Technical Guide
Spray foam insulation
WALLTITE® A foam insulation system for internal roofs, floors and walls that provides a seamless airtight solution which, unlike conventional insulation materials, is spray applied.

WALLTITE is ideal for many applications:
- New pitched roof
- Existing pitched roof
- Room in a roof
- New timber frame wall
- Masonry cavity wall
- External soffit
- External roof
- Refurbished masonry wall (timber framing)
- Refurbished masonry wall (steel stud)
- Concrete slab ground floor

✓ Energy efficiency
WALLTITE is a speedy, efficient insulation solution coupled with significantly lower U-values than other conventional insulation materials.
WALLTITE has a thermal conductivity as low as 0.025 W/mK.

✓ Air tightness
The continuous spray leaves a minimal amount of surface area without insulation resulting in an airtight building envelope of low permeability, and without the need for supplementary material.
The purple foam is fast to apply and quick to cure. WALLTITE therefore offers the specifier an all in one solution to meet and exceed latest Building Regulations requirements.

✓ Sustainability
By virtually eliminating air leakage, WALLTITE with its closed cell structure helps control the movement of vapour and moisture throughout the building, reducing the risk of condensation and mould. Sustainable over the life span of the building, WALLTITE can even prolong the building's life as it protects against premature deterioration of building materials.

✓ Design freedom
WALLTITE also provides the specifier with complete design freedom as the spray foam adapts to the shape of the substrate providing an ideal solution for insulating difficult areas such as profiled and curved roofs.
Technical support is available via our in-house BASF team and external retained consultants.

✓ Occupier comfort
For building occupiers, WALLTITE makes a significant contribution to a comfortable indoor climate by creating a draft free environment that prevents the infiltration of pollutants, toxins and allergens.

✓ Reliability
WALLTITE is only installed by BASF-trained professionals. A nationwide network of Approved Contractors is available throughout the UK.
PU spray foam insulation can be applied onto any substrate – IN SITU and offers significant benefits over other insulations:

• adheres well to breather membranes and even roof tiles (this will help stabilise the roof structure and prevent tile slippage)
• typical lambda value 0.025 W/m K (closed cell)
• can be applied to: solid walls (internal and some external applications), cavity walls (slight change in formulation), roofs, soffits and floors
• cures rapidly hence no waiting time – less wastage on site
• provides a seamless form of insulation which provides an airtight barrier
• closed cell spray foam not permeable to moisture and provides excellent thermal properties
• some acoustic performance
• Class 1 fire rating.

The problem
Heat loss from a house or building occurs in almost every direction, with walls and roofs accounting for nearly 60% of total heat loss.
Loft and cavity wall insulation are simple and efficient ways to prevent heat loss through roofs and walls – but in time these can “fail” and not perform as intended.
Energy savings could amount to as much as 40% depending on the type of insulation and the thickness used.
Even insulated buildings can show signs of heat loss which ultimately affects the building’s performance and its sustainability
Damp and moisture ingress can affect the performance of certain insulation materials (such as mineral fibre).
Reducing air leakage can help to reduce the amount of fuel necessary to heat a building.

So why insulate with PU spray foam?

PU spray foam insulation can be applied onto any substrate – IN SITU and offers significant benefits over other insulations:
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• provides a seamless form of insulation which provides an airtight barrier
• closed cell spray foam not permeable to moisture and provides excellent thermal properties
• some acoustic performance
• Class 1 fire rating.
How it works

Composition

Polyurethane spray foam consists of two raw materials: a resin and a hardener – obtained from crude oil.

Mixing the two components – which contain auxiliary materials such as catalysts, foaming agents or stabilisers – gives rise to a reactive compound.

Depending on formula and proportions of the mix, the properties of the compound can be precisely regulated, e.g. hard, soft, integral, cellular (foamed) or compact.

Summary of key benefits...

Insulation with no joints or gaps

Spray application of WALLTITE insulating material produces a seamless insulating layer with no joints or gaps and reduces energy loss due to thermal bridging.

Maximum insulating performance at minimum thickness

WALLTITE has an extremely low thermal conductivity not achieved by any other conventional insulating material, saving valuable space.

Insulation of components in hard to treat areas

Liquid installation means that critical, inaccessible or curved areas can be insulated without any problem – no need for spurious cutting and fitting.

Excellent adhesion to the substrate

WALLTITE fits like a second skin and is suitable for virtually all substrates such as corrugated fibre cement, profiled metal sheet or timber boards.

