

# A guide to spray and injected foam insulation in the UK



Insulation Manufacturers Association (IMA) is the Trade Association that represents both the polyisocyanurate (PIR) and polyurethane (PUR) insulation industry in the UK. Its members manufacture rigid insulation that provides around 40 per cent of the total thermal insulation market into the UK. IMA's membership comprises all of the major companies in the industry, including manufacturers of finished PIR and PUR insulation products, as well as suppliers of raw materials and associated services.

IMA represents the industry's views across all government and industry stakeholders and decision makers and promotes a positive and dynamic business environment for the PIR and PUR insulation industry in the UK.

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IMA and any contributors believe that the guidance and information contained in this guide is correct. All parties must rely on their own skill and judgement when making use of it.

This guide is not exhaustive and building designers will be required to check constructions against guidance for a number of functional standards. It is recommended that project specifics are discussed with the local authority and a qualified fire engineer, particularly when following alternative guidance or a fire safety engineered approach.

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# 1 Introduction

Injected and spray foam has been used successfully in the UK, Europe and worldwide for more than 30 years and is a valuable addition to improving the energy efficiency of many buildings. It is estimated that more than 250,000 properties in the UK have been treated with spray or injected foam insulation improving thermal performance for building occupants as well as reducing fuel bills.

Injected and spray foam can make an important contribution to the thermal performance of a building, especially when retrofitting existing buildings, although its uses and benefits are wide ranging and can also be used in new build applications.

It is widely accepted that insulation is the single most important energy efficient element in the specification of a building. Ensuring that the fabric of a building is insulated is the most cost effective and easiest way to improve its energy efficiency regardless of whether the building is old or new. Greater energy efficiency means that less energy is needed to either heat or cool a building. In turn this can lead to lower fuel consumption, lower energy bills, greater comfort for the consumer and fewer carbon emissions to damage the environment. The successful longevity of spray foam applications has resulted in many properties being bought, sold and mortgaged over time to the satisfaction of lenders, insurers and homeowners and the products continue to perform as intended.

# 2 Scope of the document

This document is aimed at anyone who wants to know more about spray or injected PU foam insulation products. It will be particularly valuable for mortgage lenders, valuers and surveyors to help their understanding of pre-installation preparations, proof of professional application and post-installation warranties and certification.

It covers the various applications of in-situ applied foam whether it is added for thermal performance or stabilisation of cavity walls suffering from wall tie failure.

## **3 Definitions and terms used in this document**

### **3.1 Polyurethane foam (PUR)**

Rigid cellular insulation material or product with a structure based on polymers mainly of the polyurethane type.

### **3.2 Polyisocyanurate foam (PIR)**

Rigid cellular insulation material or product with a structure based on polymers mainly of the polyisocyanurate type.

### **3.3 Polyurethane foam (PU)**

Rigid cellular insulation materials or products including both polymer types based mainly on polyurethane (PUR) or mainly on polyisocyanurate (PIR) groups.

### **3.4 In-situ installed foam insulation**

#### **3.4.1 Injected cavity foam**

A PU foam system for injection into cavity walls

#### **3.4.2 Spray foam**

A PU foam system for spraying onto walls, floors and roofs.

## 4 Benefits

PUR injected and spray foam insulation foam provides a wide range of benefits whether used as a retrofit application in existing buildings or in new build applications.

- Maintains an airtight seal so that insulation and air tightness can be provided in the one application delivering enhanced energy efficiency performance
- Injected cavity foam insulation can provide excellent thermal performance
- Injected cavity foam can be used in some more difficult to treat properties such as those with narrow cavities
- Injected cavity foam can be used where traditional cavity wall ties have failed by adhering the inner and outer leaves of the building providing stabilisation as well as enhanced thermal performance
- Expands to fill the full area that requires insulation, so is suitable for uneven surfaces and cavities
- Is quick to have professionally installed when compared to traditional installation methods.
- Can be carried out with minimal disruption or mess to building occupants
- Closed cell foams can provide water resistance properties in cavity walls, particularly useful in high flood risk areas
- Can last the lifetime of the building (check third party certification)
- Does not sag, shrink or settle and expands and contracts with the natural movement of the building

## 5 Open celled and closed cell foams

There are typically two types of in-situ insulating foam:

- **Closed cell foams** – Cells inside a closed cell foam do not allow air to pass through the foam thus maintaining an airtight barrier but does permit low levels of water vapour to pass through. Closed cell foam has a much higher density than open cell and is more solid and stable in its structure.
- **Open cell foams** – These are foams where the cells aren't completely encapsulated and are deliberately left open but still provide air tightness. The foam is a softer, more flexible material. Open cell foam is breathable and facilitates vapour diffusion and bi-directional drying

There are some differences in the performance characteristics of the two types which can be found in section 7.

