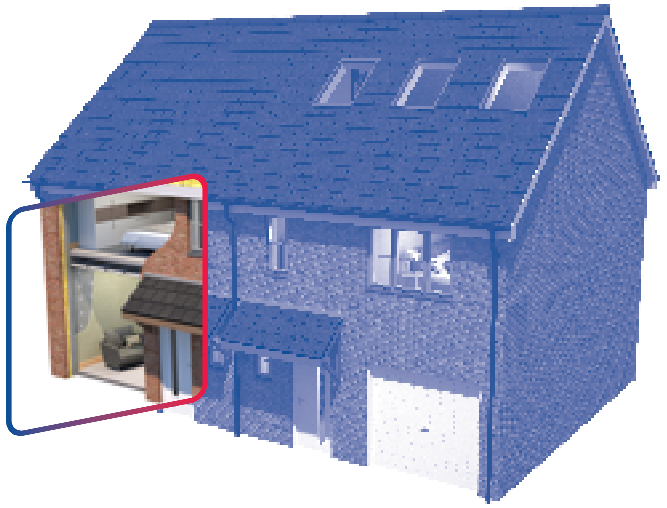
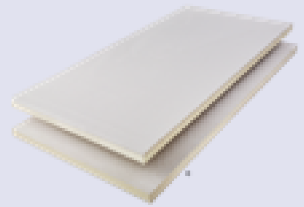
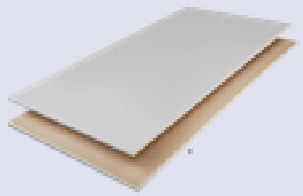


Table 4: Achievable U-values for traditional external walls

ACHIEVABLE U-VALUE (W/m²K)	EXTERNAL FACING FABRIC	CAVITY SIZE (mm)	ISOVER INSULATION IN CAVITY	CAVITY INSULATION THICKNESS (mm)	INSULATION LAMBDA VALUE λ (W/m.K)	INTERNAL FACING FABRIC	INTERNAL LINING SPECIFICATION	OVERALL THICKNESS (mm)	SAINT-GOBAIN CALCULATION REFERENCE
0.14	Brick	150		150	0.032	100 mm aerated block (λ 0.11)		405.0	TEW2
0.15	Brick	150		150	0.032	100 mm aerated block (λ 0.15)		405.0	TEW1
0.16	Brick	125		125	0.032	100 mm aerated block (λ 0.15)	 Gyproc ThermaLine PIR 38 mm (dot & dab)	380.0	TEW3
0.16	Brick	125		125	0.032	100 mm aerated block (λ 0.11)		380.0	TEW4
0.17	Brick	150	 Isover Cavity Wall Slab (CWS) 32	150	0.032	100 mm aerated block (λ 0.11)		380.0	TEW5
0.17	Brick	150		150	0.032	100 mm aerated block (λ 0.15)		380.0	TEW6
0.17	Concrete block (λ 0.46) + external render	150		150	0.032	100 mm aerated block (λ 0.11)	 12.5 mm Gyproc WallBoard	397.5	TEW7
0.18	Concrete block (λ 0.46) + external render	150		150	0.032	100 mm concrete block (λ 0.41)		397.5	TEW8
0.18	Brick	150		150	0.032	100 mm concrete block (λ 0.41)		380.0	TEW9

Note: Stainless steel wall ties were used for the calculations 2.5 per m² with a cross sectional area of 12.5 mm² for up to 100 mm cavities and 24 mm² for over 100 mm cavities.

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Solutions for timber frame external walls

Notional U-value required = 0.18 W/m²K

The U-values listed in the left hand column of the table are examples of what can be achieved using various build-ups for timber frame construction.

EnveoVent

EnveoVent is a complete ventilated and insulated structural wall system, designed, manufactured and delivered from the internal plasterboard right through to a choice of external finishes.
Click here to learn more.