Prolongs the life of buildings

WALLTITE rigid, robust, closed-cell foam demonstrably improves the construction and life of buildings.

Rapid installation times

An experienced installation team can treat many m² of roof area a day with a foaming unit, when conditions are favourable.

Safe, professional installation

Trained, qualified people from certified installation companies guarantee safe, accurate application of the spray foam.

Increases comfort in the home

Residents of buildings insulated with WALLTITE report an improved indoor environment and a greater degree of comfort.

Low material weight

WALLTITE’s low weight places very little stress on components making it safer, for example, when there is heavy snow on flat roofs.

Quality assurance through self-monitoring

BASF plc is certified to BS EN ISO 9001, ISO/TS 16949:2002 and BS EN ISO 14001. Each batch is checked and tested before delivery. Relevant countries have local product certifications for WALLTITE.

Easy to transport and store

WALLTITE is foamed as a liquid mixture on site which means rapid transport and space-saving storage at the site.
Roof applications

- New pitched roof insulation
- Existing pitched roof insulation
- Room in a roof insulation
- External roof insulation (ELASTOSPRAY)
- Insulation over insulation
Roof applications

New pitched roof insulation

Description

WALLTITE is applied directly to the breathable roofing membrane between timber rafters in tiled or slated pitched roofs.

WALLTITE has a measured water vapour permeability, therefore it does not compromise the performance of any breathable membrane, or the timbers to dry out when subjected to periods of solar radiation.

The system minimises unwanted air leakage and air infiltration.

Certification

BBA Certificate No. 11/4816.

WALLTITE has undergone various performance tests. Certificates are available on request.

Technical data

Specification: Spray applied polyurethane foam between rafters, directly onto breather membrane

NBS clause: P1015A

Air leakage (50mm): 0.0033m³/hr/m²

Lambda 90/90: 0.025W/mK

Fire rating: Class 1 to BS 476: Part 7

Water vapour diffusion resistance factor: 61.12

Adhesion to roof tile underlay: 232kPa

Typical detail:

New roof with breathable underlay

1. WALLTITE CL100 insulation to achieve target U-value
2. Vapour control layer
3. Plasterboard and skim
4. Unventilated air space
5. WALLTITE returned to insulated cavity stop at head of wall
6. Breathable roof tile underlay

Loft space only, non habitable: insulated between and over rafters to achieve target U-value. WALLTITE may remain exposed.
Roof applications

Existing pitched roof insulation

Description

WALLTITE can be applied directly onto the underside of existing slate or tiled roofs. It seals any air gaps, preventing the ingress of windblown snow, rain, dust and unwanted air infiltration.

The water vapour permeability of WALLTITE permits all roof timbers to dry out following periods of solar radiation.

WALLTITE is applied between rafters in sloping ceiling areas and loft conversions. Plasterboard can then be fixed to the rafters.

In applications such as barn conversions the foam is dubbed out with a coat of bonding plaster and then finish plaster. Existing structures must be in a good state of repair with no evidence of rain penetration or damp. Defects should be made good prior to installing the product. WALLTITE also reduces airborne noise pollution from air and road traffic.

Certification

BBA Certificate No. 11/4816.

WALLTITE has undergone various performance tests. Certificates are available on request.

Technical data

<table>
<thead>
<tr>
<th>Specification</th>
<th>Spray applied polyurethane foam between battens and rafters, directly onto existing tiles or slates</th>
</tr>
</thead>
<tbody>
<tr>
<td>NBS clause</td>
<td>P10 15A</td>
</tr>
<tr>
<td>Air leakage (50mm)</td>
<td>0.0033 m³/hr/m²</td>
</tr>
<tr>
<td>Lambda 90/90</td>
<td>0.025 W/m² K</td>
</tr>
<tr>
<td>Fire rating</td>
<td>Class 1 to BS 476: Part 7</td>
</tr>
<tr>
<td>Water vapour diffusion resistance factor</td>
<td>61.12</td>
</tr>
<tr>
<td>Adhesion to tiles</td>
<td>123 kPa</td>
</tr>
</tbody>
</table>

U-values

<table>
<thead>
<tr>
<th>Thickness of WALLTITE (mm)</th>
<th>U-value (W/m²K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>190</td>
<td>0.14</td>
</tr>
<tr>
<td>160</td>
<td>0.16</td>
</tr>
<tr>
<td>140</td>
<td>0.18</td>
</tr>
</tbody>
</table>

Typical detail:

Existing roof with breathable underlay

1. WALLTITE CL100 insulation to achieve target U-value
2. Plasterboard and skim (optional)
3. Unventilated air space
4. WALLTITE returned to insulated cavity stop at head of wall
5. Non-combustible cavity stop, well bedded and sealed

Habitable space: plasterboard and skim/VCL with taped joints (VCL to be carefully cut and sealed around studding, ceiling posts and penetrations); batten counter batten rafters as necessary to achieve insulation depth, confirm rafter strength sufficient to receive counter batten and boarding if required.

