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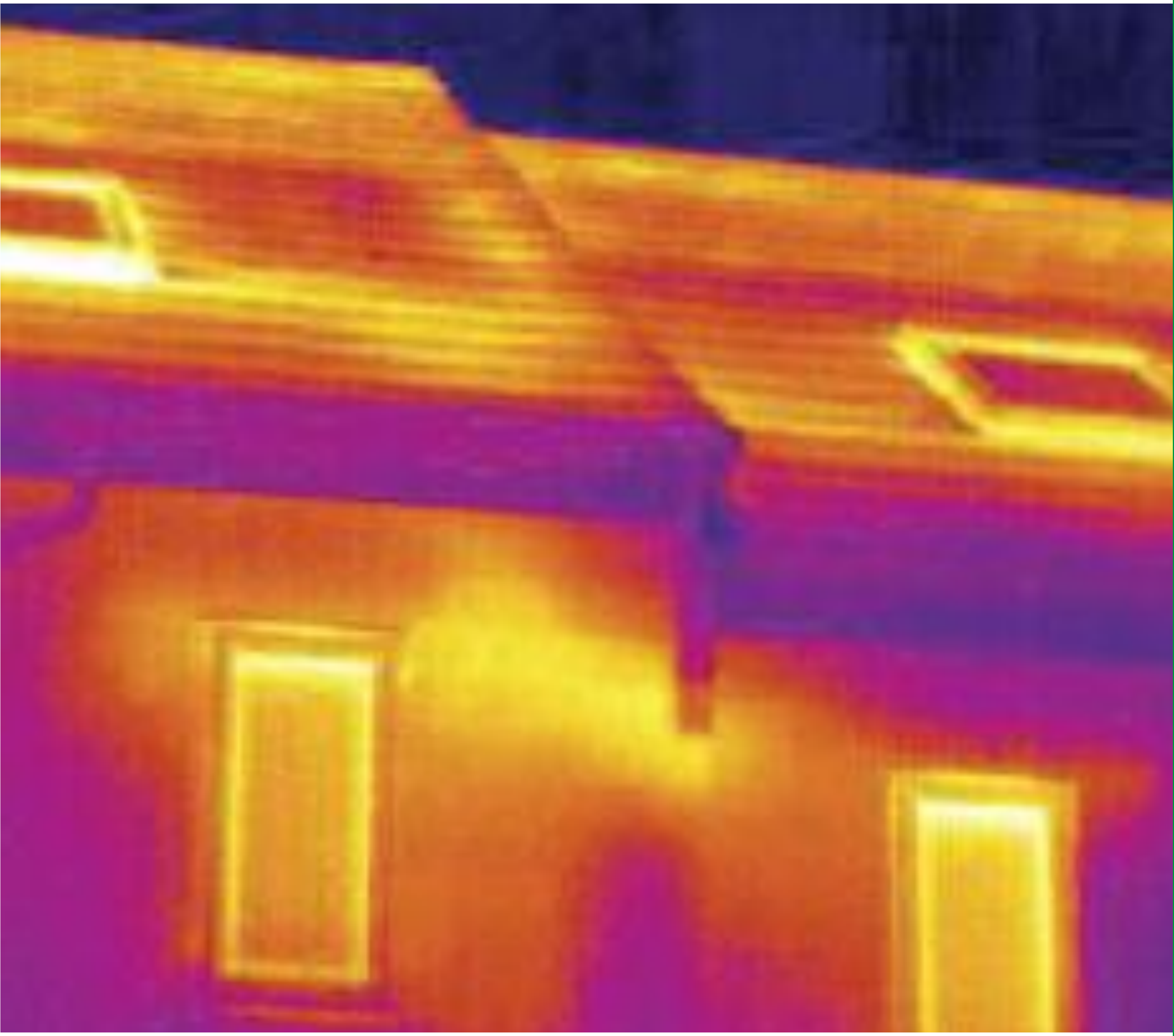
November 2010

Preventing Thermal Bypasses in Party Separating Walls

Design Guide, 2010 Building Regulations Issue



Including Robust Details

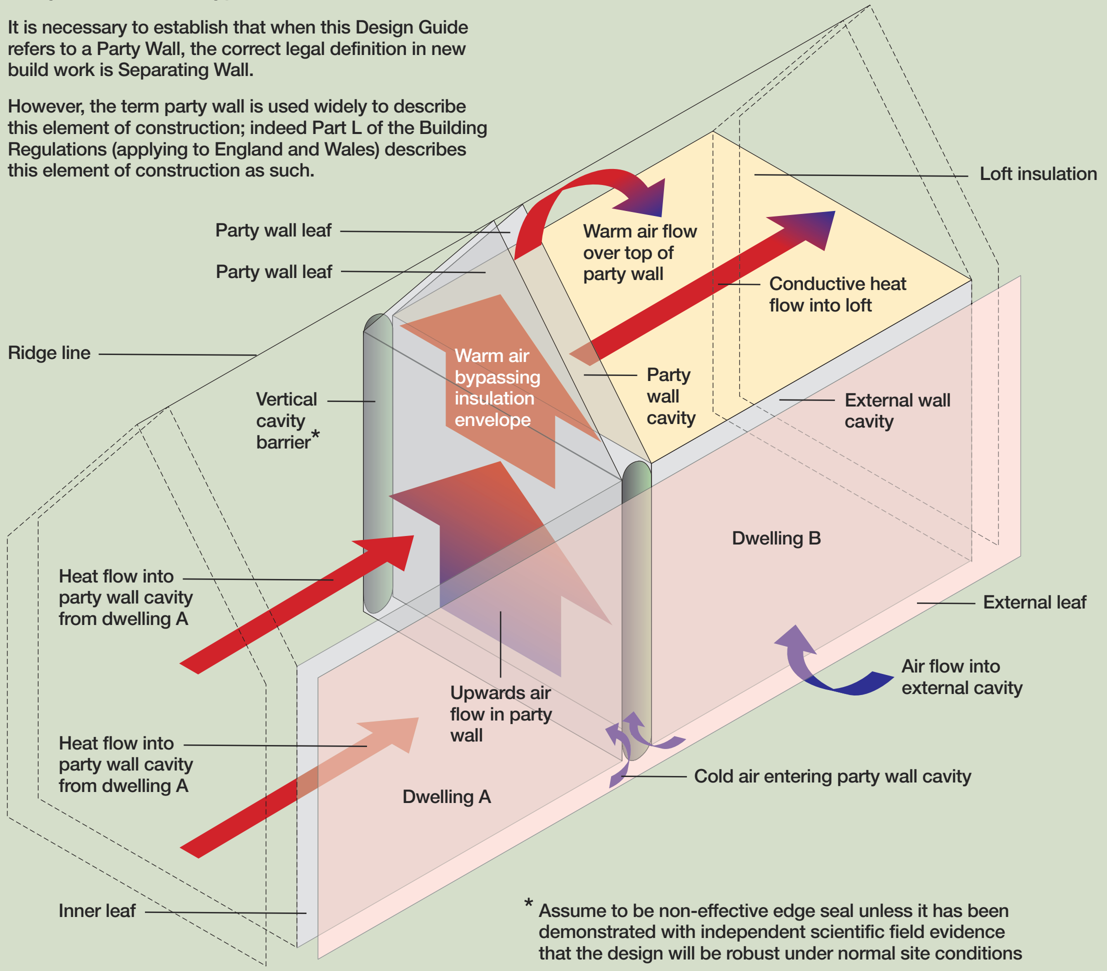
MINERAL WOOL INSULATION MANUFACTURERS ASSOCIATION

Contents

Party Wall Thermal Bypass Mechanism

It is necessary to establish that when this Design Guide refers to a Party Wall, the correct legal definition in new build work is Separating Wall.

However, the term party wall is used widely to describe this element of construction; indeed Part L of the Building Regulations (applying to England and Wales) describes this element of construction as such.



* Assume to be non-effective edge seal unless it has been demonstrated with independent scientific field evidence that the design will be robust under normal site conditions

Revisions to the Building Regulations applicable to the various regions of the United Kingdom, which are effective from October 2010, recognise for the first time that considerable heat can escape through untreated, internal cavity walls between connected buildings. These walls are referred to as party walls in Part L of England and Wales's Building Regulations and separating walls in Section 6 of Scotland's Building Standards. The heat lost through these walls needs to be considered as part of the design process.

Measures to improve the thermal performance of party cavity walls need to be proven by independent testing to meet the claimed thermal and acoustic requirements.

This design guide provides full-fill mineral wool insulation solutions that, together with effective edge sealing, have been proven to comply with the requirements for a zero U-value without compromising acoustic performance. Indeed a number of the solutions have been approved as Robust Details, and can therefore be used to comply with the requirements of Part E1 in England and Wales without pre-completion testing.

It is also important to consider upgrading the party cavity walls in existing as well as new-build properties. Whereas the heat lost from separating cavity walls was previously thought to be zero, studies by the Buildings and Sustainability Group of the School of the Built Environment at Leeds Metropolitan University have shown that, for example, in a mid-terraced dwelling the heat lost through an untreated separating or party cavity wall is greater than that lost through all of the other external walls combined.

The mineral wool insulation solutions in this guide provide specifiers and contractors with practical, robust and cost-effective means of insulating both domestic and non-domestic separating walls.

Effective mineral wool solutions are also available for use throughout the whole building to insulate external walls, floors, partitions, lofts, roofs, pipes, ducts and elsewhere.

On-site tests show that the effective U-value for a party wall in a masonry dwelling can potentially be reduced to zero if the party wall cavity is completely filled with mineral wool insulation and when combined with mineral wool-filled cavity barriers at the edges of the cavity. Timber party walls are similarly affected.

Introduction

Background to Party Wall Thermal Bypass

Party Wall, Separating Wall, Common Wall

t is necessary to establish that when this document refers to a Party Wall, the correct legal definition in new build work is Separating Wall. However, the term party wall is used widely to describe this element of construction; indeed Part L of the Building Regulations (applying to (England and Wales) describes this element of construction as such.

Common walls between two separate properties which contain a cavity can 'communicate with the external environment' and present an opportunity for heat loss where previously not expected.

The energy performance requirements of new housing, set out in Part L1A of the Building Regulations, demands that very low or zero carbon emissions are achieved.

However, it has become apparent through whole-house test measurements, that the actual energy performance achieved in the constructed building is often significantly worse than the expected energy performance as designed.

These observations showed that whilst some of the shortfall was due to lower levels of efficiency in services than assumed in their design, there was also a significant shortfall in the performance of the building fabric.

Space heating demands are calculated in SAP, based upon a total heat loss figure for the building fabric. This includes factors such as U-values of building elements and fittings, the rate of unintended ventilation, and an estimate of the heat loss through thermal bridging.

If the actual measured heat loss is higher than the calculated figure this suggests that a) either one of these factors is not being accounted for accurately or b) there is some other heat loss mechanism or thermal bypass that is being overlooked.

Testing revealed that the shortfall was attributable to both factors.

What is Meant by Thermal Bypass?

Thermal bypass is simply where heat bypasses the insulation and escapes to the external environment. This can occur where a cavity internal to the insulation layer is able to communicate with the external environment, thus causing heat loss from a location in the building that isn't considered to be so affected or allows the transport of heat around the insulation. Thermal bypasses can render the insulation layer completely irrelevant to the flow of heat in localised areas and significantly worsen the fabric energy efficiency of the building.

The most significant bypass identified in these trials was the Party Wall Thermal Bypass in attached dwellings.

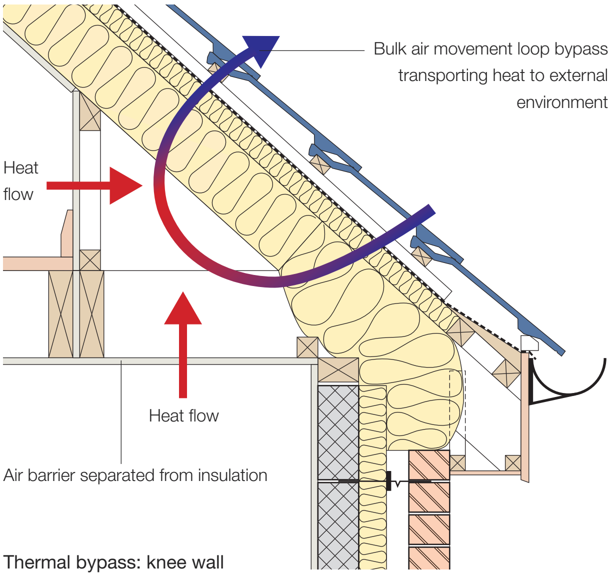
Party Wall Thermal Bypass

This is a process whereby heat is lost to an uninsulated party wall cavity containing moving cold air that has entered from external flanking building elements. A number of trials have been undertaken to firstly observe and quantify this phenomenon and secondly develop and provide a solution that eliminates the heat loss.

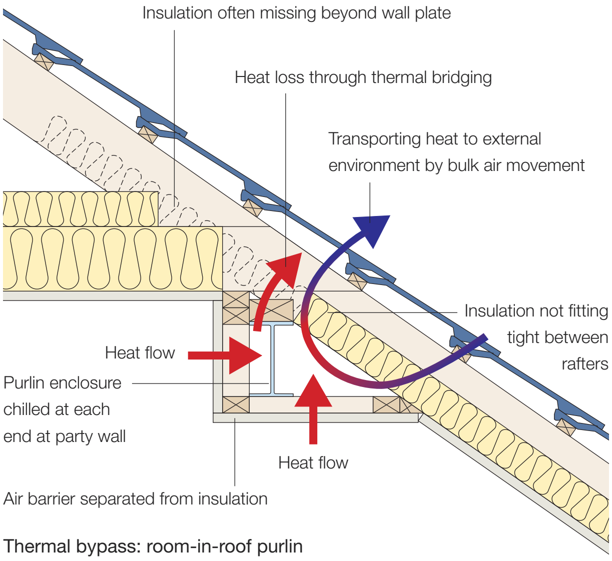
An illustration of this process is shown on page 2.