Typical specifications for timber frame external walls

- Brick outer leaf
- Cavity 50mm
- Isover Polterm Max Plus (optional)
- Breather membrane
- Plywood
- Isover Timber Frame Batt/Roll between Timber Studs (15% proportion bridged)
- VCL where required
- Gyproc WallBoard or Gyproc ThermaLine PIR

Table 5: Achievable U-values for timber frame external walls

ACHIEVABLE U-VALUE (W/m²K)	TIMBER SIZE (mm)	INSULATION BETWEEN TIMBER FRAME	ISOVER INSULATION LAMDA VALUE λ (W/m.K)	SHEATHING BOARD THICKNESS	BREATHER MEMBRANE	VCL	THERMAL LAMINATE	GYPROC BOARD TYPE	CAVITY SIZE (mm)	INSULATION WITHIN CAVITY	OVERALL THICKNESS (mm)	EXTERNAL FACING FABRIC (mm)	SAINT-GOBAIN CALCULATION REF
0.15	89	90 mm Isover Timber Frame Roll or Batt 35	0.035	9 mm plywood	N/A	Polythene 1000 gauge VCL	N/A	12.5 mm Gyproc WallBoard	50	140 mm Isover Polterm Max Plus	403.0	102.5 Brick	TFEW1
0.15	140	140 mm Isover Timber Frame Roll or Batt 32	0.032	12.5 mm cementitous board	Breather membrane	N/A	Gyproc ThermaLine PIR 78 mm*	N/A	50	N/A	382.5	102.5 Brick	TFEW2
0.16	140	140 mm Isover Timber Frame Roll or Batt 35	0.035	12.5 mm cementitous board	Breather membrane	N/A	Gyproc ThermaLine PIR 78 mm*	N/A	50	N/A	382.5	102.5 Brick	TFEW3
0.18	89	90 mm Isover Timber Frame Roll or Batt 35	0.035	9 mm plywood	N/A	Polythene 1000 gauge VCL	N/A	12.5 mm Gyproc WallBoard	50	100 mm Isover Polterm Max Plus	363.0	102.5 Brick	TFEW4
0.18	140	140 mm Isover Timber Frame Roll or Batt 35	0.035	12.5 mm cementitous board	Breather membrane	N/A	*Gyproc ThermaLine PIR 53 mm*	N/A	50	N/A	357.5	102.5 Brick	TFEW5
0.18	140	140 mm Isover Timber Frame Roll or Batt 32	0.032	12.5 mm cementitous board	Breather membrane	N/A	Gyproc ThermaLine PIR 53 mm*	N/A	50	N/A	357.5	102.5 Brick	TFEW6
0.19	89	90 mm Isover Timber Frame Roll or Batt 32	0.032	9 mm plywood	Breather membrane	N/A	Gyproc ThermaLine PIR 78 mm*	N/A	50	N/A	328.0	102.5 Brick	TFEW7
0.21	89	90 mm Isover Timber Frame Roll or Batt 32	0.032	9 mm plywood	Breather membrane	N/A	Gyproc ThermaLine PIR 63 mm*	N/A	50	N/A	313.0	102.5 Brick	TFEW8
0.21	89	90 mm Isover Timber Frame Roll or Batt 35	0.035	9 mm plywood	N/A	Polythene 1000 gauge VCL	N/A	12.5 mm Gyproc WallBoard	50	75 mm Isover Polterm Max Plus	338.0	102.5 Brick	TFEW9
0.21	140	140 mm Isover Timber Frame Roll or Batt 32	0.032	9 mm plywood	Tyvek Reflex breather membrane	Tyvek AirGuard VCL	N/A	15 mm WallBoard / T25 mm service battens@600 mm	50	N/A	341.5	102.5 Brick	TFEW10
0.24	140	140 mm Isover Timber Frame Roll or Batt 32	0.032	9 mm plywood	Tyvek Reflex breather membrane	Tyvek AirGuard VCL	N/A	12.5 mm Gyproc WallBoard	50	N/A	314.0	102.5 Brick	TFEW11

* Gyproc ThermaLine has an integral VCL

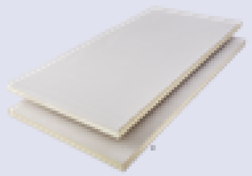
Solutions for warm roofs, e.g. room-in-the-roof

Notional U-value required = 0.13 W/m²K

The U-values listed in the left hand column of the table are examples of what can be achieved using various build-ups for warm roofs.