## 6 Applications

Injected and spray foam can be used in a wide variety of applications as shown in the table below:

	Open cell foam	Closed cell foam
Pitched tiled roof with breather membrane	✓	✓
Pitched tiled roof with sarking felt	✓	✓
Pitched roof above a loft space	✓	✓
Flat roof	✓	✓
Timber framed wall	✓	✓
Masonry cavity wall	✗	✓
Solid masonry wall (dry lining systems)	✓	✓
Suspended timber floor	✓	✓
Solid concrete ground floor	✗	✓

## 7 Performance characteristics

Property	Closed Cell	Open Cell
<b>Thermal performance</b>	Closed cell foams typically have thermal conductivity or $\lambda$ value of 0.025 W/m.K.	Open cell foams typically have a thermal conductivity or $\lambda$ value of about 0.039 W/m.K.
<b>Vapour resistance</b>	Closed cell foams permit only low levels of water vapour to pass through thus restricting the passage of water vapour through the outer leaf of a building thereby reducing the risk of interstitial condensation.	Open cell foams allow higher levels of vapour to pass through the space between the open cells.
<b>Water resistance</b>	Water resistant - doesn't allow for ingress of water through the insulation. Closed cell foam is non-absorbent and as such will remain serviceable in the event of high exposure to water.	Water can ingress into the space left inside the open cells allowing water to pass through the foam.
<b>Compressive strength</b>	The high density of closed cell foam gives stronger compressive strength characteristics. As such it can enhance the structural stability of building frameworks and is often used to help with wall tie failure and nail fatigue.	The density in open cell foam is generally lower than closed cell and as such has a soft sponge-like structure to it. As a result open cell do not offer the same structural stability as closed cell foams.
<b>Reaction to fire</b> (check with individual manufacturers for their specific classifications)	When tested to EN 13501-1 closed cell foam achieves a class E rating. Systems incorporating an intumescent coating can achieve a EN13501 class B rating.	When tested to EN 13501-1 open cell foam usually achieves a class E or F rating.
<b>Density</b>	The typical density of closed cell foam is around 35 kg/m <sup>3</sup> or more.	The typical density of open cell foam is around 8kg/m <sup>3</sup> or more.



## 7.1 Air tightness

Using spray foam will contribute to meeting air tightness requirements of the different Buildings Regulations. Care should be taken to follow the regulations for the relevant nations of the UK.

**For England – Approved Document L**

**For Scotland – Section 3 of the Technical Handbook**

**For Wales – Approved Document L**

**For Northern Ireland – Technical Booklet F**

## 7.2 Ventilation

Ventilation strategies should be in line with BS 5250 and the relevant sections of Buildings Regulations.

**For England – Approved Document F**

**For Scotland – Section 6 of the Technical Handbook**

**For Wales – Approved Document F**

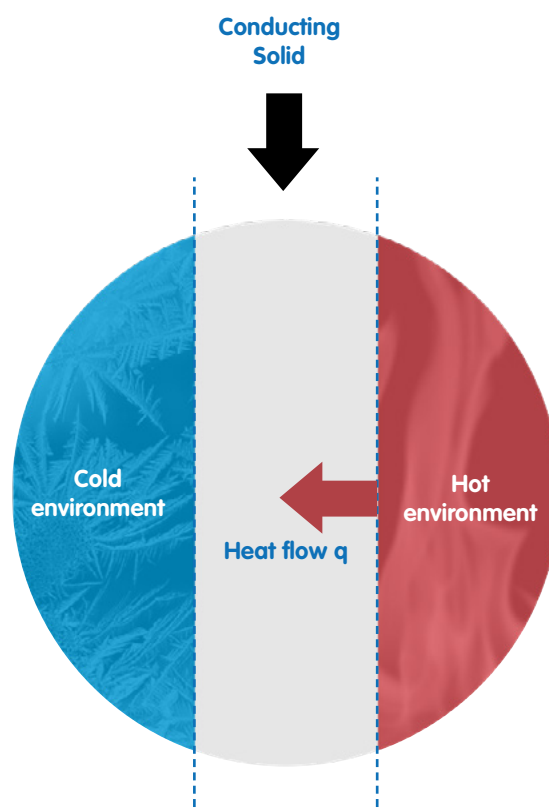
**For Northern Ireland – Technical Booklet K**

## 7.3 Thermal performance

Thermal conductivity, also referred to as the lambda value, dictates the insulating ability of a material and is a key factor in designing insulation strategies that achieve stringent building fabric thermal performance. Thermal conductivity is the rate of transmission of energy through 1m<sup>2</sup> of material, 1m thick with a 10°C temperature difference on both sides. The unit measurement is watts per metre Kelvin.