Loft space only, non-habitable. Insulated between and over rafters to achieve target U-value. WALLTITE may remain exposed in a non-habitable loft space.

Repair all roof defects and thoroughly overhaul where necessary prior to spraying.
**Roof applications**

**Room in a roof insulation**

**Description**

The versatility of in-situ applied WALLTITE insulation foam makes it an ideal material for use in loft conversions. It can be applied to external solid or cavity walls, separating or party walls, knee or side walls, flat and pitched roofs. WALLTITE automatically provides designers with a more air tight roof. It prevents the ingress of wind blown rain, snow and dust and other forms of airborne pollution.

**Certification**

BBA Certificate No. 11/4816. WALLTITE has undergone various performance tests. Certificates are available on request.

**Technical specifications**

**Existing pitched roof, ceiling at rafter line**

Target U-value: 0.18W/m²K

150mm of WALLTITE

WALLTITE is applied between the rafters in sloping ceiling areas, either directly onto the underside of slates or tiles, or onto a membrane of low vapour resistivity. Plasterboard is then fixed to the face of the rafters.

**New flat roof**

Target U-value: 0.18W/m²K

140mm of WALLTITE

WALLTITE is applied directly to the underside of the plywood decking, between the roof joists. When used in conjunction with spray applied foam, any external weatherproofing must be of low vapour resistivity, e.g. single ply membranes.

**External Cavity Wall**

Target U-value: 0.30W/m²K

50mm + 35mm of WALLTITE

Injection grade foam can be injected through a series of evenly spaced holes, normally drilled in the outer leaf. This closed cell foam is totally resistant to driving rain. In a residential property, the cavity is usually continuous from the ground floor to the apex of the roof. In this case the whole elevation must be filled. For a nominal 50mm cavity you would need to top this up with 35mm sprayed to the inner leaf.

**Party wall**

Target U-value: 0.30W/m²K

95mm of WALLTITE

For solid wall insulation, WALLTITE is sprayed between metal or timber studs. Plasterboard is then fixed to the face of the studwork.

**Knee or side wall**

Target U-value 0.30W/m²K

95mm of WALLTITE

WALLTITE is sprayed between the timber studs of the wall. Plasterboard or ply is used as a backing board. Plasterboard is fixed to the face of the studwork, on the warm side of the wall.

**Typical detail:**

**Room in a roof insulation**

1. 100mm x 50mm rafter
2. Unventilated air space
3. Plasterboard and skim
4. Flooring
5. WALLTITE CL100 insulation to achieve target U-value

Habitable space: plasterboard and skim/VCL with taped joints VCL to be carefully cut and sealed around struts, ceiling joists and penetrations; batten/counter batten rafters as necessary to achieve insulation depth, confirm rafter strength sufficient to receive counter battenning and boarding if required.

Loft space only, non-habitable insulated between and over rafters to achieve target U-value. WALLTITE may remain exposed.
Roof applications

**External roof insulation**

**Description**
ELASTOSPRAY can be applied to the external surfaces of corrugated and profiled roof cladding. The in-situ application overcomes problem areas such as cracked roofing sheets and glazing, perished fixing bolt seals and gaps in the sheeting.

This practical way of insulating and weatherproofing a commercial building roof, provides a lightweight solution to condensation problems without disruption to production within the premises.

In these situations the ELASTOSPRAY needs to be provided with UV protection via a recommended membrane coating.

- Simple, seamless insulation of critical areas
- Suitable for virtually all substrate
- Economic due to ‘fast track’ installation
- Lightweight
- Adapts to any profile without gaps
- High compressive strength for occasional foot traffic

**Certification**
ELASTOSPRAY has undergone various performance tests. Certificates are available on request.

**Technical data**

<table>
<thead>
<tr>
<th>Density</th>
<th>&gt; 42kg/m³</th>
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<tbody>
<tr>
<td>Compressive strength</td>
<td>240kPa</td>
</tr>
<tr>
<td>Reaction to fire</td>
<td>E</td>
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</table>

**U-values**

<table>
<thead>
<tr>
<th>Thickness of ELASTOSPRAY (mm)</th>
<th>U-value (W/m²K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>135</td>
<td>0.18</td>
</tr>
<tr>
<td>100</td>
<td>0.25</td>
</tr>
<tr>
<td>50</td>
<td>0.46</td>
</tr>
</tbody>
</table>

**Typical detail:**
External industrial roof

1. ELASTOSPRAY insulation to achieve target U-value
2. Metal deck
3. Roof beams
Roof applications

Insulation over insulation

Description

WALLITITE is applied directly to the ‘over rafter’ laminated insulation board, between timber rafters in tiled or slated pitched roofs.

