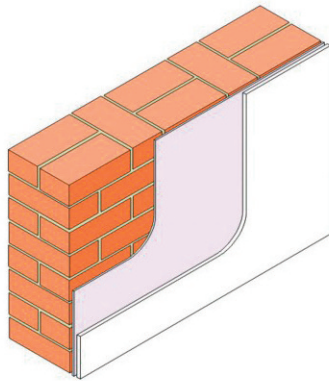
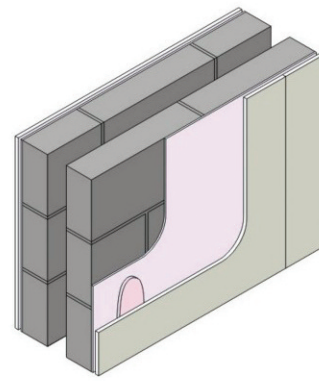




# Party Wall Thermal Bypass

**Solid brick****1900 - 1950****Empty cavity****1950 - 2003**

# The History of Party Walls

Masonry party walls have seen many changes over the years, driven by the need to improve acoustic performance, prevent thermal bypass and reduce the cost of installation. Tom Foster, senior product manager at Saint-Gobain Isover, looks at the evolution of the masonry party wall and how Isover have supported the industry in developing a better performing construction.

**1900-1950**

During the first half of the twentieth century the majority of homes were built with a solid brick party wall. The acoustic performance was relatively good due to the high level of mass, and restriction in air movement also ensured no heat could be lost from the party wall via thermal bypass, a concept that would not be identified for many years.

Despite good acoustic and thermal performance, the cost of materials and speed of installation were too high, which resulted in the industry gradually moving to a cavity wall construction in the 1950s and 1960s.

**1950-2003**

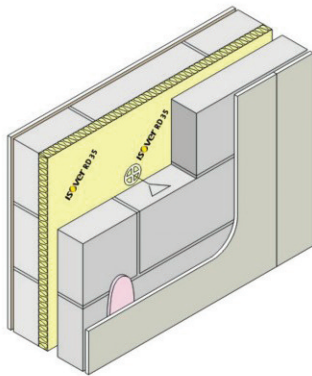
The acoustic twin leaf concept was introduced to reduce mass from the construction by around a third, without negatively impacting acoustic performance. The introduction of the cavity allowed the industry to build the same standard of wall more cheaply and quickly.

The unforeseen consequence was that, by introducing an empty cavity, the industry had created a way for heat to escape from the building – a concept that would later be known as ‘party wall bypass’.

**2003-2010**

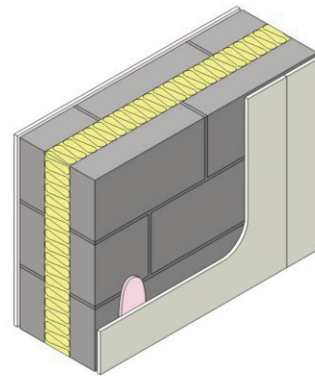
Developments in the past ten years have primarily been driven by the introduction of Approved Document E 2003, which set out a minimum 45dB requirement for party walls, as well as on-site pre-completion testing (PCT). The requirement for PCT, while effective at enforcing the regulation, proved a burden to house builders and so Robust Details Limited was established as an alternative route of compliance in 2004.

## Partial-fill cavity



2003 - 2010

## Full-fill cavity



2010 -

In 2005, Iover were the first to market a series of Robust Detail compliant proprietary party walls that removed the requirement for PCT and the labour-intensive parge coat, without negatively impacting the acoustic performance. This was achieved with a partial-fill insulation product called Iover RD35 and was the first time an insulation product had been used in the party wall, something that has now become an industry norm.

Despite this leap forward for the industry, the partial-fill construction still didn't fully address heat loss through thermal bypass, an issue that was gaining momentum within the industry.

