Scope

Retrofit room in roof insulation is now established as a common energy efficiency measure in the domestic sector. This guide is intended to supplement Annex B12 of PAS2030:2017 to offer more specific advice. This document identifies the main viable methods that can be deployed and seeks to offer guidance on appropriate installation techniques. Installers should ensure that they continue to work to all other required standards including building regulations and manufacturers’ guidance which may change from time to time.

Please note that this guide covers vented roof spaces only.
This document is intended as a guide to assist parties involved in the delivery of retrofit room in roof insulation to complete installations in line with the requirements of PAS2030:2017 and other relevant standards and regulations. It is intended to complement PAS2030:2017 and is not specific to any additional requirements which may need to be fulfilled in order to be compliant with specific funding schemes such as the Energy Companies Obligation (ECO).

The authors of this document, the National Insulation Association and ATMA will not be held responsible for any errors, omissions, or for any liabilities whatsoever arising from the content of the guide. Installers must ensure that they follow all building regulations, PAS requirements, industry best practice and other relevant standards.

All standards and regulations referred to in this document may be updated from time to time and users of this guide are responsible for ensuring they are working to the most up to date standards.
What Defines A Room in Roof in RdSAP?

RdSAP Conventions for RdSAP 9.92 issued 12 August 2016 (v9.0) states that a room in roof must be accessed via a permanent fixed staircase such that one is able to walk down facing forwards. For a roof room to be classed as such and not as a separate storey, the height of the common wall must be less than 1.8 m for at least 50% of the common wall (excluding gable ends or party walls). The common wall is a vertical continuation of the external wall of the storey below.
The components that form the thermal envelope of the room in roof typically comprise:

- Stud Walls
- Common Walls
- Sloping Ceilings
- Flat Ceiling
- Gable end
- Party Walls
- Dormer Windows
- Residual Loft Space
PAS 2030:2017 outlines the requirement for a pre-installation survey to be undertaken. Annex B12 outlines the minimum competency requirements required to undertake this task.

In order to facilitate common and compliant processes across the industry, a Pre-Installation Survey template has been drafted for use alongside this guidance.

Two areas have been given specific focus in Annex B12 of PAS2030:2017:

- B12 I2a Ventilation to spaces in the roof void
- B12 I2b The need to address thermal bridging
Pre-installation Requirements: Ventilation

Without proper ventilation, a property could suffer from condensation issues after insulation has been added in a room in roof. It is therefore essential that ventilation is either maintained, or enhanced (where required). In a room in roof, crossflow ventilation is achieved when air can travel up one side of a sloping ceiling, across the loft area at the top and back down the other side.

Where a ceiling is vaulted, there is no crossflow ventilation between the two sloped areas, so additional ventilation measures must be undertaken to ensure adequate ventilation is provided. Section A.5 of PAS2030:2017 outlines the minimum ventilation requirements and where applicable you should also consider the guidance offered in ‘General requirements and guidance for the installation of cold roof loft insulation (CITB Version 2.0)’.
Sloping Ceilings And Crossflow Ventilation

It is very important to ensure crossflow ventilation around the room in roof at all times to prevent condensation. Eaves ventilation must be cleared of any old insulation that may be blocking the air flow.

Image illustrating blocked eaves
Example Room in Roof – showing cross flow ventilation
Pre-Installation Requirements: Thermal Bridging

Thermal bridging can lead to condensation and mould growth.

A thermal bridge (or cold bridge) is;

*an area of a building construction having significantly higher heat transfer characteristics than the surrounding materials.*

Examples of where this might occur in a retrofit Room-in-roof installation;

- Uninsulated rafters
- Around un-insulated sections of dormer windows

PAS2030:2017 sets out in Section A.6 how consideration needs to be given to thermal bridging in the pre-installation and design phases.
When installing insulation to the room in roof you are responsible for the ventilation requirements for all existing fuel burning appliances within the room in roof. If a fuel burning appliance is present, this should be assessed by a competent person to determine whether the pre-existing ventilation and subsequent post installation requirements are sufficient or further remedial works are required.

Works **MUST NOT PROCEED** unless a competent person has deemed the fuel burning appliance to have sufficient ventilation or any associated remedial actions (such as the installation of new vents) have been completed and signed off by person competent to do so.
Pre-Installation requirements: Combustion Appliances

Relevant guidance can be found in CIGA Technicians Guide to Best Practice: Flues Chimneys and Combustion Air Ventilators (Version 3.0 May 2016)

Examples of combustion appliances that could be encountered in a room in roof:
Examples of circumstances when it would not be appropriate to proceed with an installation without further remedial works.