Other Thermal Bypasses

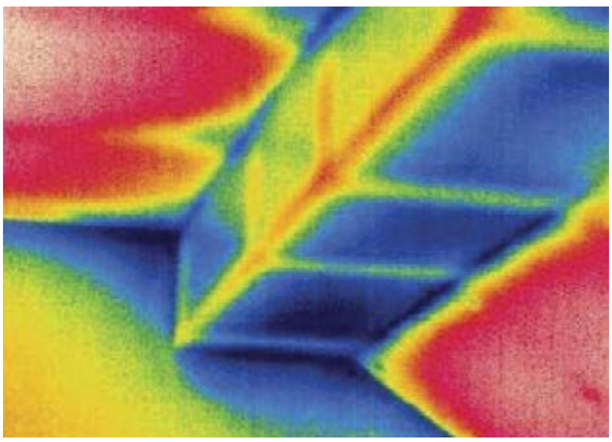
However, two other common sources of thermal bypass are knee walls and purlins in room-in-roof constructions where the insulation is placed in the pitch of the roof and the air barrier follows the plasterboard lining.



Thermal bypass: knee wall



Thermal bypass: room-in-roof purlin



Thermal image of thermal bypass: room-in-roof purlin

Party Wall Field Trials - Stamford Brook

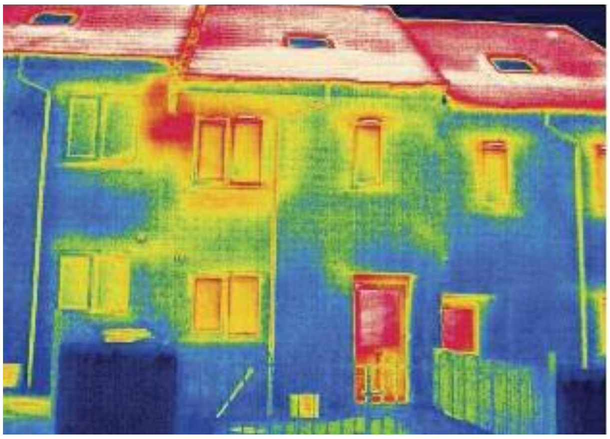
Between 2005 and 2007, tests were conducted in a field trial project at the Stamford Brook residential development of around 700 cavity masonry dwellings. The development was carried out under a partnership agreement between the land owner, the National Trust, and the two developers Redrow and Bryant Homes. The development partners also participated in a 'Partners in Innovation' (PII) project with the Centre for the Built Environment at Leeds Metropolitan University, where the overall PII project objective was to support future reviews of Part L of the Building Regulations.

The testing, conducted by Leeds Metropolitan University, established that there were significant heat losses because of thermal bypass operating in the party wall cavities of terraced and semi-detached masonry houses. This was equivalent to the party wall having an effective U-value of between 0.5 and 0.7 W/m^{2}K.

These findings on thermal bypass in party wall cavities are important because modelling conventions used in domestic energy models such as SAP 2005 (BRE 2005) and in other heat loss calculation methodologies such as PHPP (Passive House Planning Package) assume that there is no heat loss through a party wall between dwellings.

A further investigation was also carried out to investigate the use of an insulated cavity barrier positioned horizontally at the top of the party wall cavity, the aim of which was to reduce vertical air flows in the party wall and thus mitigate the bypass. The effect of this horizontal cavity barrier was to reduce the effective U-value of the party wall to around 0.2 W/m^{2}K.

Stamford Brook masonry houses used in field trial



Thermal image of masonry houses

Masonry Party Walls - Bradford

A new research project, again undertaken by Leeds Metropolitan University, to further investigate the party wall thermal bypass in more detail, was funded by MIMA (formerly Eurisol). With experimental work taking place between January and April 2009 the general aims of this project were to build upon the observations made at Stamford Brook. This would allow the development of a better understanding of the fundamental mechanisms of the bypass effect and to confirm that fully filling the party wall cavity with mineral wool insulation would eliminate the heat loss due to the bypass.

A series of thermal measurements were conducted on a pair of semi-detached masonry dwellings which had a standard cavity party wall constructed according to the requirements of Robust Detail E-WM-2*****. The experimental programme was designed to quantify the size of the party wall thermal bypass for the un-insulated cavity and then to determine the reduction in the bypass effect when the cavity was insulated with mineral wool.

The acoustic performance of the party wall was also measured before and after filling the cavity with mineral wool insulation in order to assess the impact on airborne sound transmission.

The results of these tests showed that:

- The effective U-value of the party wall could potentially be reduced to zero if the cavity was completely filled with mineral wool insulation combined with mineral wool filled cavity barriers at cavity edges
- The mineral wool insulation made no significant difference to the airbourne sound insulation properties of the party wall, where the mean value remained at 53 dB, close to the typical performance of robust detail E-WM-2

The test procedures adopted at Bradford are described in detail at – http://www.leedsmet.ac.uk/as/cebe/projects/measurement_of_thermal_bypasses.pdf

Timber Frame Party Walls - Darlington

Equivalent tests for a timber frame party wall in a pair of semi-detached houses near Darlington have shown that timber frame dwellings also suffer from thermal bypasses.

Acoustic tests indicated that the airbourne sound insulation was marginally reduced after the cavity was filled, but still achieved a value of 56 dB, thereby easily meeting the airbourne sound insulation requirements of Part E of the Building Regulations.

The Details in this Design Guide

Based on these test results, the details in this design guide have been designed to enable the construction of party walls with an effective U-value of zero whilst complementing Robust Detail constructions without compromising acoustic performance.

Refer to the Key to Details on page 9 for an overview of each type of detail considered and its location.

***** From the Robust Detail Ltd manual

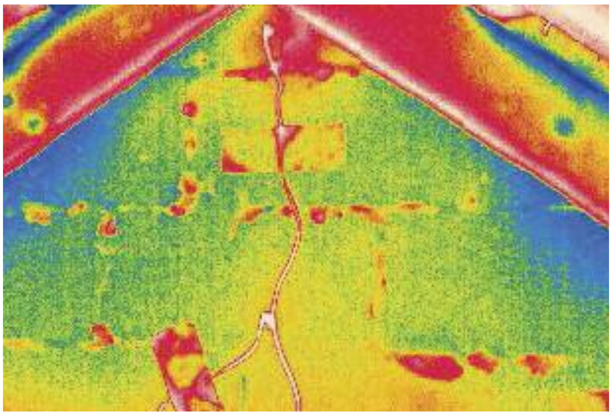
Party Wall Design

Party Wall Function

A party, or more properly separating, wall in a building may be utilised to provide structural strength to the building, but its primary function is to provide separation. This is both for physical separation and for fire and acoustic protection, with specific minimum performance standards being required by Building Regulations for fire and acoustic protection. Thermal separation between dwellings either side of the party wall was not considered by Building Regulations as it was assumed that both dwellings will be heated. Of course this assumption is not valid if the dwellings have different heating régimes, even if there is no party wall thermal bypass present.

The phenomenon of party wall thermal bypass is not an issue of failing thermal separation. Indeed, the testing that is used to quantify its value requires both dwellings to be heated to the same temperature so that there is no heat flow from one dwelling to another. Party wall thermal bypass is a heat loss from both sides of the party wall to the external environment, and testing has shown that this level of heat loss is so high that it must be included in the SAP calculation. Clearly, designers will seek to take measures that reduce or eliminate the total heat loss. However, caution should be exercised for two reasons:

1. The measures taken do not compromise the acoustic or fire separation performance of the wall.
2. The effectiveness of the measures taken to reduce party wall thermal bypass is not compromised by poor workmanship.



Thermal image of party wall in masonry house

Building Regulations

Fire Separation

Building Regulations require separating walls to provide a minimum of 60 minutes of fire resistance between dwellings, with dwellings above 18 metres potentially requiring a longer period. Any measure that is included to reduce or eliminate thermal bypass should not compromise this.

The solutions contained within this guide only use non-combustible materials which will definitely not reduce the fire resistance of the separating wall and will possibly improve it. The solutions also place strong emphasis on the correct installation of sleeved flexible cavity barriers for edge sealing which will serve to reinforce their good installation for fire protection purposes.

Acoustic Separation

Building Regulations require that a separating wall provides reasonable resistance to sound between the adjoining dwellings. The requirement itself is expressed slightly differently in the regulations that apply in England and Wales to those that apply in Scotland.

Approved Document Part E1 (England and Wales)

Separating walls are required to provide a minimum airborne sound insulation of 45 dB $D_{nT,w}+C_{tr}$. Compliance with this requirement is shown by either carrying out sample pre-completion sound testing or by building walls to specified Robust Detail designs and registering them with Robust Details Limited. All the Robust Detail designs have been subjected to both rigorous on-site testing before acceptance, and continuous inspection to ensure that they will consistently meet the requirements of the Building Regulations. Indeed, to become a Robust Detail, the construction must show a level of performance significantly higher than the minimum 45 dB $D_{nT,w}+C_{tr}$ requirement.

This approach has resulted in a significant improvement in the acoustic performance of separating walls.

Technical Handbook Section 5 (Scotland)

In Scotland there is no option to use Robust Details. The design standard is a minimum airborne sound insulation of 56 dB DnT,w (note this does not include the low frequency Ctr correction in the England and Wales Regulations, and can be taken as being of approximately similar performance). Compliance is proven by post-completion sound testing.

General Acoustic Performance Considerations

It is important that any solution to party wall thermal bypass does not undermine the improvements to the acoustic performance of party walls. Since testing of separating walls is now commonly undertaken for Building Regulations requirements, specifiers should expect, as a minimum, that on-site test evidence is provided. This would show that the performance of separating walls that includes a solution to party wall thermal bypass can meet the minimum requirements of Building Regulations and, ideally, have shown higher levels of performance that will then allow the solution to be adopted as a Robust Detail.

Party Wall Thermal Bypass

Party wall thermal bypass is now recognised in Building Regulations for new buildings, and details of how to include the phenomenon is provided in Approved Document Part L1A: 2010 Edition for England and Wales and Section 6 of both the Domestic and Non-Domestic Technical Handbooks for Scotland. In both cases the approach requires that a value for the heat loss through the party wall is included in the calculation of whole building energy performance and carbon emissions. However, the finer details vary between Part L1A and Section 6.

Conservation of Fuel and Power in New Dwellings

Approved Document Part L1A (England and Wales)

Part L1A requires that a Target Emission Rate (TER) is calculated for the proposed dwelling based on a notional building of the same dimensions. For Part L1A: 2010, the notional building now includes a party wall heat loss, but it is set at zero.

The Dwelling Emission Rate (DER) is calculated for the dwelling to be constructed and this also must include the heat loss through the party wall.

Part L1A, Section 5, deals with the issues of how to assign a value to the heat loss due to party wall and other thermal bypasses. It gives four options for the value of party wall bypass heat loss, and these are detailed in the table opposite.

TABLE OF U-VALUES FOR PARTY WALLS	
PARTY WALL CONSTRUCTION	**U-VALUE** (W/m²K)
Solid	0.0
Unfilled cavity with no effective edge sealing	0.5
Unfilled cavity with effective sealing around all exposed edges and inline with insulation layers in abutting elements	0.2
A fully filled cavity with effective sealing at all exposed edges and inline with insulation layers in abutting elements	0.0

Table Note:
This table shows the heat loss as a U-value, although strictly speaking this is not a U-value in the sense that is normally understood because the heat loss mechanism is a combination of heat loss through the wall and junctions with air circulation effects between the party wall cavity, other building cavities and the external environment. The values here have been obtained from measurements of total heat loss attributable to the party cavity wall in real buildings and then divided by the total area of the party wall, and should be considered as 'effective U-values'. This is how it is possible to have zero U-value options.

Clearly, using a construction option with an effective U-value other than zero will mean that a higher heat loss value is used for the party wall in the DER calculation than in the TER calculation making the achievement of a 25% reduction in DER over Part L: 2006 standards even harder. Also, it is not possible to use the option of an empty cavity and no effective edge sealing because the limiting fabric parameter in Part L1A: 2010 is an (effective) U-value of 0.20 W/m²K.

Approved Document L1A deals with party wall and other thermal bypasses in paragraphs 5.3 to 5.8 where it states that in the absence of specific independent scientific field evidence it is reasonable to apply the U-values, shown in the above table for the relevant type of construction, in the DER calculation. But in applying those U-values where edge sealing is adopted, either on its own or with a fully filled cavity, the sealing must be effective in restricting airflow and is aligned with the thermal envelope. It further states that in order to claim a reduced (effective) U-value (0.2 W/m²K - 0 W/m²K) it is necessary to demonstrate that the design will be robust under normal site conditions.

Technical Handbook Section 6 (Scotland)

Similarly to Part L1A the party wall thermal bypass is included in the whole building calculation, and this is detailed in sections 6.1.2 and 6.2.1 of the Technical Handbook. Where a cavity separating wall is present, the Notional Building includes an (effective) U-value of 0.2 W/m²K for the area of the separating wall. When calculating the DER it is possible to exclude separating walls between heated areas where thermal transmittance need not be assessed, provided measures to limit heat loss arising from air movement within the cavity separating wall are made.

The Technical Handbooks further state that to limit heat loss, a separating wall cavity should have effective perimeter sealing around all exposed edges and in line with insulation layers in abutting elements which separate the dwelling from another building or from an unheated space. Further reduction in heat loss can be achieved where the cavity separating wall is also fully filled with a material that limits air movement.