### 2010-Present

After work was carried out by Leeds Metropolitan University to prove the concept of party wall bypass, steps were taken to address the issue in the update of Approved Document L in 2010.

Once again, Iover were the first to market in 2009, a year before the regulations were introduced, with

Iover RD Party Wall Roll. This full-fill roll restricts air movement within the cavity and when installed with effective edge sealing, helps the house builder to claim a zero heat loss party wall.

### Summary

Since the introduction of Approved Document E 2003, Saint-Gobain Iover has been at the forefront of maximising acoustic performance, reducing cost of installation, and removing thermal bypass from party wall structures.

Iover offer the widest choice of proprietary full-fill Robust Details on the market. E-WM-17, E-WM-20 and E-WM-24 all deliver three credits towards the Code for Sustainable Homes, remove the requirement for parge-coating and help to deliver a zero U-value party wall.

# The case for insulating party cavity walls

*Recognising that cavity walls are a source of heat loss, Nick Ralph from the Mineral Wool Insulation Manufacturers Association (MIMA) looks at the background to the changes and the solutions available to meet the requirements of Part L...*

Historically, there was an assumption that cavity party walls were an area of thermal equilibrium between two heated spaces and not a source of heat loss. However, studies by the Buildings and Sustainability Group of the School of the Built Environment at Leeds Metropolitan University between 2005 and 2007 showed that, for example, in a mid-terrace dwelling the heat lost through the untreated party cavity walls could be greater than that which is lost through all of the other external elements combined.

The study demonstrated that heat energy from both dwellings can escape into the party wall cavity. This causes free moving air in the cavity to warm and rise up through the cavity, bypassing the loft insulation and - in a majority of cases - continuing to the roof line where the air and heat energy escape to the external environment. As the warmed air in the cavity rises, cool air from adjoining external cavity constructions is drawn into the party wall cavity, forming a chimney stack effect and a significant source of continuous heat loss. In addition, windy conditions can induce differential pressure that leads not only to heat losses at the junction of the party cavity with both external walls and suspended floors, but also increased heat loss due to the stack effect of the cavity.

A series of field trials conducted on the party wall cavities of terraced and semi-detached masonry houses revealed that the magnitude of the party

cavity wall thermal bypass was equivalent to the party wall having an effective U-Value of the order 0.5 to 0.7 W/m<sup>2</sup>K. If not addressed, this has a considerable effect on a dwelling SAP score and needs to be countered through additional enhanced performance in other areas, in order to bring the dwellings SAP score up.

As a result, there was an inclusion in the amended Domestic Building Regulations in 2010 (Part L1A) that party walls would need to be fully filled with suitable insulation and effectively sealed at the edges in order to achieve an effective zero-value. Full-fill mineral wool insulation is particularly suited, as together with effective edge sealing, it has been proven to comply with the requirements for a zero U-value without compromising acoustic performance. Indeed, since the inclusion, a number of 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.

Mineral wool is easy to install and is also non-combustible, providing in-built fire protection and effectively contributing to the fire safety of buildings. 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. The recycled content and recyclability of the material also reduces waste disposal needs and saves



valuable resources both now and in the future. This is reflected in the Green Guide A+ rating of mineral wool party wall insulation products.

### **The case for retro-fitting party cavity walls**

Through its work with Leeds Metropolitan University and the BRE, MIMA has also more recently proven the case for retrofitting existing party cavity walls using blown fibre mineral wool, prompting DECC's plans to include the measure in the latest RdSAP changes for Green Deal and in turn making it eligible for ECO.

Leeds Metropolitan University undertook a series of field tests over four heating seasons between 2008 and 2013, to analyse the effects of filling existing party cavity walls with mineral wool insulation, using conventional cavity blowing techniques. Taking a mid-terrace house, which was built between 1990 and 2001, the study demonstrated an annual saving of 1,978 kWh of energy and 0.38 tonnes of CO<sub>2</sub> – equating to a £70 reduction in household energy costs. The performance improvement was modelled on RdSAP at an improved effective U-value from 0.20w/m<sup>2</sup>k to 0.05w/m<sup>2</sup>K.