Saint-Gobain products used: Gyproc ThermaLine PIR, Isover Timber Frame Batt.

Table 6: Achievable U-values for warm roofs

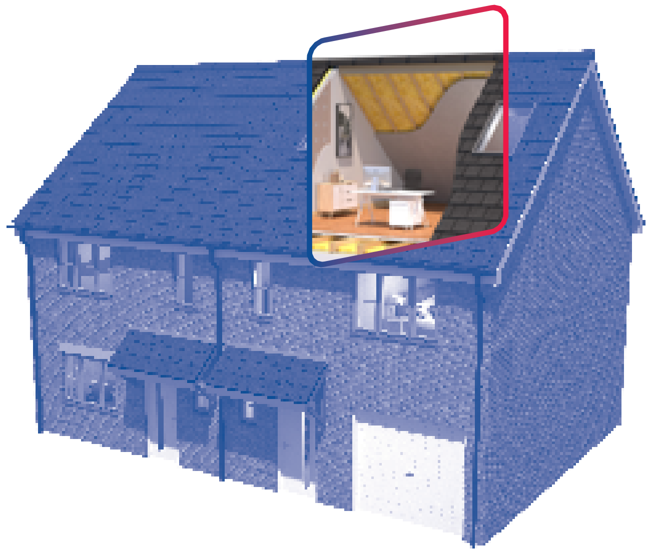
ACHIEVABLE U-VALUE (W/m²K)	TIMBER RAFTER SIZE (mm)	RAFTER CENTRES (mm)	ISOVER INSULATION BETWEEN RAFTERS	INSULATED BOARD UNDER RAFTERS
0.12	275	400	Isover Timber Frame Batt 35 150 mm + 100 mm	 Gyproc ThermaLine PIR 78 mm
0.12	245	600	Isover Timber Frame Batt 35 140 mm + 90 mm	
0.12	245	400	Isover Timber Frame Batt 32 140 mm + 90 mm	

Note: A breather membrane must be used with all options in the table, as the ventilation zone is under 50 mm.

Typical specifications for warm roofs

Isover Timber Frame Batt insulation is located between the rafters and a minimum 50 mm ventilation zone above the insulation is required. However, if the tiling batten / counter batten cavity is vented and a breathable membrane is used, the 50 mm vented zone may not be required.

A vapour control layer is required at sloping ceiling level and given that it is likely additional thermal insulation is required to meet the stringent U-value requirements, Gyproc ThermaLine PIR can be used as the sloping internal ceiling lining.



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Solutions for cold roofs

Notional U-value required = 0.16 W/m²K

The U-values listed in the left hand column of the table are examples of what can be achieved using various build-ups for cold roofs.

This method of insulating is an efficient way of exceeding SAPs by over-insulating the roof space.

Typical specification for cold roofs

Vapour control membranes are positioned at ceiling level to reduce the amount of water vapour migrating into the roof space, however, a continuous barrier is unlikely to be achieved because of the difficulty of sealing leaks through loft access hatches, electrical wiring drops, pipe penetrations and cracks. Gaps in the ceiling can be much more important in the mechanism of water vapour migration than diffusion through the ceiling itself. Appropriate cross-ventilation of the roof space is necessary.

Insulation, e.g. Isover Spacesaver range, is located on top of and between the ceiling joists and Gyproc plasterboard fixed to the underside. Gyproc Duplex grade plasterboards can be used as the ceiling lining if a vapour control layer is required.