This composite system of insulation provides all the benefits of reduced U-values, controlled air leakage and air infiltration and reduces thermal bridging to a minimum.

Certification

BBA Certificate No. 11/4816.

WALLITITE has undergone various performance tests. Certificates are available on request.

Technical data

Specification: Spray applied polyurethane foam between rafters, directly onto board insulation

NBS clause: P10 15A

Air leakage (50mm): 0.0033m³/hr.m²

Lambda 90/90: 0.025 – 0.028W/m²K

Fire rating: Class 1 to BS 476: Part 7

Water vapour diffusion resistance factor: 61.12

U-values

<table>
<thead>
<tr>
<th>Thickness of WALLITITE (mm)</th>
<th>Thickness of board (mm)</th>
<th>U-value (W/m²K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>90</td>
<td>50</td>
<td>0.18</td>
</tr>
<tr>
<td>90</td>
<td>100</td>
<td>0.13</td>
</tr>
</tbody>
</table>

Typical detail:

New roof with board insulation

1. WALLITITE CL100 insulation between rafters to achieve target U-value
2. Over rafter PIR board insulation (minimum 50mm thick)
3. Breathable roof tile underlay
4. Counter-batten
5. Unventilated air space
6. Plasterboard and skim

Habitable space: plasterboard and skim/VCL with taped joints VCL, to be carefully cut and sealed around struts, ceiling joists and penetrations; batten/counter batten rafters as necessary to achieve insulation depth, confirm rafter strength sufficient to receive counter batten and boarding if required.

Loft space only, non habitable insulated between and over rafters to achieve target U-values. WALLITITE may remain exposed.
Wall applications

- New timber frame wall insulation
- Refurbished masonry wall insulation (timber frame)
- Refurbished masonry wall insulation (independent metal frame)
- Masonry cavity wall insulation
Wall applications

New timber frame wall insulation

Description

WALLTITE is applied directly between the studs onto the OSB. The stud depth should be sufficient to meet the recommended elemental U-value. Unwanted air leakage and air infiltration is minimised and sound attenuation improved.

Polyurethane foams are hypoallergenic and so contain no fibres or dust and no noxious vapours. Mechanical and electrical services can be fixed between the foam and the plasterboard. WALLTITE is very quick to install minimising on overhead costs, site storage and waste.

Certification

BBA Certificate No. 11/4816.

WALLTITE has undergone various performance tests. Certificates are available on request.

Technical data

<table>
<thead>
<tr>
<th>Specification</th>
<th>Insulation sprayed between studwork</th>
</tr>
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<tbody>
<tr>
<td>NBS clause</td>
<td>P10 205A</td>
</tr>
<tr>
<td>Lambda 90/90</td>
<td>0.025 to 0.028W/mK</td>
</tr>
<tr>
<td>Fire rating</td>
<td>Class 1 to BS 476 Part 7</td>
</tr>
<tr>
<td>Adhesion to timber</td>
<td>136kPa</td>
</tr>
</tbody>
</table>

U-values

<table>
<thead>
<tr>
<th>Thickness of WALLTITE (mm)</th>
<th>U-value (W/m²K)</th>
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<tr>
<td>135</td>
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<tr>
<td>100</td>
<td>0.25</td>
</tr>
<tr>
<td>90</td>
<td>0.27</td>
</tr>
</tbody>
</table>

Typical detail: New timber frame wall

1. Plasterboard and skim
2. Vapour control layer to be lapped over DPC at floor level and returned to window reveal and jambs
3. Unventilated air space
4. Sheathing ply
5. Sheathing membrane
6. WALLTITE CL100 insulation to achieve target U-value
7. 50mm air gap
8. Noggin to support plasterboard
9. sill plate
10. DPC
11. Treated timber cill support fixed to timber frame, clad and protected in DPC with insulation set above

Allow for differential movement at ALL openings, i.e. at window sill and window heads, as recommended by the timber frame manufacturer/UK Timber Frame Association to accommodate differential movement and provide weather resistant and durable joint.
Wall applications

Refurbished masonry wall insulation (timber frame)

Description

WALLTITE can be applied directly onto a solid masonry wall, between 90mm or 140mm timber studs, without the need for traditional adhesion promoters or mechanical fixings.