It was these results that lead to the measure being included in RdSAP, which is expected to come into force in August 2014.

### **About the organisation**

Representing manufacturers of stone and glass mineral wool insulation, MIMA aims to provide an authoritative source of independent information on the products' properties and applications; and is recognised for its contribution to a wide range of consultation exercises relating to energy saving strategies and the improvement of the built environment.

MIMA has been instrumental in bringing about changes to Part L of the Building Regulations and RdSAP for Green Deal to address the issue of significant energy leakage.

The trade body has close relationships with central government, local authorities and research institutes. It is actively involved in the development of relevant directives and regulations; and in particular has championed the use of Building Regulations to drive change in building practices to improve delivered thermal performance and measure real, in-situ performance.

For further information on MIMA and technical guidance on insulating party walls visit [www.mima.info](http://www.mima.info)



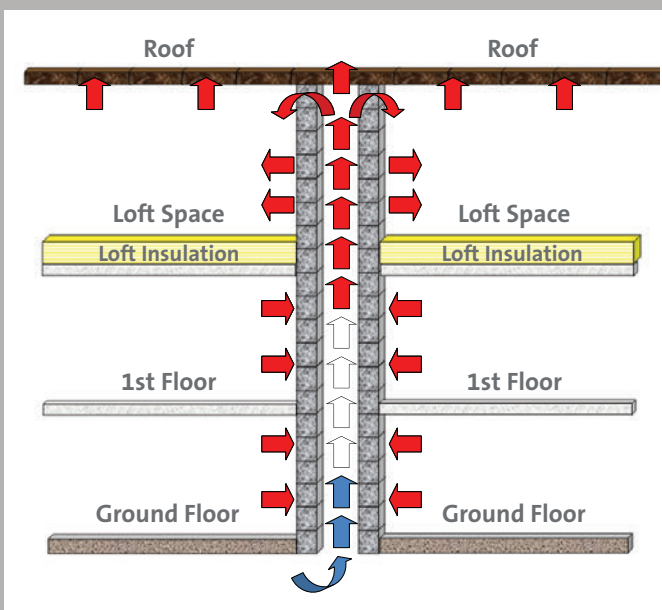
**Nick Ralph**  
**Mineral Wool Insulation Manufacturers Association (MIMA)**

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# Regulatory requirements

## What is meant by party wall thermal bypass?

Thermal bypass is simply where heat bypasses 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.



**Table 3 U-values for party walls**

**Party wall construction**

Solid

Unfilled cavity with no effective edge sealing

Unfilled cavity with effective sealing around all exposed edges in abutting elements

A fully filled cavity with effective sealing at all exposed edges in abutting elements



## England

The revisions to Approved Document L1A 2010 will no longer treat separating cavity walls as a zero heat loss element, due to a phenomenon known as the 'thermal bypass' or 'party wall bypass' effect.

The heat loss can be reduced by measures that restrict air movement through the party cavity, either by means of fully-filling the cavity and/or by providing effective sealing around the perimeter.

From the table above, there are four options when dealing with party wall bypass.



### Wales

The new Welsh Approved Document L came into force on 31st July 2014 and represents an 8% aggregate improvement on 2010 for new housing. Although the document has a number of differences to its English equivalent, thermal bypass requirements are the same.

|                                | U-value W/(m <sup>2</sup> K) |
|--------------------------------|------------------------------|
|                                | 0.0                          |
|                                | 0.5                          |
| es and in line with insulation | 0.2                          |
| s and in line with insulation  | 0.0                          |

**The first option** is to build a solid wall. This removes the possibility of air movement within the wall and therefore a zero U-value can be claimed. However, building a solid wall may have a lower acoustic performance and is often not the most cost effective way to build a party wall.