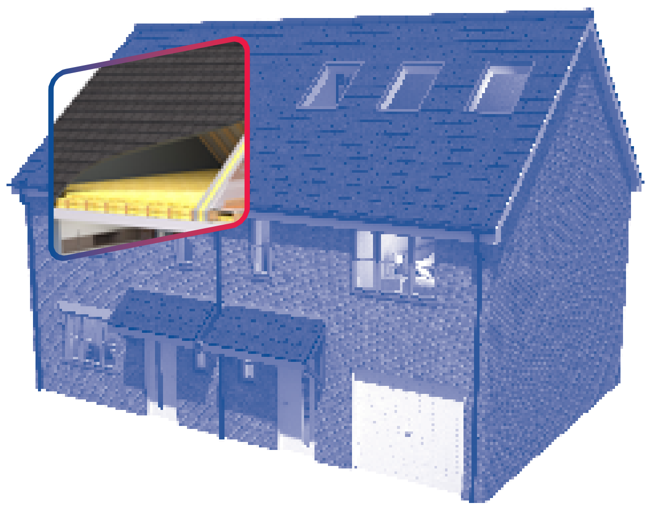

Table 7: Achievable U-values for cold roofs with 600mm joist centres

ACHIEVABLE U-VALUE (W/m²K)	JOIST CENTRES (mm)	JOIST DEPTHS (mm)	INSULATION BETWEEN RAFTERS	INSULATION OVER RAFTERS	OVERALL INSULATION THICKNESS (mm)
0.09	600	150	150 mm Isover Spacesaver (0.044 W/m.K)	350 mm Isover Spacesaver (0.044 W/m.K) 200 mm + 150 mm	500
0.11	600	100	100 mm Isover Spacesaver Plus (0.040 W/m.K)	250 mm Isover Spacesaver Plus (0.040 W/m.K) 150 mm + 100 mm	350
0.11	600	100	100 mm Isover Spacesaver (0.044 W/m.K)	300 mm Isover Spacesaver (0.044 W/m.K)	400
0.11	600	150	150 mm Isover Spacesaver (0.044 W/m.K)	250 mm Isover Spacesaver (0.044 W/m.K) 150 mm + 100 mm	400
0.12	600	100	100 mm Isover Spacesaver (0.044 W/m.K)	150 mm Isover Spacesaver (0.044 W/m.K) + 100 mm over	250
0.12	600	150	150 mm Isover Spacesaver Plus (0.040 W/m.K)	200 mm Isover Spacesaver Plus (0.040 W/m.K)	350
0.12	600	100	100 mm Isover Spacesaver (0.044 W/m.K)	250 mm Spacesaver (0.044 W/m.K) 150 mm + 100 mm	350
0.13	600	150	150 mm Isover Spacesaver (0.044 W/m.K)	200 mm Isover Spacesaver (0.044 W/m.K)	350
0.15	600	150	150 mm Isover Spacesaver (0.044 W/m.K)	150 mm Isover Spacesaver (0.044 W/m.K)	300

THERMAL SOLUTIONS FOR RESIDENTIAL BUILDINGS

Expert technical support

We'll support you with technical advice to guide you to the best tested solutions for your project.

SpecSure®
SYSTEMS WARRANTY

Technical Support

Our Technical Support Team are here to ensure you receive the best possible advice and are readily available, as and when you need it, to solve your queries and help find the best performance solutions for your build.

Field based support includes Residential Technical Managers to advise on solution proposals, technical details, as well as direct liaison with architects and in-house design teams as required.

Or, you can help yourself by accessing the **White Book Specification Selector** and online tools such as our **U-value thermal calculator** and our **BIM Locker**.

Extensive test reports

Our 13,000+ test reports cover almost every possible performance combination of our internal partitions, wall linings, and ceilings, including non-loadbearing timber specifications, ensuring our systems are often acknowledged as the most comprehensively and accurately tested systems on the market.

Building Test Centre (BTC)

We use the UKAS-accredited Building Test Centre (BTC), which is a UKAS accredited laboratory for fire, acoustic and structural testing facilities in Europe.

Training Academies

We've invested in our Build Better training academies and facilities to make our industry-recognised training easy and accessible to everyone. Our academies are both CITB and FIS-approved training providers and hold ISO 9001, ISO 14001 and ISO 45001 certifications. We help to **train around 5,000 professionals each year** aiding them to gain specialist knowledge in all aspects of plastering and drylining.

Our SpecSure® warranty

Guarantees our systems, comprising of genuine British Gypsum and Isover components, will perform as specified, for the lifetime of the building. You can rest assured your British Gypsum system is developed, tested and supported by drylining specialists, protecting the future of your building and its users.

For further information on the SpecSure® lifetime system warranty visit **british-gypsum.com**

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For more information

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