Mechanical and electrical services can be fixed between the foam and the plasterboard.

WALLTITE guarantees additional support and stability for the whole of the timber frame construction.

The resulting continuous insulation and air barrier system will provide a cleaner, healthier, more comfortable environment for any “hard to treat” home situation.

Certification

BBA Certificate No. 11/4816.

WALLTITE has undergone various performance tests. Certificates are available on request.

Technical data

<table>
<thead>
<tr>
<th>Specification</th>
<th>Dry lining of solid masonry wall</th>
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<tbody>
<tr>
<td>NBS clause</td>
<td>P10 15A</td>
</tr>
<tr>
<td>Lambda 90/90</td>
<td>0.025 to 0.028 W/mK</td>
</tr>
<tr>
<td>Fire rating</td>
<td>Class 1 to BS 476 Part 7</td>
</tr>
<tr>
<td>μ</td>
<td>61.12</td>
</tr>
</tbody>
</table>

U-values

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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>130</td>
<td>0.20</td>
</tr>
<tr>
<td>100</td>
<td>0.25</td>
</tr>
<tr>
<td>65</td>
<td>0.35</td>
</tr>
</tbody>
</table>

Typical detail:

Existing solid wall

1. 25mm WALLTITE behind studwork
2. Treated timber studs set off by wall by brackets
3. WALLTITE CL100 insulation between and behind studwork to achieve target U-value
4. Unventilated air space
5. 12.5mm vapour check wallboard and skim finish

At corners of internal and external walls to rooms, set frame to external wall back from corner a minimum of 25mm and set batten to line with vapour check wall boarding to receive board end to internal wall.
Wall applications

**Refurbished masonry wall insulation (independent metal frame)**

**Description**

WALLTITE can be applied directly onto a solid masonry wall, around the frame/channel brackets, without the need for traditional adhesion promoters or mechanical fixings. This method greatly reduces repeating thermal bridges through the insulation caused by either timber studs or metal frames.

The resulting continuous insulation and air barrier system will provide a permanent solution for any ‘hard to treat’ solid wall situation.

**Certification**

BBA Certificate No. 11/4816.

WALLTITE has undergone various performance tests. Certificates are available on request.

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<td>NBS clause</td>
<td>P10</td>
</tr>
<tr>
<td>Lambda 90/90</td>
<td>0.025 to 0.028 W/mK</td>
</tr>
<tr>
<td>Fire rating</td>
<td>Class 1 to BS 476 Part 7</td>
</tr>
<tr>
<td>µ</td>
<td>61.12</td>
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</table>

**U-values**

<table>
<thead>
<tr>
<th>Thickness of WALLTITE (mm)</th>
<th>U-value (W/m²K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>120</td>
<td>0.20</td>
</tr>
<tr>
<td>85</td>
<td>0.26</td>
</tr>
<tr>
<td>65</td>
<td>0.34</td>
</tr>
</tbody>
</table>

**Typical detail:**

Existing solid wall

1. WALLTITE CL100 insulation between and behind studwork to achieve target U-value
2. Galvanized metal frame independent of the wall
3. Unventilated air space
4. 12.5mm vapour check wallboard and skim finish
Wall applications

Masonry cavity wall insulation

Description

WALLTITE is used to restore the structural stability and reduce the thermal transmittance of existing cavity walls, with masonry inner and outer levels, in which the conventional wall ties have corroded. It is also used in new construction where its superior thermal performance and resistance to flood water is of importance. It has excellent resistance to driving rain and can be installed in all geographical exposure zones.

WALLTITE is also ideal where the need to reduce air leakage is important. The foam seals the cavity, does not shrink or allow air to pass through it, therefore air leakage through the cavity can be reduced to zero. WALLTITE stabilises the wall by adhering to the inner surfaces of the cavity and providing a continuous structural connection between the two leaves.

The system can also be used on random stone walls that form uneven cavities.

Certification

BBA Certificate No. 13/5002.

WALLTITE has undergone various performance tests. Certificates are available on request.