**The second option** is to not address the issue and take the penalty U-value of 0.5 W/m<sup>2</sup>K in the SAP calculation tool. This penalty will have a significant impact on the overall SAP score and so is unlikely to be an option for most of the industry.

**The third option** is to effectively seal the edges of the party wall cavity, without fully-filling the cavity itself. By doing this a reduced penalty of 0.2 W/m<sup>2</sup>K is incurred.

**The final option** is to effectively seal the edges of the party wall and fully-fill the cavity with insulation. With this option a zero U-value can be claimed and so no penalties are incurred in the SAP calculation tool.



### Scotland

Scottish regulations also recognise that separating walls should no longer be treated as zero heat loss. The penalties and solutions are the same as the English regulations.

Section 6 stipulates the following:

*“Recent research has established that previously unanticipated heat loss can arise via air movement, within a cavity separating wall, from heated areas to points outwith the insulation envelope. To limit this 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 this allows a U-value of 0.2 to be assigned to such walls. Further reduction in heat loss can be achieved where the cavity separating wall is also fully filled with a material that limits air movement.”*



## Fully Filled Cavity Separating Wall

The Building Control Alliance (BCA) has an agreed definition for what is acceptable as a fully filled cavity separating wall.

*“A “fully filled” cavity separating wall (or party wall) means a cavity wall which has been insulated such that no continuous air path communicates between the top and bottom of the wall, nor are there any uninterrupted air paths between flanking elements at either end of the wall, whether or not such junctions are edge-sealed, nor between any intervening structural junctions or service penetrations in the separating wall.”*

The insulation should be designed such that, after installation, it will be in contact with both sides of the cavity, although providing that: any resultant voids do not interconnect; and any such voids are not so extensive as to provide an air path between

external wall cavities and/or floor, roof and intermediate floor cavities, then the wall may be regarded as fully filled for these purposes.

The purpose of the requirement is to prevent air movement between structural cavities (thermal bypass) rather than to create a uniform barrier to the passage of heat transfer from one side of the wall to the other. Thus, imperfections, such as areas of unfilled blown fibre (or indeed dense/compact areas of fill) are unimportant for such purpose, as are unintended gaps between insulation batts (or between batts and imperfect wall surfaces) PROVIDING THAT such imperfections do not create an uninterrupted air path between separating wall junctions with roofs, floors, external walls and/or any other opening or service penetration in the separating wall.





## A MASONRY SOLUTION

### Isover RD Party Wall Roll

The use of Isover RD Party Wall Roll in a wall cavity allows industry to meet the BCA description for a fully-filled separating wall. The product is supplied in 75mm, 100mm, 125mm and 150mm to meet common cavity thicknesses.

### Use within Robust Details

When adding insulation to the cavity it is important to ensure there is no adverse effect on the acoustic performance of the wall. The easiest way to do this is by using Robust Details.

Isover RD Party Wall Roll is also a proprietary component of four Isover robust details

England & Wales – E-WM-17, E-WM-20, E-WM-24

Scotland – V-WM-20

Isover RD Party Wall Roll also conforms to the Robust Details generic full-fill mineral wool specification for non-proprietary details. Fully-filling these details with Isover RD Party Wall Roll will help deliver a zero U- value for the party wall as defined in Building Regulations (Approved Document L1A, Table 3).

In addition to meeting thermal bypass requirements, using Isover RD Party Wall Roll in one of Isover's four proprietary Robust Details also provides the following benefits:

- Exceed building regulations with an acoustic performance of 50dB (minimum)
- No requirement for render or parge coating prior to drylining
- No requirement for PCT (Pre-Completion Testing)



## A TIMBER FRAME SOLUTION

### Isover Timber Party Wall Roll

The use of Isover Timber Party Wall Roll in a wall cavity allows industry to meet the BCA description for a fully-filled separating wall. The product is supplied in 50mm, 75mm and 100mm thickness but can be compression fit to suit cavity widths between those intervals.