The lambda value, dictates the insulating ability of a material and is a key factor in designing insulation strategies that achieve stringent building fabric thermal performance. The lower the lambda value of an insulation product, the better it performs.

PUR and PIR is characterised by its excellent thermal performance compared to other products, which need to be much thicker to achieve the same performance.



## 7.4 Building stabilisation

Because of its high compressive strength and ability to adhere to any substrate, closed cell spray insulation can be used where cavity wall ties have failed, in order to bond together the inner and outer leaves of the building.

Similarly, where nail fatigue has occurred on a roof, closed cell spray foam insulation can be used to secure the roof tiles. Prior to any application a full survey of all roof elements is carried out, checking for moisture content of timbers, cracked or missing tiles, damage to vapour control layers and any other defects to ensure that the defects are corrected before installation can proceed. Not all buildings can be treated and where a roof is not suitable for spray foam application the professional survey will identify this and application will not occur.



## 8 Installation

Injected and spray foam insulation cannot be carried out as a DIY project. It is important that it is carried out by a registered installer who has been approved by the manufacturer of the product being installed.

The product being installed should have a third party certificate of fitness for purpose such as a BBA certificate, Kiwa BDA or from another UKAS accredited certified body. Each certificate is individual to the product and its application.

For domestic roofs, IMA has produced a code of practice for the installation of spray foam [which can be found here](#).

### **Pre-installation checks**

Before carrying out an installation the installer must carry out a series of pre-installation checks. These will vary depending on the application being carried out. For example, the checks for inspecting a masonry cavity wall will differ from those for an installation in a loft.

### **Post-installation pack**

To the satisfaction of many mortgage lenders and insurers, post-installation information is left with the building owner. For roof installations many contractors also attach information in the roof space detailing the installer, date of installation, product type and batch and certification details. For cavity walls installations, information is lodged with local authority building control either by notification or self-certification by an installer who is part of a competent persons scheme.

Every effort is made to ensure accurate information about the application is lodged with the customer and all other relevant parties.

When installed in accordance with the manufacturer's instructions, there should be no need to remove spray foam from a property.

## 9 Spray foam in domestic roofs

Spray foam in domestic roofs has been in the news over the last two years following the publication of a discredited and inaccurate report in 2021. Unfortunately, although the report was withdrawn it gained some traction and created a culture of doubt and confusion around properties with spray foam. Since then and because of that, IMA along with surveyor groups, some building societies and others have produced an [industry protocol](#) to inform and help those required to survey properties with spray foam.

This has helped to produce a more positive environment and there should be no issues for properties with spray foam that can show a homeowner pack and pre-installation surveys demonstrating the installation has been correctly and professionally installed

Unfortunately, people are still being targeted by unscrupulous agents who frighten people into having the spray foam removed unnecessarily and at great expense. Our advice is not to remove the spray foam as this is very rarely necessary. Information is available on the IMA website to help.

Homeowners having difficulty selling their property because it has spray are advised to locate the supporting paperwork. If this is not available homeowners can contact either the installer or manufacturer who should be able to provide it retrospectively. This should be sufficient for a knowledgeable surveyor and/or mortgage company to satisfy themselves that the spray foam has been professionally and correctly installed.

### **For anyone considering having spray foam installed we offer the following advice:**

- Do not be bounced into a quick decision
- Get a second quote from a reputable company
- Check with the spray foam manufacturer that the company proposing to install the product is a registered trained contractor, qualified to install that product
- Ensure the installer carries out a survey before installation and that you see a copy of the survey
- That you are given a home-owners pack when the job is completed

In essence do not allow just anyone into your property, however good their sales pitch. If you are interested ask them to make an appointment at a future date and don't agree to anything without taking time to consider it.

In the same way that you would with any home improvement, do not part with any money without discussing with someone you trust what is being proposed and why.

## 10 Publications referred to in this document

Below are a list of publications referred to in this document. To access each document, please click on the text as indicated below below: -

- [Approved Document F \(England\) Ventilation](#)
- [Approved Document F \(Wales\) Ventilation](#)
- [Approved Document L \(England\) Conservation of fuel and power](#)
- [Approved Document L \(Wales\) Conservation of fuel and power](#)
- BS 5250: 2021 Management of moisture in buildings - Code of practice
- BS EN 13501-1 Fire classification of construction products and building elements  
Part 1: Classification using data from reaction to fire tests
- [Building Standards Technical Handbooks \(Scotland\)](#)
- [Fire safety: Approved Document B, Volume 1 Dwellings](#)
- [Technical Booklet F \(Northern Ireland\) Conservation of fuel and power](#)
- [Technical Booklet K \(Northern Ireland\) Ventilation](#)

For more details on the benefits of PIR insulation please visit: [insulationmanufacturers.org.uk](http://insulationmanufacturers.org.uk)



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