Defining Effective Cavity Edge Sealing

Neither Approved Document L1A nor Technical Handbook 6 specify what is an acceptable material for full-fill or what constitutes effective edge sealing. In fact the two issues are linked.

The more effective the cavity fill material is at restricting air movement in the cavity (reducing the ability for air to move within, and to and from, the party wall cavity) then the easier it becomes to create an effective edge seal. In reality the only way to be certain of the performance of a system is to undertake scientific field trials that measure the heat loss. Laboratory simulations are unlikely to provide for the range conditions that a real party wall will be subjected to in terms of differential pressure from wind impinging on the buildings, and equally will not be able to replicate the installation conditions and factors that are present on a live construction project.

The test methodology developed by Leeds Metropolitan University and used in the MIMA trials is available at http://www.leedsmet.ac.uk/as/cebe/projects/measurement_of_thermal_bypasses.pdf. This provides a robust method for obtaining scientific field evidence.

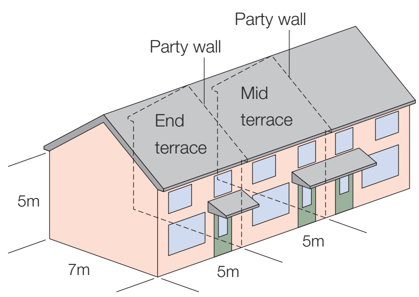
Party Wall Bypass in Buildings Other Than Dwellings and in Existing Buildings

The mechanism that creates party wall bypass is not restricted to new dwellings. Anywhere there is an arrangement that includes a cavity in a party wall that can connect to external wall and floor cavities and the roof, a bypass will be present. Whilst Section 6: 2010 in Scotland explicitly requires the inclusion of this heat loss in the SBEM calculation for New Build Non Dwellings, Part L2A does not. Clearly, responsible building owners, designers and developers will wish to incorporate the latest research so that the buildings they commission, design and build, perform as closely as possible to the design expectations.

With respect to existing buildings, of course heat loss exists here too and when refurbishing properties with party wall cavities the treatment of these walls should be undertaken to maximise the energy efficiency of the building.

The Importance of Aiming for a Zero Effective U-Value

The thermal impact of having a U-value of 0.20 W/m²K in a party wall is very high. If this is chosen and the building is still to comply with regulations then the other parts of the building have to work harder to overcome this. The two examples below of an end terrace house and a mid-terrace house show the importance of constructing a party wall with a U-value of 0 W/m²K.



End terrace house example
External wall area 17m x 5m = 85m²
Party wall area 7m x 5m = 35m²
If a party wall solution with an effective U-value of 0.2 W/m²K rather than 0 W/m²K is built, then an extra heat loss of 7 W/K is incurred. This wasted heat loss is the equivalent of **increasing** the external wall U-value by 0.08 W/m²K (7W/85m²)

Mid-terrace house example
External wall area 10m x 5m = 50m²
Party wall area 14m x 5m = 70m²
If a party wall solution with an effective U-value of 0.2 W/m²K rather than 0 W/m²K is built, then an extra heat loss of 14 W/K is incurred. This wasted heat loss is the equivalent of **increasing** the external wall U-value by 0.28 W/m²K (14W/50m²)

For compliance with Part L1A and Section 6: 2010, it is likely that external walls will have to be built with a U-value in the range of 0.23 W/m²K to 0.28 W/m²K. To accept an unnecessary heat loss equivalent to a U-value **increase** in the external wall of 0.08 W/m²K (29%) in a mid terrace house let alone 0.28 W/m²K (100%) in an end terrace house, would seem to be unjustifiable.

What is Mineral Wool?

Mineral wool is a non-metallic, inorganic product manufactured from a carefully controlled mix of raw materials, mainly comprising either rock or silica which are heated to a high temperature until molten. The molten glass or rock is then spun and formed into a flexible, fibrous mat for further processing into finished products.

The exceptional thermal, fire and acoustic properties of mineral wool derive from the mat of fibres that prevents the movement of air, and from mineral wool's inert chemical composition.

It is a very versatile material, and can be manufactured to many different densities to give varying properties, formed in various shapes and faced with a variety of sheet materials. The range of products includes loose granular material used for blown insulation of cavity walls, slabs for walls, rolls for loft insulation through to pre-formed and faced pipe sections, ceiling tiles and acoustic panels.

Global Warming

Climate change is the crucial environmental issue of the 21st century. Through the Kyoto Protocol, the EU has committed to reducing European emissions of man-made greenhouse gases which are thought to be one of the major causes of climate change.

Carbon dioxide is one of a group of greenhouse gases that are responsible for climate change and targeted by initiatives such as the Kyoto agreement. Carbon dioxide, or CO_2, is emitted as a result of the combustion of fossil fuels.

Mineral wool insulation offers a proven and effective technology that can help to substantially reduce greenhouse gas emissions by better insulating buildings, including housing, and so reduce energy demand. Housing accounts for some 27% of the UK's greenhouse gas emissions, with a large proportion of this attributable to space heating.
(From Home Truths: a low-carbon strategy to reduce UK housing emissions by 80% by 2050 – pub. University of Oxford)

The Environmental Sustainability of Mineral Wool

Mineral wool products, with their inherent benefits of thermal insulation, acoustic protection and fire protection, are manufactured and delivered in an environmentally efficient way that ensures highly sustainable construction solutions are achieved every time.

Energy in Manufacture and Energy in Use

Although the manufacture of mineral wool consumes energy, the finished products save far more energy in use than is expended in their manufacture.

Similarly, the ratio of in-use savings against emissions due to manufacture for the main greenhouse gas CO_2, is equally positive.

Other greatly reduced air pollutant emissions include SO_2, various nitrogen oxides (NO_X) and fine particulates.

When mineral wool is assessed under rigorous life cycle analysis it is found to have lower embodied environmental impacts than many competitor products, especially in applications where low density mineral wool products are used.

Recycling and the Manufacturing Process

Increasing amounts of recycled materials are used in the manufacture of mineral wool products.

Within the glass wool sector a major contributor to energy savings in recent years has been the use of recycled materials in the production process.

Depending on the quality and availability of local supplies, recycled content now makes up 30% to 60% of the raw material input in mineral wool production, as defined by the WRAP Rules of Thumb Guide. In some plants the recycled content is as high as 80%.

Owing to improving technology, most of the waste products are recycled back into the production process as well as increasingly using waste from building sites or demolition works to replace raw materials.

Water Pollution and the Manufacturing Process

Water used in the manufacturing process is generally in a closed circuit system. This has the twofold advantage of reducing fresh water consumption and avoiding the discharge of dirty or polluted water.

Transport of Mineral Wool Products

The high compression ratio and elasticity of mineral wool means that the products can often be packed at up to one ninth of their original volume. Fewer lorries are required for transportation, thus reducing the environmental impact of transportation.

The Benefits of Mineral Wool

- **Thermal Insulation**

  Helps to restrict heat transfer through building envelopes thus reducing the demand for space heating and cooling energy. This in turn reduces a host of negative environmental impacts including the emissions of CO_2 and other pollutants such as sulphur dioxide (SO_2) and nitrogen oxides (NO_X), as well as delivering cost savings to the building occupier.

- **Acoustic Protection**

  Ability to absorb sound energy means that it improves the acoustic insulation of walls, floors and roofs, helping to restrict noise transfer within a building, from one building to another and both to and from a building and the external environment.

- **Fire Protection**

  Non combustible, so provides in-built fire protection and effectively contributes to the fire safety of buildings.

- **Environmental Sustainability**

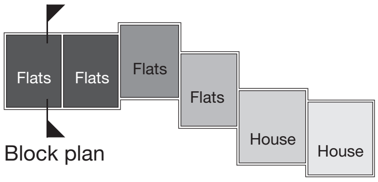
  Mineral wool insulation is one of the few building materials that saves energy in use and reduces the need for combustion of fossil fuels to provide energy for heating or cooling of buildings. When used as a thermal insulant in its in-use phase, mineral wool will save many tens of times more CO_2 and primary energy than is invested in the sourcing of raw materials, manufacture, distribution, installation and disposal at end of life. The balances become positive in the first few years after installation. The recycled content and recyclability of the material reduces waste disposal needs and saves valuable resources both now and in the future. This is shown in the Green Guide A+ rating of many mineral wool products.

- **Wider Benefits**

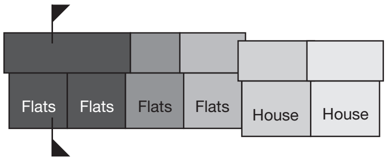
  Alongside the environmental benefits provided, using mineral wool can of course help reduce energy costs for the householder or building occupier and contribute significantly to a comfortable and healthy indoor environment.

Key to Party Wall Bypass Solutions

Masonry construction is shown
Timber construction has equivalent details



Block plan

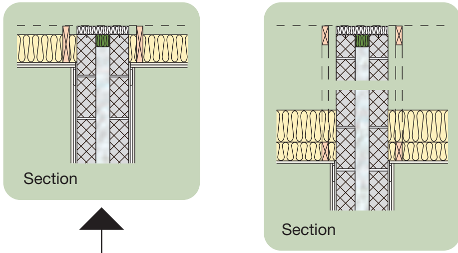


Block elevation

The key locates the details of mineral wool full-fill solutions to party wall bypass, for both masonry and timber frame constructions.

These solutions have been proven in the field, by co-heating testing, to have an effective U-value of zero, and are a combination of both cavity fill and edge sealing.

Each solution carries detailed design information for the junction of the party wall with the external elements.



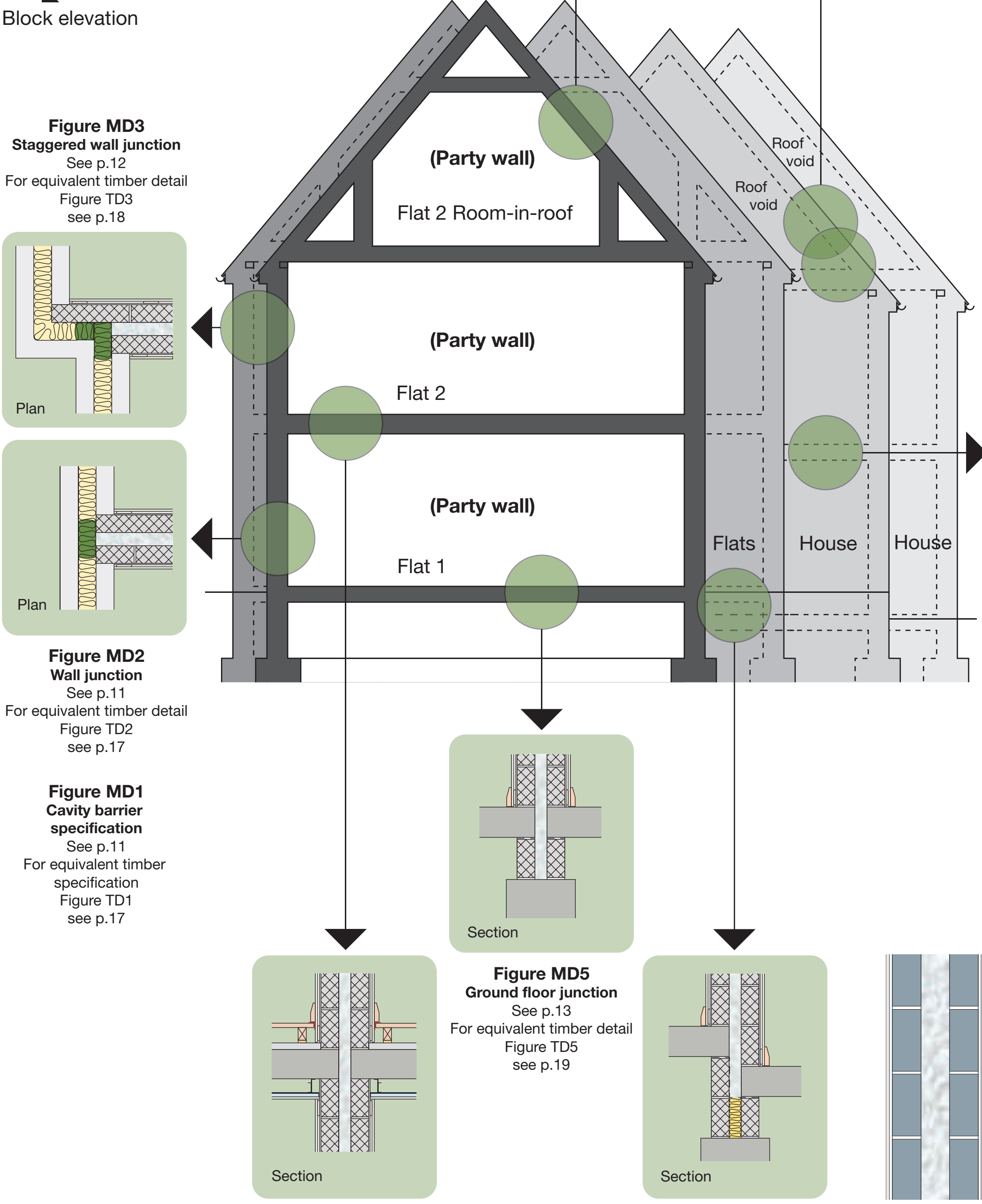


Figure MD8
With room-in-roof
See p.14
For equivalent timber detail
Figure TD8
see p.20

Figure MD7
Without room-in-roof
See p.14
For equivalent timber detail
Figure TD7
see p.20

Figure MD3
Staggered wall junction
See p.12
For equivalent timber detail
Figure TD3
see p.18