When there is existing evidence of any of the following:

- Damp and mould on rafters and joists
- Damp plasterboard
- Wood rot
- Holes in the roof or felt
- Signs of water penetration on timbers and wall areas
- Timbers that are flaking and weak
- Signs of condensation on surfaces in the cold loft space
- Unsuitable Existing cables and electrical connections
- Bats or other protected species present in the roof space
Other examples of circumstances when it is not appropriate to proceed with an installation.

When any other pre-installation requirements cannot be satisfied, including:

- When building regulations cannot be satisfied;

- When clause 5.13 Installation methods of PAS2030:2017 cannot be satisfied. This is most likely to be when you do not have…

*method(s) for the installation of the EEM(s) originating from the product/system specification sheets or other such guidelines and information provided by the product or system manufacturer, supplier or design source for this purpose.*
There are several methods of insulating a RIRI therefore there are several types of insulation product that can be installed in a room in roof install.

These include: PIR, Phenolic Foam, Mineral wool and Polyurethane (not covered in this guide).

Different combinations of these materials could be used to treat various thermal elements.
Insulating the Thermal Elements of a Room in Roof

When insulating any of the thermal elements in a room in roof the installation method used should be approved by the product supplier or system designer as required in PAS2030:2017.

Insulation requirements are covered in Section 5 (Guidance on Thermal Elements) of the Approved Document L1b (Building Regulations). In particular, consideration should be given to Table 3. Upgrading Retained Thermal Elements.
The scenarios presented by individual properties will differ. However, there are fundamental Requirements which need to be satisfied in relation to Building Regulations. These are set out in the document link below:


The target U-values that should be achieved are those presented in Table 3 - Upgrading Retained Thermal Elements. The following slide gives guidance on what to do in circumstances where this is not achievable.
Where technically, functionally and economically possible the U-values in Table 3 of Building Regulations Approved Document Part L1b overleaf should be met.

It is commonly accepted that where it is not possible to reach the Target U-Value, the standard met should reach the Threshold U-value as a minimum which takes into account area-weighted values.

<table>
<thead>
<tr>
<th>Element</th>
<th>(a) Threshold U-value W/(m²·K)⁺</th>
<th>(b) Improved U-value W/(m²·K)⁺</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wall – cavity insulation</td>
<td>0.70</td>
<td>0.55</td>
</tr>
<tr>
<td>Wall – external or internal insulation</td>
<td>0.70</td>
<td>0.30</td>
</tr>
<tr>
<td>Floor¹</td>
<td>0.70</td>
<td>0.25</td>
</tr>
<tr>
<td>Pitched roof – insulation at ceiling level</td>
<td>0.35</td>
<td>0.16</td>
</tr>
<tr>
<td>Pitched roof – insulation between ratters²</td>
<td>0.30</td>
<td>0.18</td>
</tr>
<tr>
<td>Flat roof or roof with integral insulation³</td>
<td>0.35</td>
<td>0.18</td>
</tr>
</tbody>
</table>

1. ‘Roof’ includes the roof parts of dormer windows and ‘wall’ includes the wall parts (cheeks) of dormer windows.
2. This applies only in the case of a wall suitable for the installation of cavity insulation. Where this is not the case, it should be treated as ‘wall – external or internal insulation’.
3. A lesser provision may be appropriate where meeting such a standard would result in a reduction of more than 5% in the internal floor area of the room bounded by the wall.
4. The U-value or the floor of an extension can be calculated using the exposed perimeter and floor area of the whole enlarged building.
5. A lesser provision may be appropriate where meeting such a standard would create significant problems in relation to adjoining floor levels.
6. A lesser provision may be appropriate where meeting such a standard would create limitations on head room. In such cases, the depth of the insulation plus any required air gap should be at least to the depth of the rafters, and the thermal performance of the chosen insulant should be such as to achieve the best practicable U-value.
7. A lesser provision may be appropriate if there are particular problems associated with the load-bearing capacity of the frame or the upstand height.
8. Area-weighted average values.
Insulation of Sloping Ceilings

According to guidance provided by BRUFMA (British Rigid Urethane Foam Manufacturers’ Association), the following two options are deemed acceptable to the thermal element commonly referred to as the sloping ceiling:

**OPTION 1:** Remove all existing plasterboard and follow the guidance given in the Construction Products Association Loft Conversion Guide.


**OPTION 2:** Overboard existing plasterboard with suitable products approved for use by the product supplier which meet the required U-values set out in the Building Regulations in Table 3 of Approved Document L1b.