### Use within Robust Details

Like masonry walls, when adding insulation to the cavity it is important to ensure there is no adverse effect on the acoustic performance of the wall. For this reason, Robust Details do not allow the use of cavity insulation in E-WT-1 (England & Wales) and V-WT-1 (Scotland) but does permit use in E-WT-2 (England & Wales) and V-WT-2 (Scotland). Acoustic testing has found that the inclusion of cavity insulation without a sheathing board on both frames negatively impacts acoustic performance.



## Effective edge sealing

**Edge sealing is required to restrict air movement through the party wall cavity to the external environment or other cavities in the construction, and vice versa.**

In order for the edge sealing to be judged as effective one would expect the edge seal material to: Be impermeable to moisture and the passage of air:

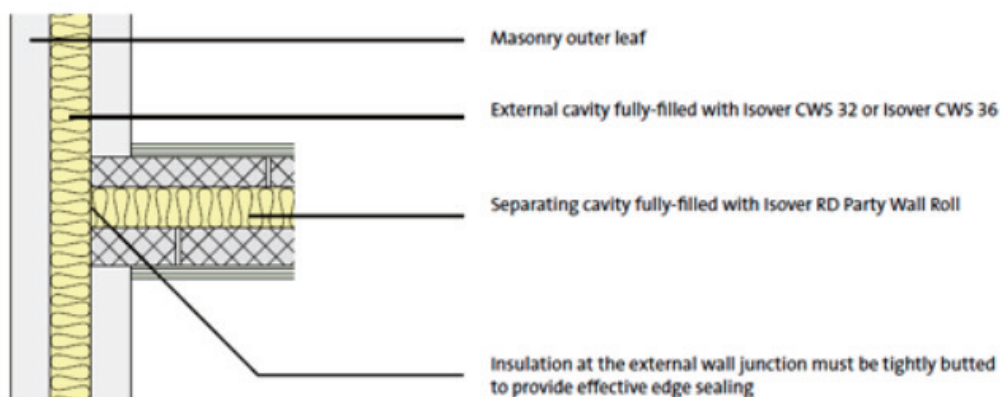
- Create an effective seal with both leaves of the party wall
- Have continuous runs of material with no gaps and where there are joints in the material for them to be effectively sealed
- Be in line with the thermal envelope in all abutting building elements
- Should be flexible
- Should not increase the fire load within the cavity

Any joints in the material must give confidence of their durability by:

- Being mechanically fixed
- Providing independent evidence of adhesion and compatibility between the materials being joined where adhesive tapes and mastics are used to form the joint.

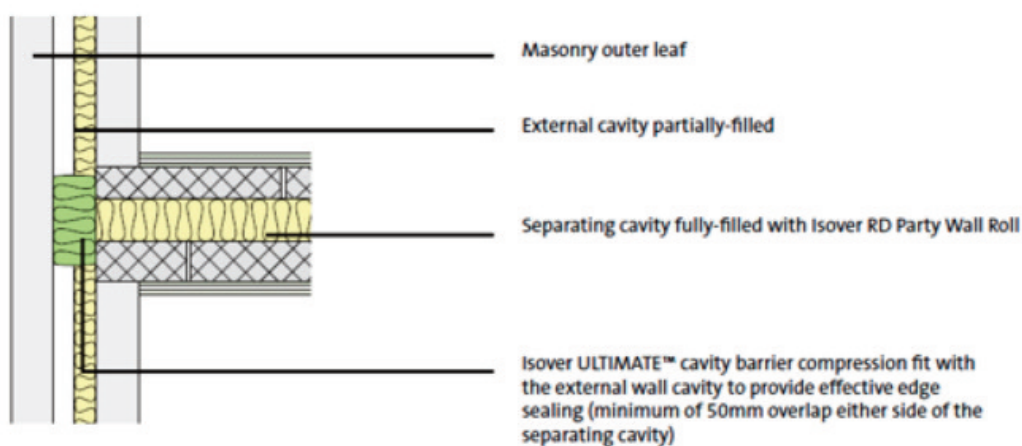
### Option 1

By fully-filling the external cavity with Isover insulation and tightly butting the insulation at the separating wall junction, additional edge sealing will not be required.