Figure MD2
Wall junction
See p.11
For equivalent timber detail
Figure TD2
see p.17

Figure MD1
Cavity barrier specification
See p.11
For equivalent timber specification
Figure TD1
see p.17

Figure MD4a
Internal floor junction
See p.12

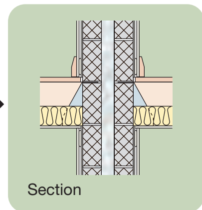


Figure MD5
Ground floor junction
See p.13
For equivalent timber detail
Figure TD5
see p.19

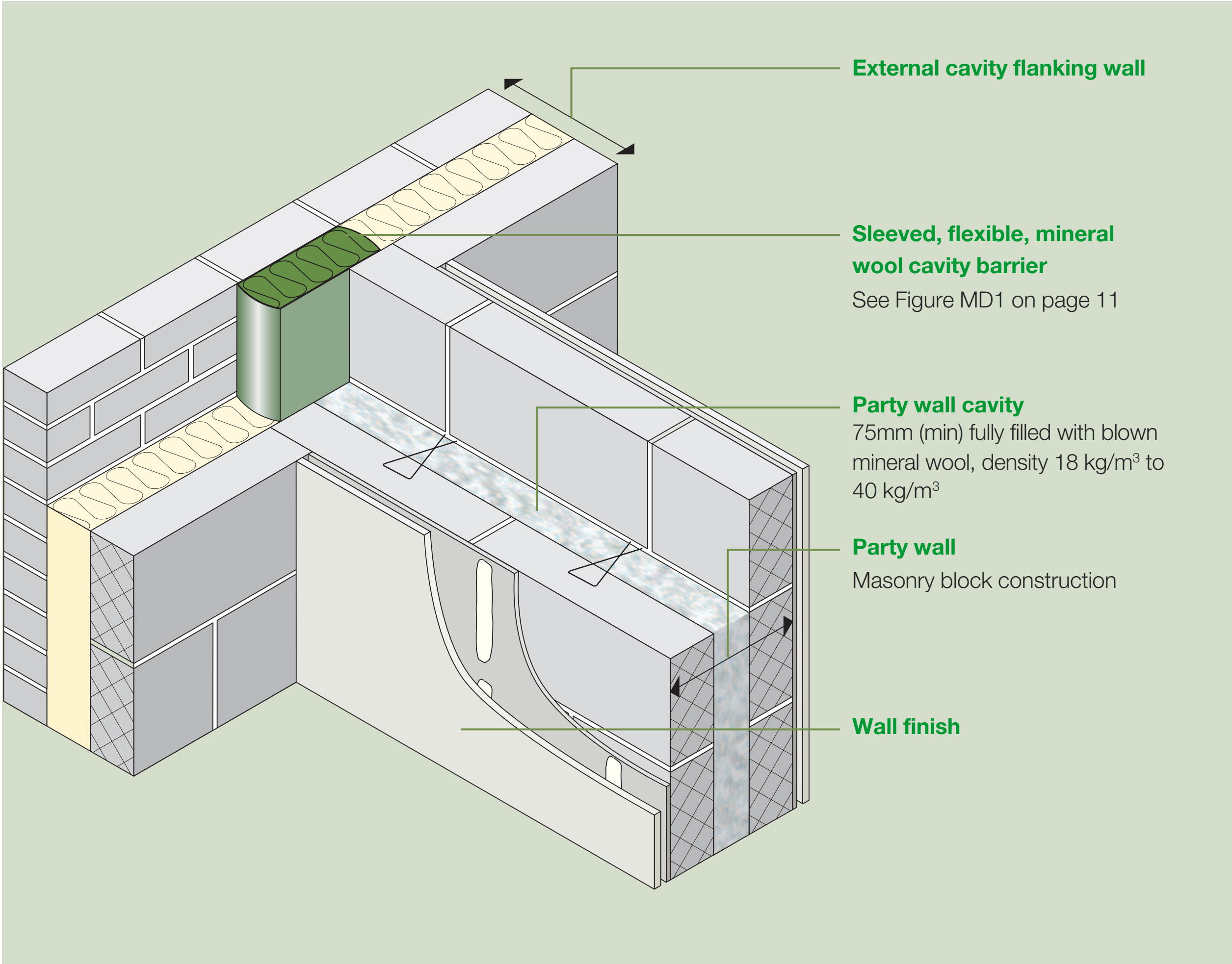
Figure MD4
Separating floor junction
See p.12
For equivalent timber detail
Figure TD4
see p.18

Figure MD6
Stepped ground floor junction
See p.13
For equivalent timber detail
Figure TD6
see p.19

Party Wall Bypass Solutions - Cavity Masonry

Masonry with Render and Plasterboard on Dabs

Robust Detail Compliant



Thermal

This form of party wall construction has an effective U-value of zero.

This has been demonstrated in the MIMA/Leeds Metropolitan University Field Trial. See report 'Investigations of the Party Wall Thermal Bypass in Masonry Dwellings'.

This form of party wall construction meets the specification in Part L1A 2010, SAP 2009, and Section 6 for a zero U-value for a party wall. This requires the wall to be fully filled and for there to be effective edge sealing. With a cavity fully filled with mineral wool in full contact with both leaves of masonry for the full height of the cavity, this type of edge sealing has been demonstrated in field trials to be effective. This form of edge sealing would need to be proven to be effective with other types of full-fill and has been demonstrated not to be effective with an empty cavity.

Acoustic

Robust Detail Ltd have approved the use of mineral wool in rolls, batt or blown form as a full cavity fill option for all the Robust Details listed in the table opposite.

Note that currently the only valid and tested full-fill solution to allow a zero effective U-value for party wall bypass in masonry wall is blown mineral wool.

BLOCK TYPE	BLOCK DENSITY (kg/m³)	CAVITY WIDTH (mm)	LINING TYPE	POST FILL SOUND ATTENUATION ENGLAND/WALES MEAN VALUE (dB $D_{nT,w}+C_{tr}$)	SCOTLAND MEAN VALUE (dB D_{nTw})	FULL FILL MINERAL WOOL ALLOWABLE FOR THESE ROBUST DETAILS*
Lightweight	1350–1600	75	Wet plaster	53.6	60	E-WM-1, E-WM-2 E-WM-18
Lightweight	1350–1600	75	Render & plasterb'd	55.1	62	E-WM-3, E-WM-4 E-WM-11, E-WM-16
Besblock (cellular)	1995 (core) 1528 (block)	75	Render & plasterb'd	55.25	61.5	E-WM-5
Aircrete	600–800	75	Render & plasterb'd	Testing being undertaken		E-WM-6, E-WM-10 E-WM-13

Table Note:
** Available for use on release of the October 2010 update of the Robust Details manual*

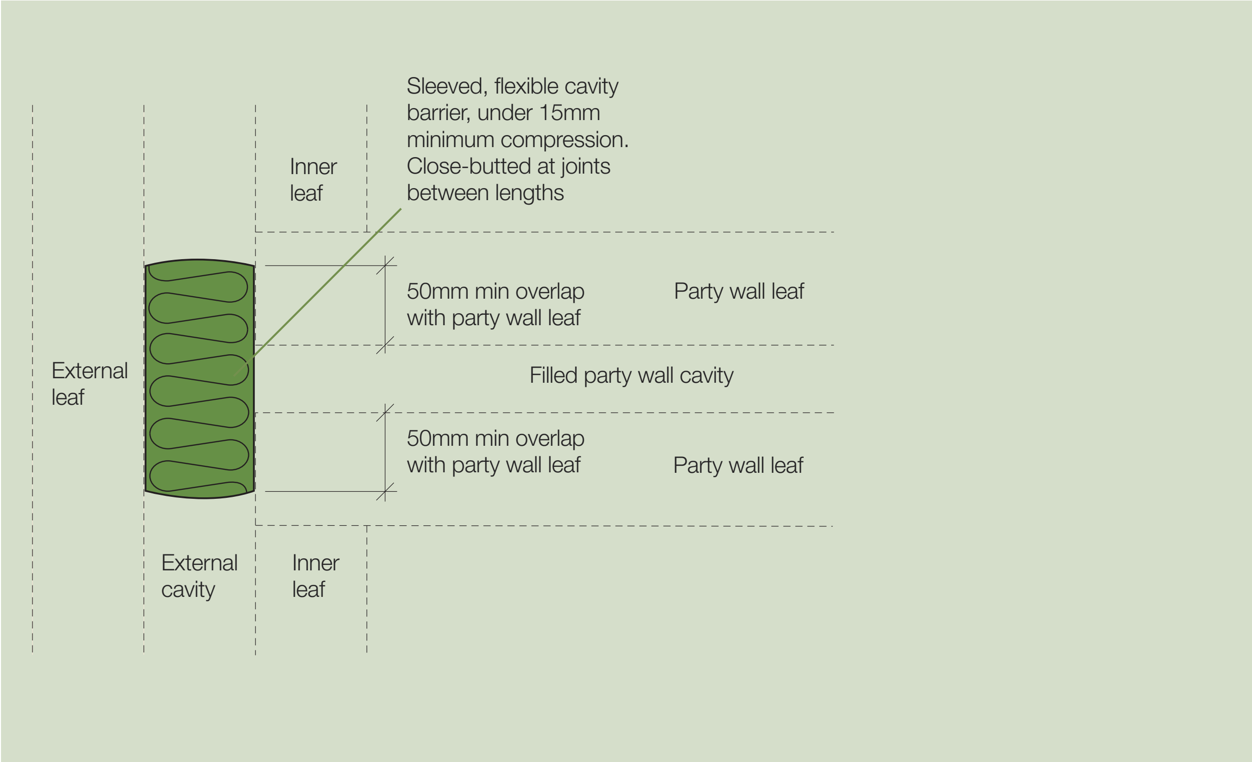
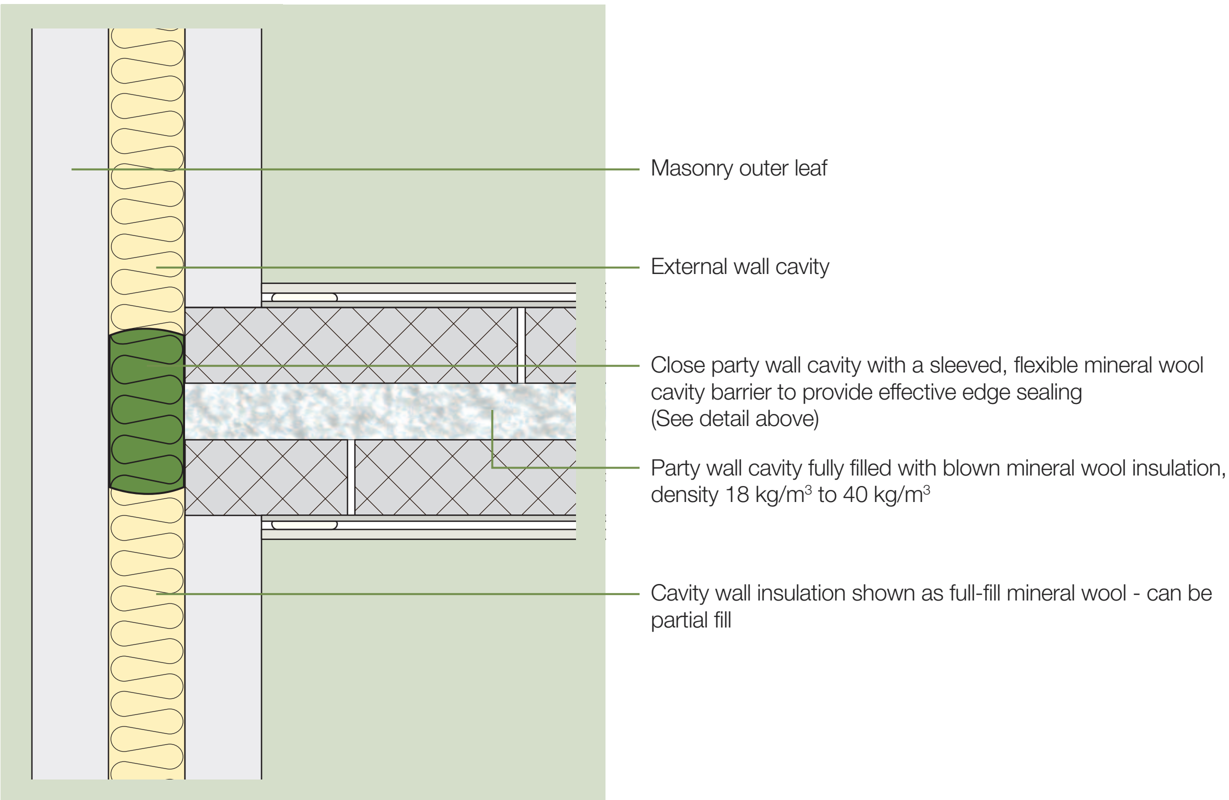
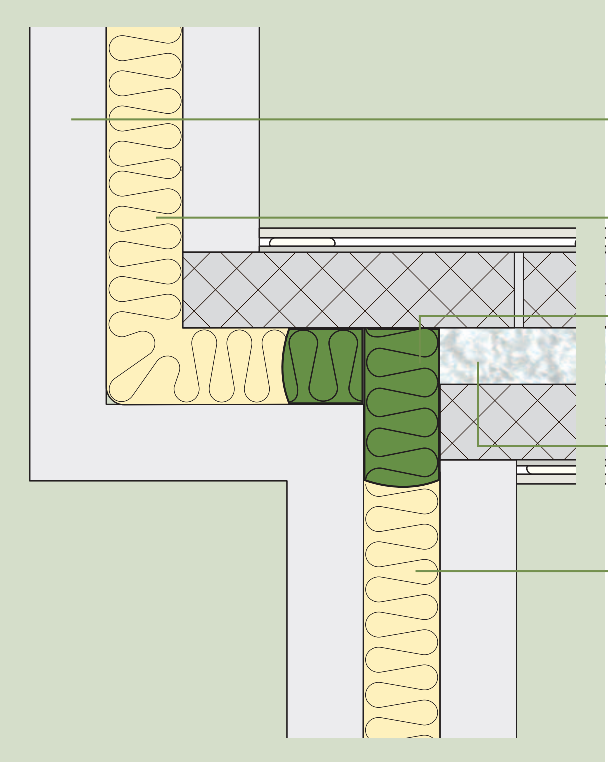