Determination of which method to follow is an important consideration as it impacts upon the requirements for the insulation of other thermal elements later in this guide.
Over boarding of existing sloping ceilings must only be undertaken where it follows an installation method that has been approved by the relevant product manufacturer / system provider for the specific product in use at the time:
Prior to over boarding the pre-installation survey needs to establish a number of key factors, including:

- An assessment of the current level of ventilation and any associated condensation risk after insulating the relevant thermal elements
- Whether an existing Vapour Control Layer (VCL) exists on the face of the existing plasterboard exposed to the cold void
- Whether it is feasible to disarm the VCL

If an existing Vapour Control Layer (VCL) is in existence, this should be dis-armed in line with the installation methods of the manufacturer of the newly installed product. As an example, one method of achieving this would be to cut through any existing joints to ensure that the new VCL applied is active.
Over boarding of Sloping Ceilings – Additional Requirements

Products should be fixed according to **the installation methods provided by the product manufacturer or system designer**, ensuring that:

- The existence and safe operation of downlighters and other light fittings is considered and treated with in line with the current guidance in the General requirements and guidance for the installation of cold roof loft insulation (CITB September 2013)

- An appropriate sealing method is utilised which does not compromise the safe use of the fitting, but allows compliance with the Continuity of Insulation and Air Tightness requirements in the Building Regulations and associated references in PAS2030:2017

- The CITB guide should also be referred to in relation to dealing with high current carrying cables (e.g., electric shower cables and electric cooker cables which could also be present in this area)
Installation of Access Points to loft areas

If there is already access into the stud wall areas and flat ceiling area, you may not need to install a new access. If these areas have no access, you may need to provide a new access hatch. When installing these new openings, this should be done in accordance with relevant Building Regulations. If the access is to be permanent, ensure the position is acceptable to the customer.
Insulation of Stud Walls

Stud Walls should be insulated to meet the required U-values set out in Table 3 of Approved Document L1b. If using mineral wool, the insulation should be fitted in line with the manufacturers installation method to all stud walls with no gaps. If using a quilt insulation, then netting must be installed to keep insulation in position. Where possible ensure that there are no exposed studs which may result in thermal bridging, by cross-laying or other suitable methods.
Insulation of Stud Walls

Stud walls can be insulated in three main ways:

1) By applying Mineral Wool insulation between and over the existing studwork from inside the residual loft space;

2) By over boarding from within the Room in Roof space;

3) By using a combination of the techniques described above.

Whichever method is used must be in line with the: method(s) for the installation of the EEM(s) originating from the product/system specification sheets or other such guidelines and information provided by the product or system manufacturer, supplier or design source for this purpose.
Insulation of Stud Walls from within the Residual Loft Space

Where possible leave access to areas where you have insulated so that future access can be gained. If the area is too small to install an access hatch then it is recommended that photographic evidence of the space pre and post installation is captured.

If original hatches are present these do not require upgrading but do require insulating and draughtproofing in line with the CITB guide: General Requirements and guidance for the installation of cold roof loft insulation (Version 2 September 2013)
The current Approved Document B Volume 1 2006 edition (England and Wales) does not make recommendations for fire protection to the ceiling below a roof space or fire protection to an internal stair in properties with a floor up to 4.5m above podium (ground) level. This is typically two storey properties. If the Room in Roof has only one room within it, NO Fire rated hatches are required. If the Room in Roof has more than one room within it, Fire Rated hatches are required. Ceiling hatches may require Fire Rated hatches depending on the room layout.

No Fire Rated hatches Required

Fire Rated hatches are required
Installation of Fire Rated Access - Stud Walls & Half Hour Fire Rated Hatches


Fire rated hatches should be Kite marked (examples shown below)
Room in Roof Hybrid System – illustrated example
The ceiling areas behind the stud walls, known as the residual loft, should be insulated in line with the CITB guide: General Requirements and guidance for the installation of cold roof loft insulation (Version 2 September 2013), ensuring that:

- All ventilation from the eaves is clear
- If crossflow ventilation is likely to be compromised, appropriate ventilation is installed prior to the insulation
- All vents, ductwork and flues are protected in line with manufacturer's instructions
- All high current cables are protected.

The photo above shows an example of a residual room in roof area prior to being insulated as a Retrofit Room in Roof Measure.
All standard loft insulation techniques utilised for flat ceilings and the residual areas of the room in roof should comply with the requirements of Annex B9 of PAS2030:2017 which makes specific reference to the need to comply with the General requirements and guidance for the installation of cold roof loft insulation published by CITB. In addition, any installation methods provided by the product manufacturer or system designer are followed.

Pay particular attention to ensuring that you do not block any ventilation coming from the sloped ceiling sections where the insulation meets the flat ceiling.