### Option 2

However, an Isover Cavity Barrier will be required to achieve effective edge sealing if the external wall is partially-filled with a rigid foam board.



#### Disclaimer

The information detailed above is guidance only and it is up to the designer / specifier to ensure that they speak with the local building control officer / NHBC officer to determine the acceptability of this statement or request for cavity barriers.

#### Junction Detailing

Isover publish a series of party wall junction details that help the industry to design effective edge sealing into their construction. The details are published in the Isover Solutions Guide for Separating Masonry Cavity Walls and can be downloaded from the Isover Website.

[www.isover.co.uk/downloads](http://www.isover.co.uk/downloads)

# The case for insulating party cavity walls

*Addressing the thermal bypass and bridge dilemma can be difficult, especially when dealing with the bridging aspect. John Tebbit, Managing Director, Robust Details Ltd examines the challenges posed and the need for third party accreditation...*

Bridges and bypasses are well known to all road users. Indeed they are generally regarded as good things as they get us over obstacles, speed up our journeys and save the inhabitants of the bypassed communities the noise and fumes from road traffic. However, as is often the case, when we move into the area of building physics and in particular thermal issues, what is seen as good in other areas is definitely bad for thermal performance. Rather than speeding up the traffic, we speed up the flow of heat, generally from our warm homes to the colder outside. That means higher fuel use, fuel bills and carbon emissions. It also increases the chances of condensation and mould. All in all, thermal bypasses and bridges are things we want to avoid. Fortunately we do have quite a bit of knowledge and guidance in this area.

Taking the issue of bypasses first, these can be avoided by good design and so then do not have to be considered. These are where warm air can circulate in some way into a colder area and thereby transfer energy. The best known of these is the party wall bypass where air in the cavity sets up circulation taking heat from the warm rooms either side, and moving it to the colder loft where energy is transferred. The effect can be seen in the photograph opposite, where the melted snow on the roofs corresponds with the party wall positions.

The answer has been to stop the circulation and this is typically done by filling the cavity with insulation along with effective edge sealing of the party wall

cavity as illustrated above. We have full filled party wall details that have also been tested to prove that filling the cavity did not compromise sound insulation.

Thermal bridging is more problematic in that even with good design the bridge often remains, even if it is no longer a four lane motorway for heat, but a slow single lane track. Also rather like real bridge design, the calculations to assess the size of the bridge are not easy. It is not something that can be done with a pencil and paper or even a spreadsheet. Typically one needs to use finite element analysis software. To make life even worse, there is not even a rigorous, unambiguous set of assumptions, simplifications and rules on how to use the software. There is guidance such as the BRE paper BR497 but even that has considerable room for judgment.

**“Indeed, for the house builder looking for ways to improve the performance of the dwelling it is difficult to be confident about the rigour of assessment that any particular detail has been through, as there is currently no requirement for third party accreditation or even assessment of competence for the modellers.”**

There is also the issue of whether the design that is intended to minimise bridging is buildable in real life. Details that look good in two dimensional sections may turn out to be impossible to build in



three dimensions, or at corners without resorting to hyper dimensional black belt origami with membranes. Anything that requires absolute precision or dry, dust and grease free working conditions is unlikely to be reliably reproduced on a building site.

For these reasons Robust Details and BBA set up a joint venture – Constructive Details ( <http://www.constructivedetails.co.uk/> ) to develop and disseminate junctions that were high performance, robust and buildable. A number of companies and trade associations have worked with Constructive Details to deliver a range of junctions all of which are free to download.