Figure MD1 **Sleeved, Flexible Cavity Barrier Specification**

Figure MD2 **External (Flanking) Wall Junction**



Party Wall Bypass Solutions - Cavity Masonry



Masonry outer leaf

External wall cavity

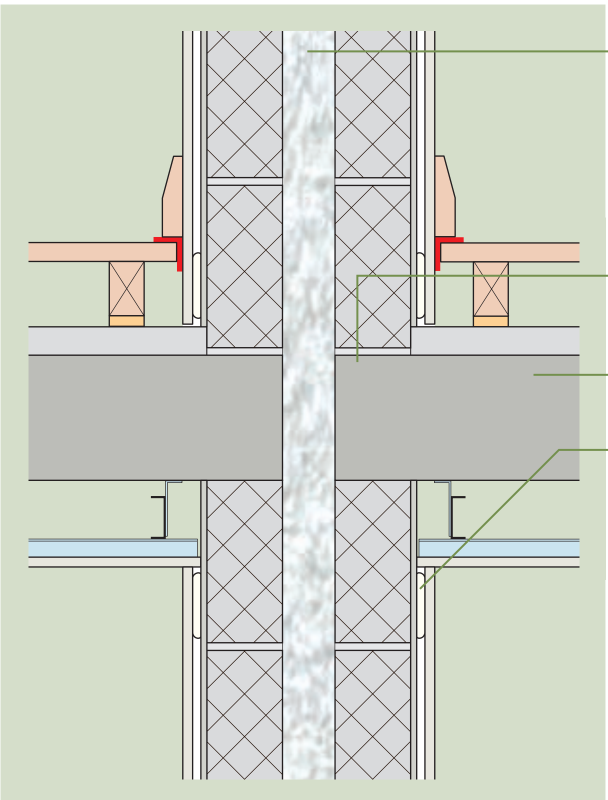
Close party wall cavity with a sleeved, flexible mineral wool cavity barrier to provide effective edge sealing (Ensure the cavity barrier and the installation comply with the specifications on page 15)

Party wall cavity fully filled with blown mineral wool insulation, density 18 kg/m^3 to 40 kg/m^3

Cavity wall insulation shown as full-fill mineral wool - can be partial fill

Figure MD3 **Staggered External (Flanking) Wall Junction**

Figure MD4 **Separating Floor Junction + (Inset Detail MD4a) Internal Floor Junction**



Party wall cavity fully filled with blown mineral wool insulation, density 18 kg/m^3 to 40 kg/m^3

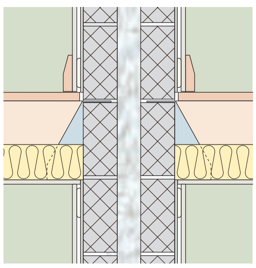
Concrete planks

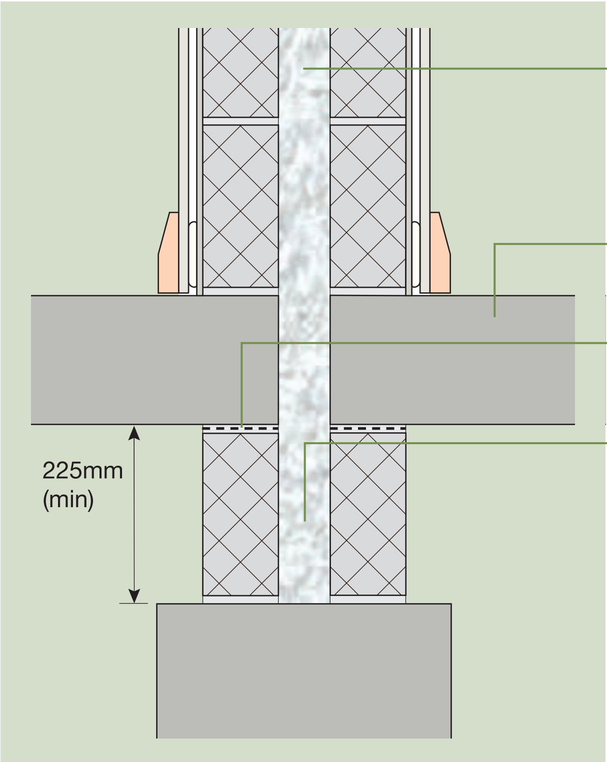
Separating floor

Continuous horizontal ribbon of adhesive

Figure MD4a

Internal Floor Junction: Non-Separating Timber Floor Supported On Joist Hangers





Party wall cavity fully filled with blown mineral wool insulation, density 18 kg/m^3 to 40 kg/m^3

Ground floor not continuous between dwellings

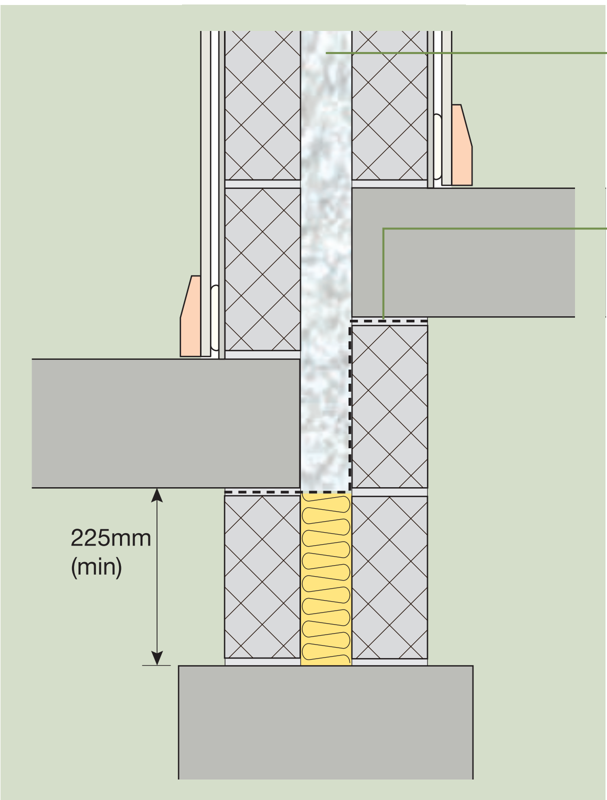
Damp proof membrane does not bridge cavity

This slot, minimum 225mm deep, should be maintained to allow for a build up of any mortar droppings that occur in the construction of the party wall below the level of the floor. This ensures that the cavity is not bridged in a position that could reduce the acoustic performance of the wall. After construction the remaining void is then filled with injected mineral wool as part of the party wall insulation process.

If a gas membrane is present refer to Robust Detail Practice Note 1, at www.robustdetails.com for the steps to be taken to ensure that the build up of mortar droppings on the gas membrane is prevented or removed post completion of the wall. Insulate below the gas membrane.

Figure MD5 **Ground Floor Junction**

Figure MD6 **Stepped Ground Floor Junction**



Party wall cavity fully filled with blown mineral wool insulation, density 18 kg/m^3 to 40 kg/m^3

Flexible damp proof membrane and gas membrane

This illustration shows a stepped party wall with a gas membrane present. If a gas membrane is present refer to Robust Detail Practice Note 1, at www.robustdetails.com, for the steps to be taken to ensure that any build up of mortar droppings on the gas membrane is prevented or removed post completion of the wall. Insulate below the gas membrane with a mineral wool cavity slab. This will help to prevent air movement from below the gas membrane and is also good practice to prevent thermal bridging in the stepped floor zone.

If no gas membrane is present, a slot, minimum 225mm deep, should be maintained to allow for a build up of any mortar droppings that occur in the construction of the party wall below the level of the floor. This ensures that the cavity is not bridged in a position that could reduce the acoustic performance of the wall. After construction the remaining void is then filled with blown mineral wool as part of the party wall insulation process.

Party Wall Bypass Solutions - Cavity Masonry

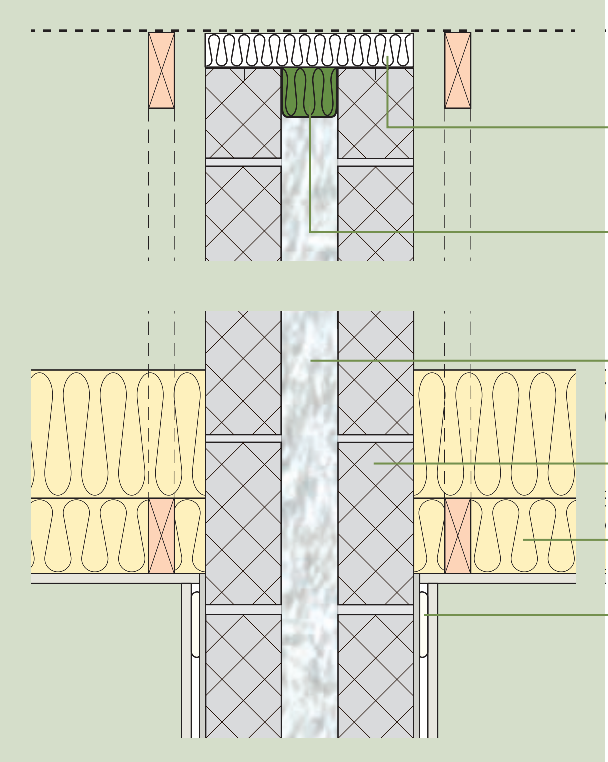
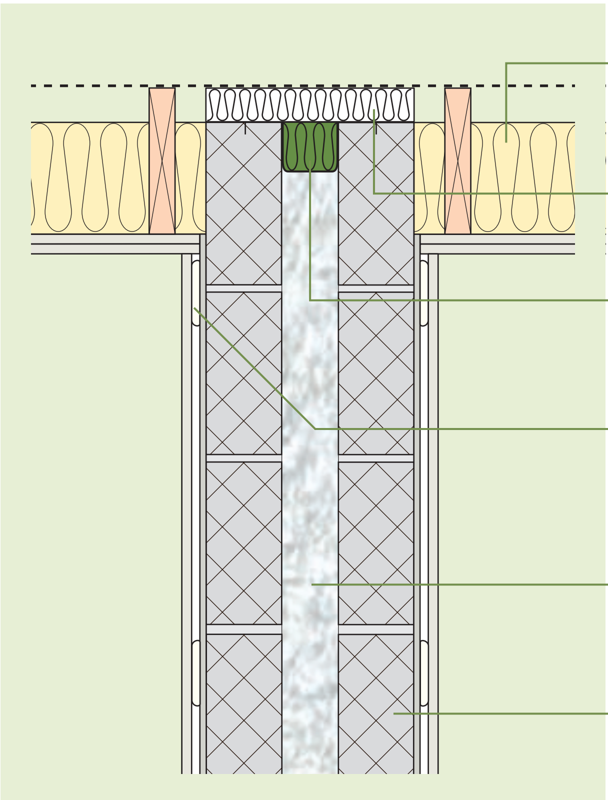
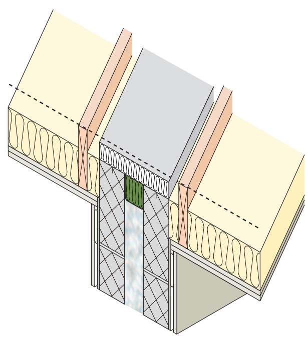


Figure MD7 **Roof Junction – Pitched Roof Without Room-In-Roof**

Figure MD8 **Roof Junction – Pitched Roof With Room-In-Roof**





Isometric view

Installation Instructions

The installation of these details is critical to the effectiveness of the solution. The list below includes the main requirements that need to be considered in the design and installation process.

The illustration opposite shows the complete solution for a masonry construction including junctions between two elements (e.g. external wall and roof) and the party wall. Extra care needs to be taken at these locations to ensure a successful installation.

Installation Guides

Consult solutions providers installation guide to ensure successful execution of the solution.