If the loft area is too small to access or ventilation issues prevent insulation at the depths required to upgrade the thermal element then the ceiling should be over boarded from inside the room in roof space.
• Where recessed lights have been installed through the ceilings there should be measures taken to safeguard and prevent air leakage around the down lights into the roof voids. These can be covered and sealed with an f-cap fire rated hood

• Recessed lights covers should be installed to CITB guide: General Requirements and guidance for the installation of cold roof loft insulation (Version 2 September 2013)
All pipework and water tanks should be insulated in line with the CITB guide: General Requirements and guidance for the installation of cold roof loft insulation (Version 2 September 2013). These MUST BE insulated within the flat ceiling section and residual loft areas, regardless of whether that area of loft has been newly insulated, as a new cold loft space has been created. All amenities within these sections which are more than 1m away from the stud wall access or loft hatch should have a walkway installed.
Retrofit insulation of dormer windows can be challenging due to:

- Limited space around the structure to allow for the fitting of additional insulation
- The need to avoid compromising the opening of windows
- Interaction with other insulation solutions used for adjacent thermal elements such as the sloping ceilings and flat roof

During the production of this guide we have attempted to determine an appropriate solution for Dormer windows which is practical, yet meets the existing requirements of Building Regulations. The dormer window component comprises a number of thermal elements with differing target U-values. It can be permissible to take an approach where an average U-Value for whole structures are utilised, through calculating weighted U-values based on the areas of each thermal element that makes up a dormer window.
Insulation of other Thermal Elements: - Dormer Windows a proposed approach

We therefore recommended that the following approaches are taken in order of hierarchy;

1) Insulate the cheeks as per the guidance for dwarf walls, and if option 1 on slide 23 is being followed, insulate the sloping ceiling by removing existing plasterboard and insulating between the rafters as per the guidance offered in the CPA Loft Conversion Guide. Insulate the flat ceiling component as a flat ceiling following the CITB Guidance. Then overboard with 20mm PIR board, or similar to assist in meeting the U-Value.

2) If following Option 2, overboard from the inside of the Room in Roof in line with manufacturer’s recommendations, where possible achieving the target U-Value, provided that this is technically, functionally and economically achievable.

3) Where this is not achievable, the thermal elements of the dormer window should be insulated to the best standard that is technically and functionally feasible. This lesser standard should not be worse that 0.7 Wm²K in line with Building Regulations which may be updated from time to time.
Insulation of Gable Walls and Party Walls

All elements of the heat loss envelope of the room should be fully insulated where possible.

Depending upon the wall type, the technique deployed may be;

- Cavity Wall and Party Wall Insulation (Refer to PAS 2030:2017 Annex B.1)
- External Wall Insulation (Refer to PAS 2030:2017 Annex B.4)
- Internal Wall Insulation (Refer to PAS 2030:2017 Annex B.8)

Where Internal Wall Insulation is utilised on gable or party walls, consideration should be given to the interaction and junctures with any other internal insulation method used (e.g. over boarding of sloping ceilings) to ensure that there is a continuous insulation envelope with no air gaps and that neither products performance is compromised.
Specific Considerations: Party Walls

Party Walls are not specifically listed in Table 3 of Part L1B. The methodology to determine insulation levels required should be as follows:

Identify if the party wall is adjoining another heated space.

a. If it is not adjoining a heated space treat as an external wall and insulate in line with Building Regulations.

b. If it is a heated space, identify if the wall is a solid wall
   i. if it is a solid wall then no need to take any measures apart from restricting thermal bridging at the perimeter
   ii. if it is an unfilled cavity wall then this can be insulated using party wall insulation or CWI as appropriate
Specific Considerations: Party Walls where Option 1 (removal of all existing plasterboard) is followed for Sloping Ceilings

Where Option 1 for the insulation of sloping ceilings is followed and all existing plasterboard is removed (see Slide 19), and there is a party wall present, there are specific considerations which must be followed in order to maintain acoustic performance between adjoining dwellings.

In these circumstances;

- There should be a double layer of 12.5mm standard plasterboard to all sloping ceiling areas.
Completion and Handover

All relevant handover requirements in section 5.8 of PAS 2030:2017 should be followed.

In addition, the CITB guide: General requirements and guidance for the installation of cold roof loft insulation (Version 2 September 2013) should also be followed. This includes specific requirements where insulation has been installed to fix Warning Notices at two adjacent points at each loft access point in line with the following template:

DANGER
CEILING JOISTS ARE COVERED BY INSULATION MATERIAL.
THE FLOOR BETWEEN THE JOISTS IS FRAGILE. IT WILL NOT CARRY YOUR WEIGHT.
YOU SHOULD NOT ENTER UNLESS A CRAWL BOARD IS PLACED ACROSS THE JOISTS.
Referenced Documents

- PAS2030:2017
- Building Regulations Approved Document Part L1b
- CIGA Technicians Guide to Best Practice: Flues Chimneys and Combustion Air Ventilators (Version 3.0 May 2016)
- CITB guide: General Requirements and guidance for the installation of cold roof loft insulation (Version 2 September 2013)
- Building Regulations Approved Document B Volume 1 2006 edition (England and Wales)
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