There are other places to find junctions including many manufacturers, BRE and government. However, not all will be up-to-date or assessed to the same level of scrutiny. For those who are less worried about how realistic the construction is either in its theoretical performance or for its onsite buildability, there are no real barriers to so doing. Indeed, for the house builder looking for ways to improve the performance of the dwelling it is difficult to be confident about the rigour of assessment that any

particular detail has been through, as there is currently no requirement for third party accreditation or even assessment of competence for the modellers.

It is virtually impossible for a non-expert to look at a junction and its performance data and judge whether it is likely to be true. The chances of building control being able to police this area are almost non-existent. In terms of thermal bridging and the claimed performance of details, if it looks too good to be true, then it probably isn't true.

Therefore, until a third party accreditation system is introduced that all parties have to adhere to, this is very much an area of caveat emptor.

## robustdetails

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# Meeting thermal and acoustic performance in party walls

Since the revision to Approved Document L in 2010, party walls have a thermal as well as acoustic purpose. Tom Foster, senior product manager at Saint-Gobain Isover, discusses the importance of meeting thermal bypass requirements without jeopardising the original purpose of the party wall – acoustics.

## Introduction

Over the past ten years, the construction industry's focus for party walls has been on improving acoustic performance, cost of installation and ease of compliance. However, since the revision of Approved Document L in 2010, focus has switched towards meeting thermal regulatory requirements by removing thermal bypass from the party wall. Despite this added complexity, it is important for the industry to remain focused on achieving good all-round performance, including acoustics.

## Meeting regulatory requirements

For anyone building to 2010 or 2013 thermal regulations, serious penalties will be incurred in the SAP calculation tool if party wall thermal bypass is not addressed. The penalty is a default U-value of 0.5 W/m<sup>2</sup>k for the party wall unless measures are taken to address the issue. This can be achieved in two ways: effectively edge sealing the cavity; and/or restricting air movement by filling the cavity with mineral wool. If both measures are taken, a zero U-value can be assigned to the wall in the SAP calculation tool.

The full-fill mineral wool insulation used to restrict thermal bypass also plays a big part in the acoustic performance of the wall. Whereas the thermal requirement for the product is generic and non-brand specific, often the acoustic requirement is much more precise and moving away from the product or brand specification could negatively impact the acoustic performance of the wall.

When applying measures to address thermal bypass, care must be taken not to create a detrimental effect on the acoustic performance of the wall. The easiest and often most financially viable way to ensure compliance with acoustic and thermal regulation is through the Robust Details scheme.

## The solution

Over the past five years, Isover has gone to great lengths to support the industry with robust solutions for masonry party walls. Isover's range of three proprietary Robust Details; E-WM-17, E-WM-20 and E-WM-24 all incorporate Isover RD Party Wall Roll, a full-fill mineral wool roll designed to meet the requirement for a fully-filled cavity to eliminate thermal bypass, and to maintain high levels of acoustics. In addition, all three details remove the requirement for pre-completion sound testing and a parge-coat prior to dry lining.

By registering and building to one of these three Robust Details, house builders can claim a zero U-value party wall in their SAP calculation whilst continuing to achieve high levels of acoustic performance. Care should be taken to ensure the exact specification of the Robust Detail is followed, including insulation, wall ties, block type and plasterboard, to ensure the designed acoustic performance is achieved on-site.

## Summary

The introduction of thermal requirements for party walls in 2010 may have created more complexity for the industry, but by building to the specification laid out in Isover's three proprietary Robust Details, construction professionals can have peace of mind that they will meet the new thermal regulatory requirements and maintain the consistently high acoustic performance of party walls that has been developed over the last decade.

# The 'Sound' Choice for Party Walls



Isover RD Party Wall Roll is a proprietary component of three Robust Details; E-WM-17, E-WM-20 and E-WM-24.

- Helps to deliver a zero U-value party wall
- 3 credits towards the Code for Sustainable Homes
- No requirement for render or parge-coat

Visit [www.isover.co.uk](http://www.isover.co.uk) for more information



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