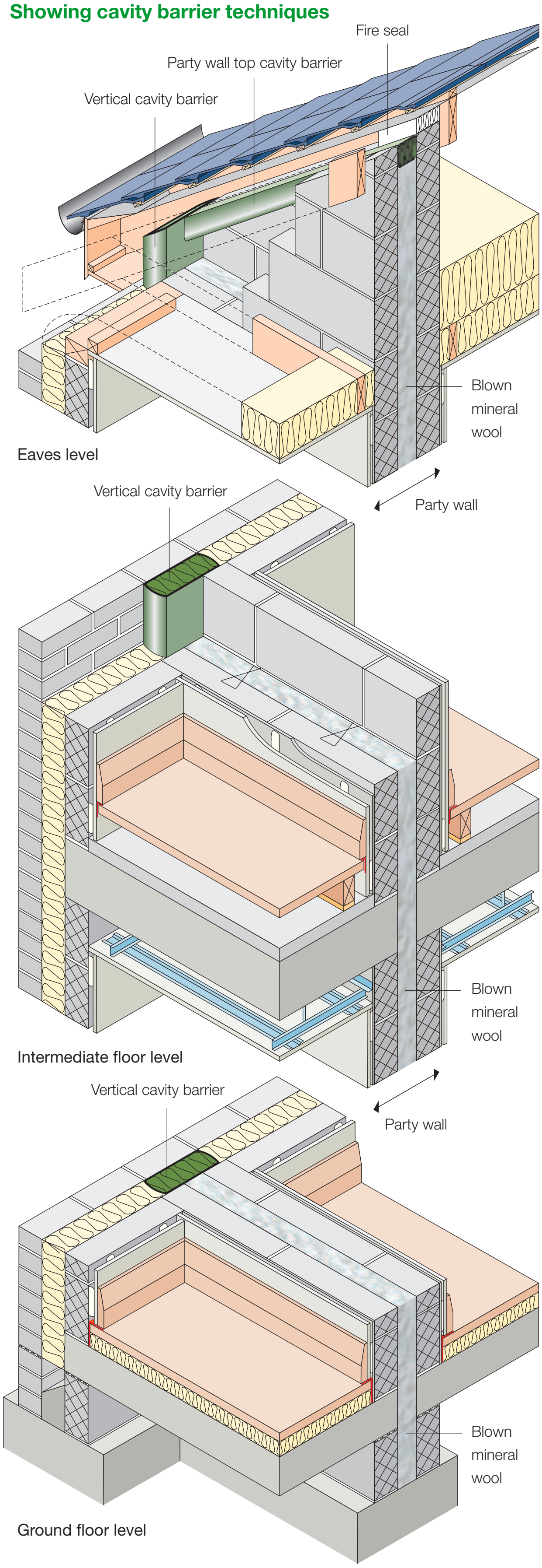
Building Control

This list below also provides a guide for Building Control officers of the measures required. To accept the party wall as having an effective zero U-value they may require conformation to be provided that each measure has been successfully completed.

1. Third party evidence to be provided showing that the system specified/installed has been shown by independent tests to meet the claimed thermal and acoustic requirements.
2. All system components to be installed fully in accordance with manufacturer's recommendations, specific to their use in party wall cavities.
3. Mineral wool insulation to be installed in the party wall cavity to the correct, stated density as detailed in this MIMA Design Guide, and measurements of installed density to be recorded.
4. Cavity to be fully filled with mineral wool without voids - monitoring of installation equipment and filling rates will help confirm proper filling.
5. Prior to filling the cavity, sleeved, flexible mineral wool cavity barriers to be installed at the junction of the party wall and the external wall, and the junction of the party wall and the roof.
6. Cavity barriers in wall to be sized in accordance with manufacturer's recommendations and installed overlapping both masonry leaves of the party wall by 50mm, minimum.
7. Cavity barriers in roof to be sized in accordance with manufacturer's recommendations and installed either into the party wall cavity in line with the top of the party wall or on top of the party wall overlapping both masonry leaves of the party wall by 50mm, minimum.
8. Cavity barriers to be continuous for the full height/length of the wall and joints between each barrier to be tightly butted.
9. Where gas membranes are present in the cavity, the area of cavity below the gas membrane to be fully filled with mineral wool (for example by using mineral wool cavity slabs).

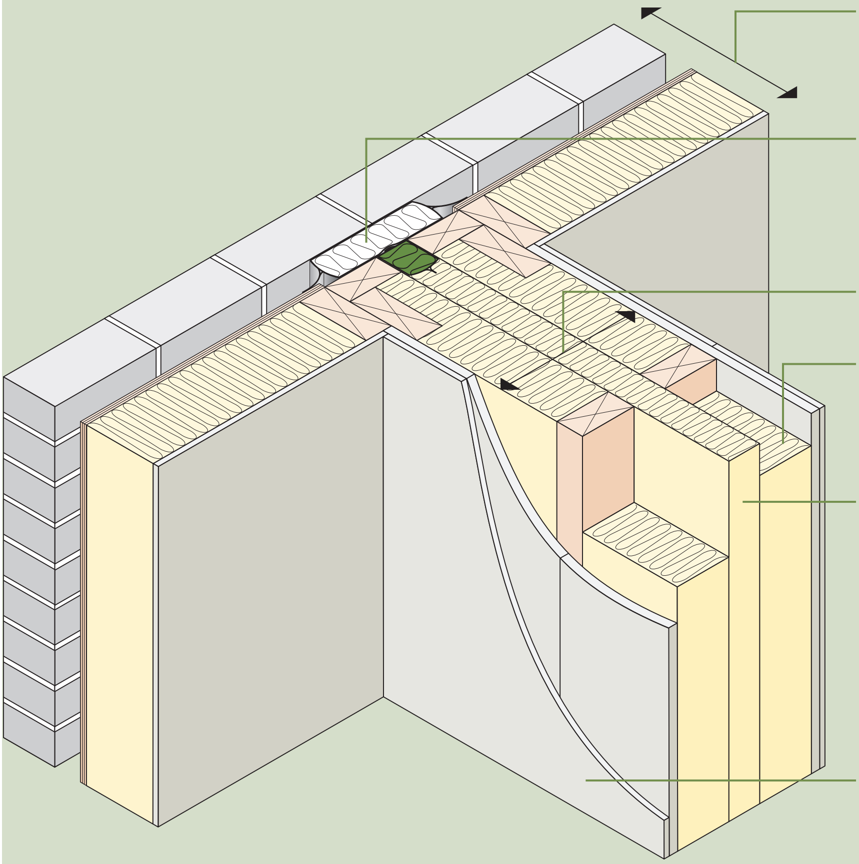
Typical Masonry Construction Details

Showing cavity barrier techniques



Party Wall Bypass Solutions - Timber Frame

Timber Frame Without Sheathing



Thermal

This form of party wall construction has an effective U-value of zero.

This has been demonstrated in the MIMA/Leeds Metropolitan University Field Trial. See report 'Investigations of the Party Wall Thermal Bypass in Timber Frame Dwellings'.

This form of party wall construction meets the specification in Part L1A 2010, SAP2009, and Section 6 for a zero U-value for a party wall, This requires the wall to be fully filled and for there to be effective edge sealing. With a cavity fully filled with mineral wool this type of edge sealing has been demonstrated in field trials to be effective. This form of edge sealing would need to be proven to be effective with other types of full-fill and has been demonstrated not to be effective with an empty cavity.

Acoustic

A program of testing is being undertaken to demonstrate the effect on the acoustic performance of party walls by filling the cavity with mineral wool. Walls built to this specification can routinely exceed the minimum requirements of Building Regulations. The table opposite shows the results of testing at the time of publication. MIMA is working with Robust Details Ltd and The UK Timber Frame Association to achieve Robust Detail status for acoustic performance to this solution to party wall bypass for timber frame party walls.

WALL TYPE	MINIMUM CAVITY WIDTH (mm)	POST FILL SOUND ATTENUATION ENGLAND/WALES MEAN VALUE (dB $D_{nT,w}+C_{tr}$)	SCOTLAND MEAN VALUE (dB D_{nTw})	RELEVANT TO THE FOLLOWING ROBUST DETAILS
Without sheathing	60	50.6	61.7	E-WT-1
With sheathing	50	56	66	E-WT-2

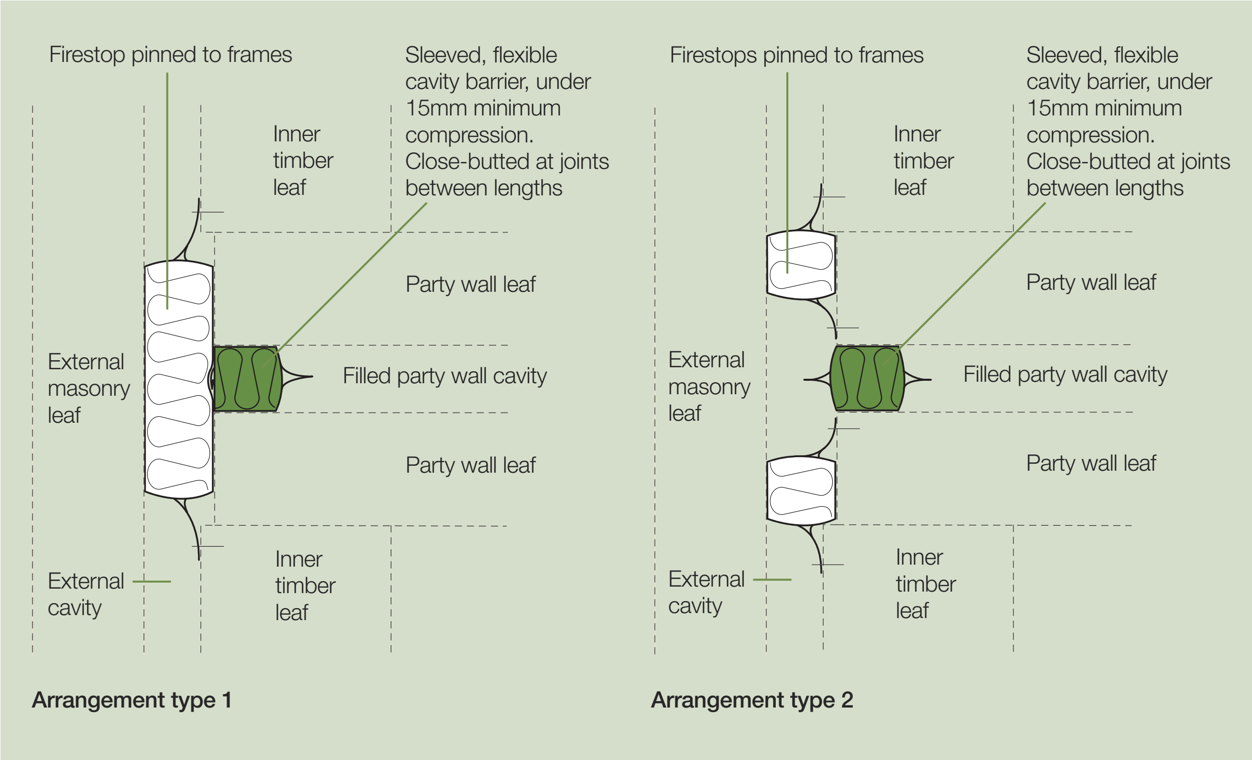
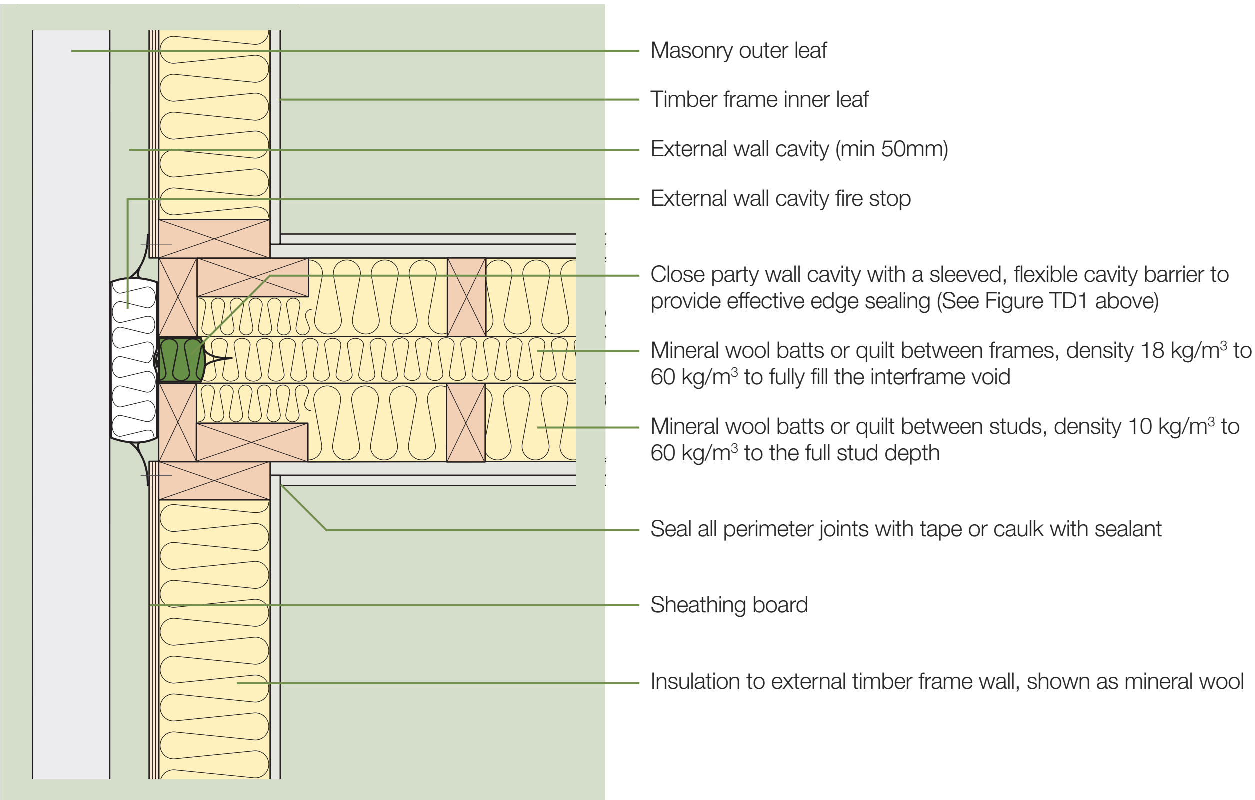


Figure TD1 **Sleeved, Flexible Cavity Barrier Specification**

Figure TD2 **External (Flanking) Wall Junction**



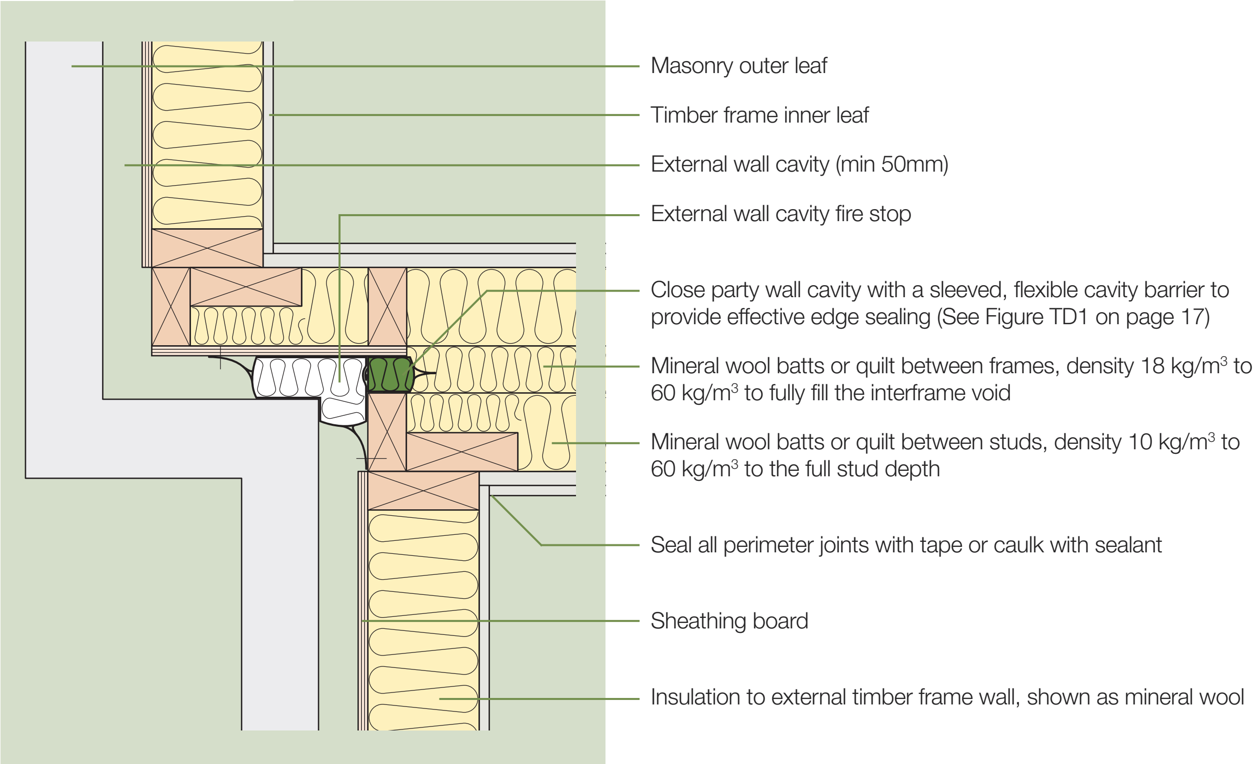
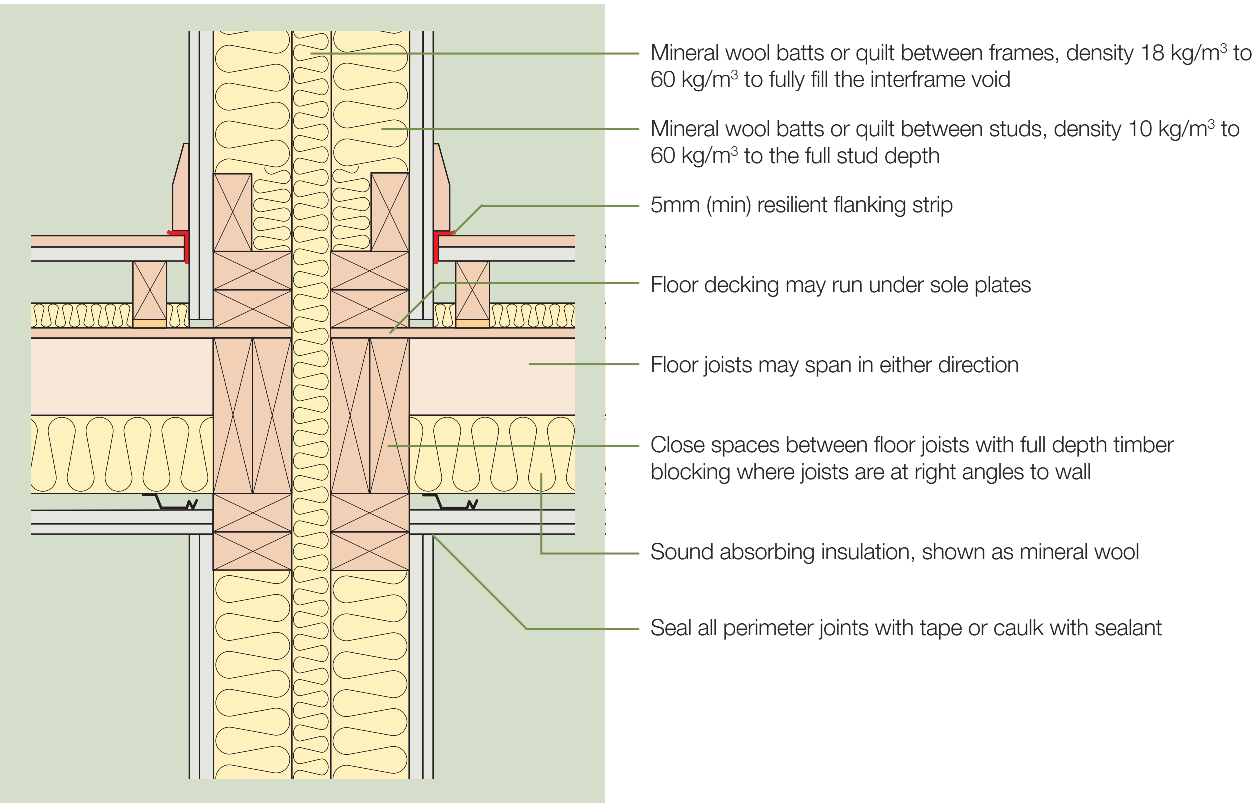


Figure TD3 **Staggered External (Flanking) Wall Junction**

Figure TD4 **Separating Floor Junction**



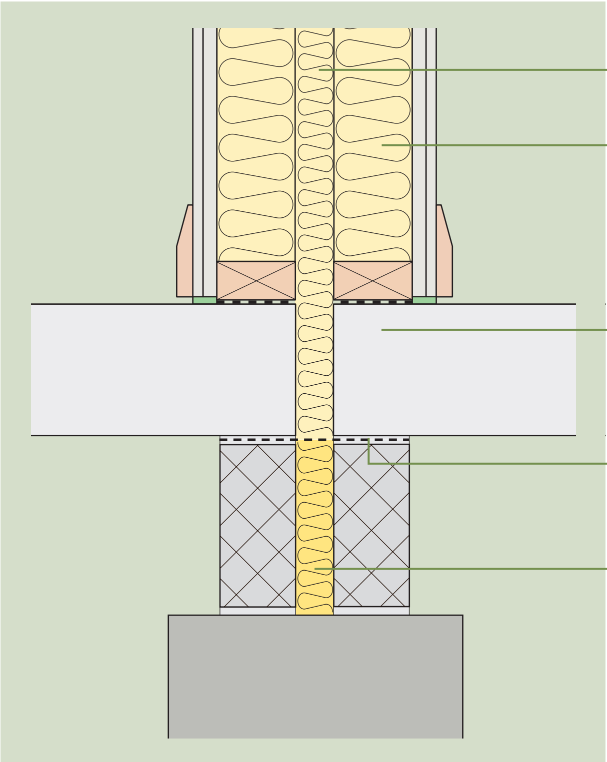
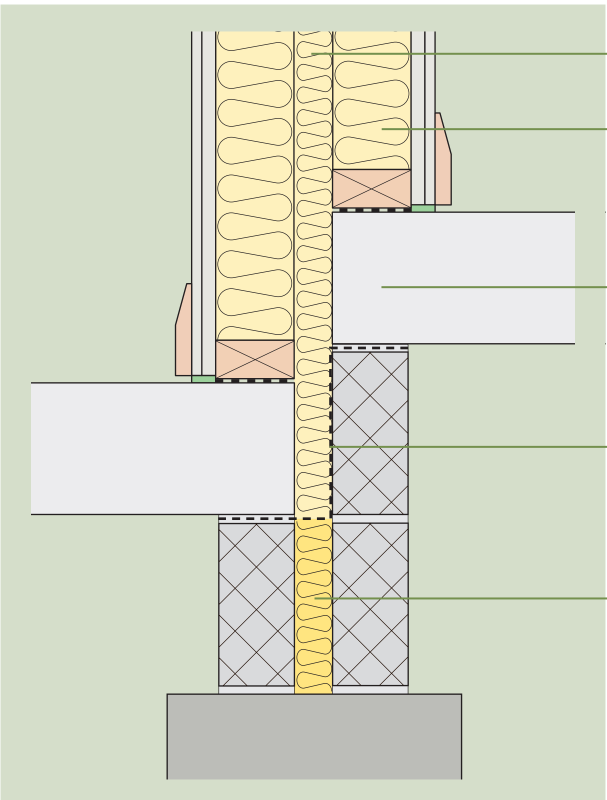


Figure TD5 **Ground Floor Junction**

Figure TD6 **Stepped Ground Floor Junction**



Party Wall Bypass Solutions - Timber Frame

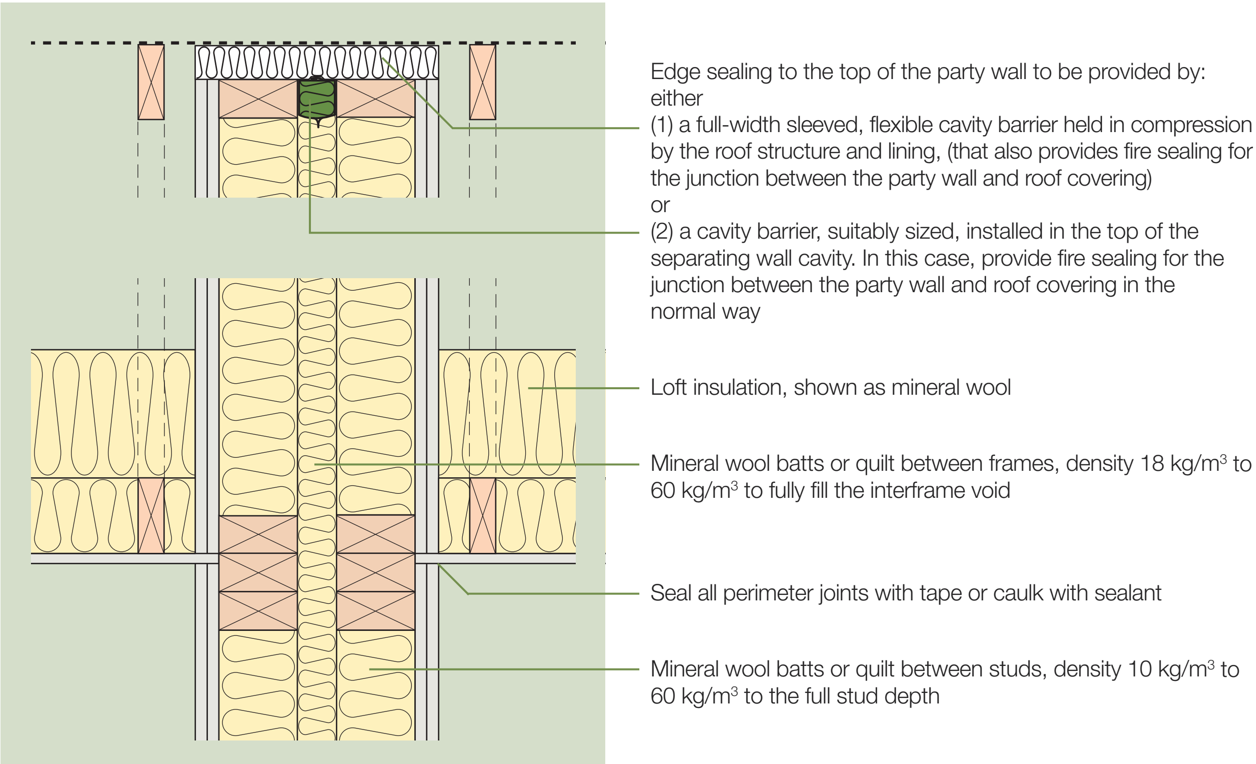
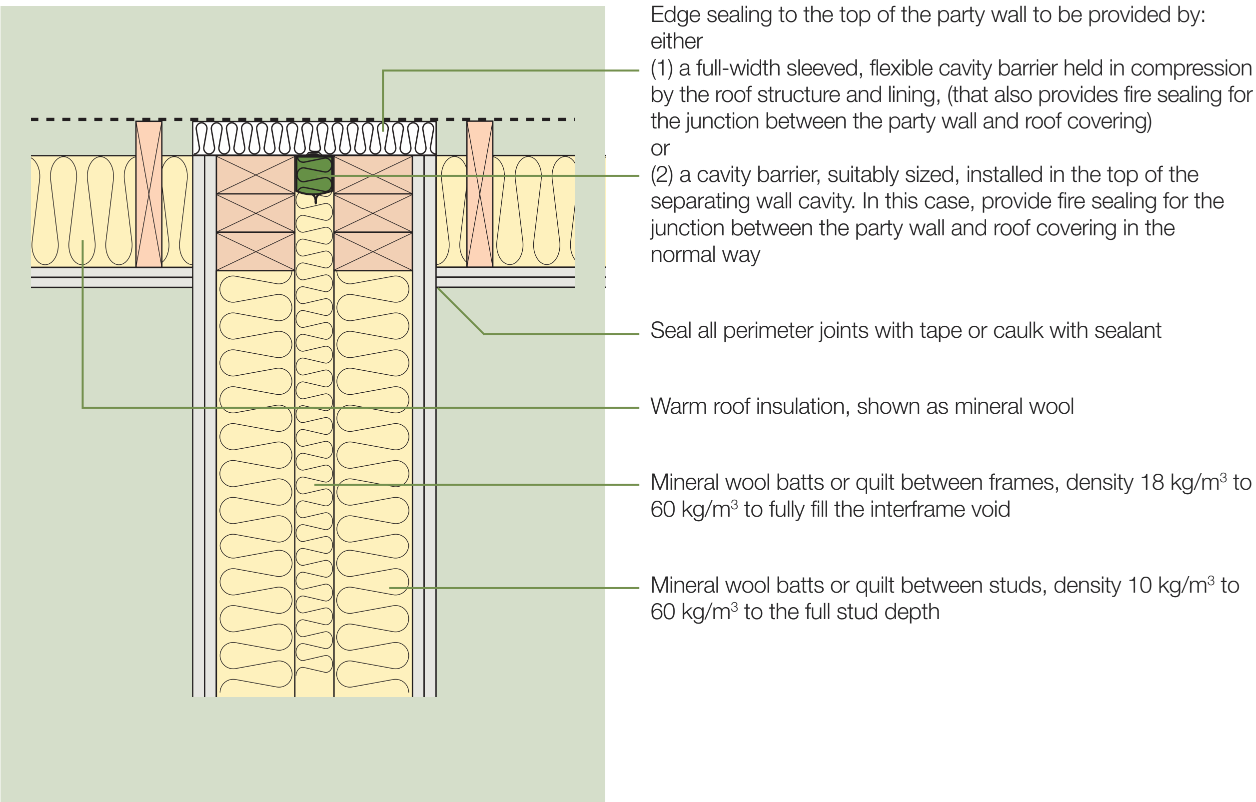


Figure TD7 **Roof Junction – Pitched Roof Without Room-In-Roof**

Figure TD8 **Roof Junction – Pitched Roof With Room-In-Roof**



Installation Instructions

The installation of these details is critical to the effectiveness of the solution. The list below includes the main requirements that need to be considered in the design and installation process.

The illustration opposite shows the complete solution for a timber frame construction including junctions between two elements (e.g. external wall and roof) and the party wall. Extra care needs to be taken at these locations to ensure a successful installation.

Installation Guides

Consult solutions providers installation guide to ensure successful execution of the solution.

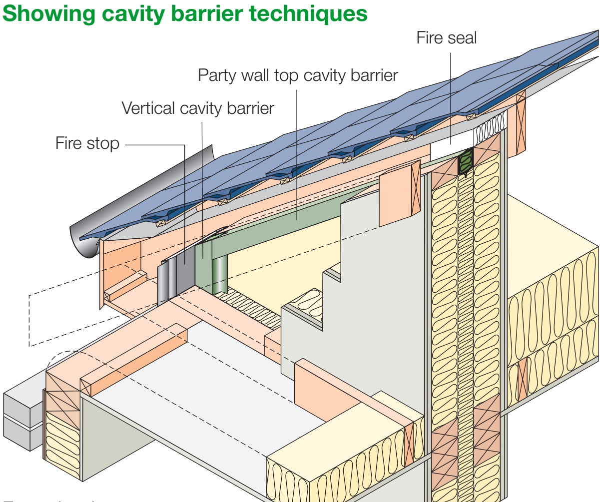
Building Control

This list below also provides a guide for Building Control officers of the measures required. To accept the party wall as having an effective zero U-value they may require conformation to be provided that each measure has been successfully completed.

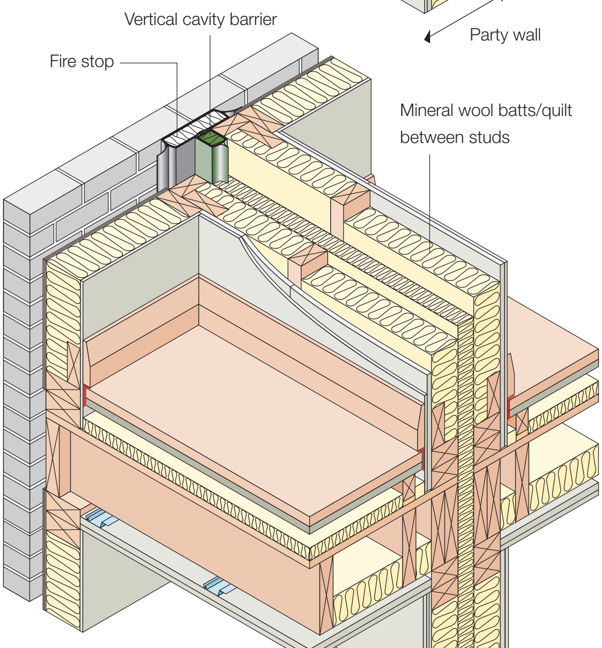
1. Third party evidence to be provided showing that the system specified/installed has been shown by independent tests to meet the claimed thermal and acoustic requirements.
2. All system components to be installed fully in accordance with manufacturer's recommendations, specific to their use in timber frame party wall construction.
3. Mineral wool insulation used within each location within the timber frame party wall construction to be of the correct density as detailed in this MIMA Design Guide.
4. All cavities within the timber frame party wall construction to be fully filled with mineral wool insulation, without voids. The insulation to be in full contact with both surfaces of the plasterboard, sheathing board or other construction board used to form the cavity. Voids within the timber stud frame to be similarly filled with mineral wool.
5. Cavity width to be measured when erecting the party wall and to be confirmed as within the design tolerance. If the cavity width deviates from that specified, an alternative mineral wool product of appropriate thickness to be used to ensure full contact with both faces of the construction board used to form the cavity.
6. Sleeved, flexible mineral wool cavity barriers to be installed in the party wall:
   (a) at the junction of the party wall and the external wall and
   (b) the junction of the party wall and the roof, in line with the top of the party wall or on top of the party wall.
7. Barriers to overlap both leaves of the party wall by 50mm, minimum.
8. Cavity barriers to be sized in accordance with manufacturer's recommendations.
9. Cavity barriers to be continuous for the full height/length of the wall and joints between each barrier to be tightly butted.
10. Where gas membranes are present in the cavity, the area of cavity below the gas membrane to be fully filled with mineral wool (for example by using mineral wool cavity slabs).

Typical Timber Frame Construction Details

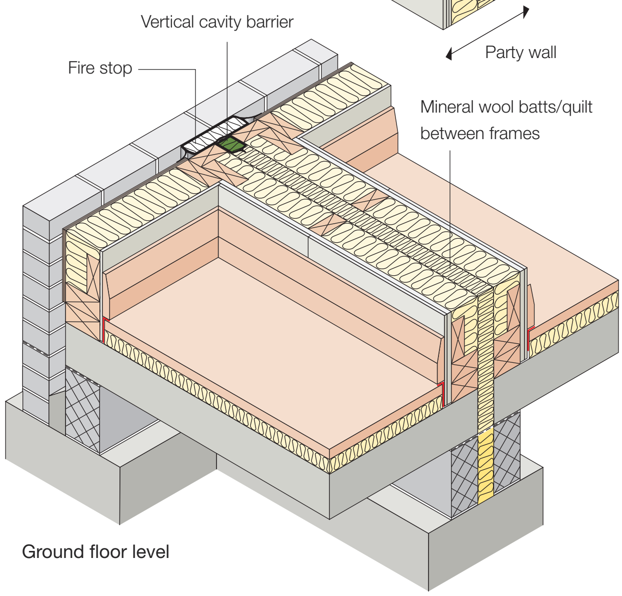
Showing cavity barrier techniques



Eaves level



Intermediate floor level



Ground floor level

Association History and Activities in the UK

Eurisol has changed its name to MIMA – the Mineral Wool Insulation Manufacturers Association. The move raises the profile of mineral wool at a time when it is increasingly important for specifiers, developers and contractors to fully understand how different insulation materials can best meet the performance requirements and demands of the many new and existing applications in the construction sector and other related industries.

MIMA, the Mineral Wool Insulation Manufacturers Association was formed in 1962 and provides an authoritative source of independent information and advice on rock and glass mineral wool. MIMA actively promotes the benefits of mineral wool insulation and the contribution it makes to a building's construction and the comfort of its occupants.

MIMA plays a valuable part in highlighting the abilities of mineral wool insulation to meet the increasing thermal, fire, acoustic and environmental performance requirements within the construction industry. Mineral wool offers unparalleled '4-benefits-in-one' products to meet these ever more testing demands, both during use and when its whole-life impact on the environment is assessed.

MIMA works with Government, industry bodies and the construction industry itself to ensure that the mineral wool manufacturing industry plays a full and positive role in helping to meet national, European and global targets for sustainability and carbon performance.

Improving levels of insulation are central to initiatives aimed at alleviating fuel poverty, ensuring that everybody enjoys a decent home, securing energy supplies and helping to tackle global warming through energy saving strategies.

MIMA's work in representing the views, objectives and aspirations of the UK mineral wool manufacturers has seen significant achievements.

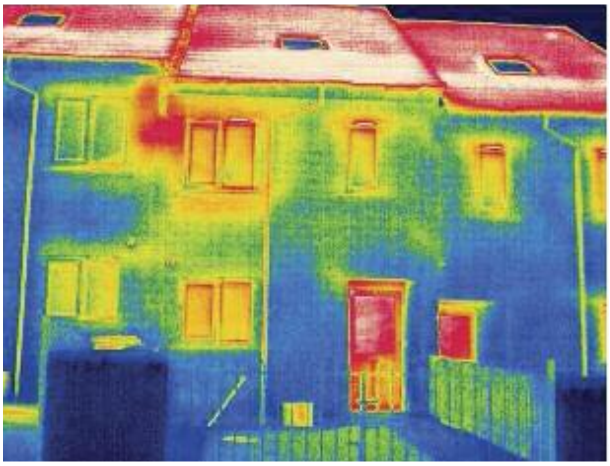
Specifically, in recent times MIMA has:

- Contributed to consultations for improved standards of insulation in the latest Building Regulations.
- Contributed to a wide range of other consultation exercises, including those involving labelling and energy efficiency grants and schemes.
- Contributed to the fire safety debate, including commissioning large scale testing.
- Contributed expertise and funds to various public investment initiatives, including the RADAR fire test programme.
- Been instrumental in establishing the independent "Cavity Insulation Guarantee Agency" which was key to cavity wall insulation being embraced by Government in energy efficiency initiatives since 1980.

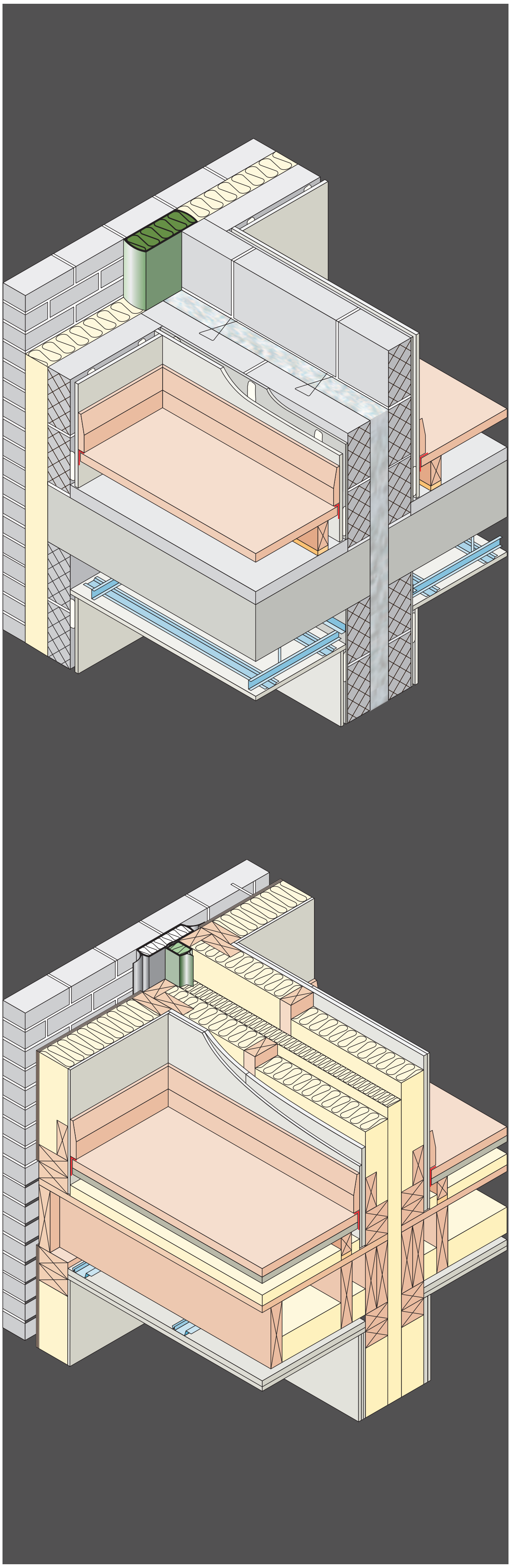
In the UK, MIMA is a member of the Construction Products Association (www.constprod.org.uk).

In Europe, MIMA is also an associate member of Eurima, the Federation of European mineral wool manufacturers (www.eurima.org).

For further information on MIMA please visit our website at www.mima.info



mima MINERAL WOOL INSULATION MANUFACTURERS ASSOCIATION



Mineral Wool Insulation Manufacturers Association
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