Technical data

<table>
<thead>
<tr>
<th>Specification:</th>
<th>Full fill, closed cell, cavity wall insulation and stabilisation system</th>
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<tbody>
<tr>
<td>NBS clauses:</td>
<td>F30, 10 and 150, P11, 50, 220, 230 and 24</td>
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<tr>
<td>Lambda 90/90:</td>
<td>0.026 to 0.028W/mK</td>
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<tr>
<td>Closed cell content</td>
<td>94.4%</td>
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<tr>
<td>Adhesion to brick</td>
<td>231k</td>
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U-values

<table>
<thead>
<tr>
<th>Thickness of WALLTITE (mm)</th>
<th>U-value (W/m²K)</th>
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<tbody>
<tr>
<td>80</td>
<td>0.25</td>
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<tr>
<td>70</td>
<td>0.27</td>
</tr>
<tr>
<td>50</td>
<td>0.35</td>
</tr>
</tbody>
</table>

Typical detail:

New cavity wall

1. Insulated DPC cavity closer to be well sealed at edges.
2. WALLTITE CV100 insulation injected into cavity to achieve target U-value.
3. Lightweight blockwork.
5. New masonry brick.

Habitable space: plasterboard and skim/VCL with taped joints (VCL to be carefully cut and sealed around struts, ceiling pits and penetrations), batten/counter batten rafter as necessary to achieve insulation depth, confirm rafter strength sufficient to receive counter batten and boarding if required.

Loft space only, non habitable: insulated between and over rafters to achieve target U-values. WALLTITE may remain exposed.
Special solutions

- External soffit insulation
- Concrete slab ground floor insulation
Special solutions
External soffit insulation

Description
WALLTITE in-situ applied PUR insulation foam can be applied directly to the underside of either concrete or steel hollow rib design, ground floor structures. This rigid insulation system does not suffer from air erosion problems and remains permanently adhered even in exposed situations. Its low thermal conductivity maximises head room. Ribbed or waffle shaped soffits can be rapidly, economically and seamlessly insulated with WALLTITE.

Any penetrations into the soffit such as ceiling or pipe hangers and cable trays can easily be sealed by a WALLTITE application, preventing heat loss and cold spots.

Certification
WALLTITE has undergone various performance tests. Certificates are available on request.

WALLTITE used in conjunction with a fire retardant coating will achieve a Class 0 rating.

Typical detail:
External soffit insulation

Technical data

<table>
<thead>
<tr>
<th>NBS clause</th>
<th>P10 185</th>
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<tbody>
<tr>
<td>Adhesion to concrete</td>
<td>260kPa</td>
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<tr>
<td>Lambda 90/90</td>
<td>0.025 to 0.028W/mK</td>
</tr>
<tr>
<td>Fire rating</td>
<td>Class 1 to BS 476 Part 7</td>
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<td>120</td>
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<tr>
<td>100</td>
<td>0.25</td>
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<tr>
<td>80</td>
<td>0.30</td>
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</table>

1. WALLTITE CL100 insulation to achieve target U-value
2. Suspended ceiling
**Special solutions**

**Concrete slab ground floor insulation**

**Description**

WALLTITE is applied directly to the concrete. Under-floor heating pipes can be fixed to the foam with the normal clips. A layer of tamped or self-levelling screed is applied, usually to a depth of 75mm. The process is extremely quick to apply compared to other methods and the problems of insulation boards lifting are avoided. Site overhead time and material waste from off-cuts are minimised.

**Certification**

BBA Certificate No. 11/4816.
WALLTITE has undergone various performance tests. Certificates are available on request.

**Technical data**

- Adhesion to concrete: 260kPa
- Lambda 90/90: 0.025 to 0.028 W/mK
- Fire rating: Class 1 to BS 476 Part 7
- Compressive strength: 259kPa

**U-values**

<table>
<thead>
<tr>
<th>Thickness of WALLTITE (mm)</th>
<th>U-value (W/m²K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>0.16</td>
</tr>
<tr>
<td>80</td>
<td>0.18</td>
</tr>
<tr>
<td>65</td>
<td>0.20</td>
</tr>
</tbody>
</table>

**Typical detail:**

Ground floor insulation (concrete slab)

1. DPC
2. Sealing agent 500 gauge DPM returned up wall at perimeter
3. WALLTITE returned to form wall perimeter insulation
4. Screed
5. DPM set below slab
6. Sandblinding
7. Weld consolidated hardcore
8. Concrete slab
**Application guide**

**Cavity walls**

**Description**
WALLTITE injection grade rigid closed cell polyurethane foam, has been widely used to restore the integrity of masonry cavity walls suffering from wall tie failure. In addition, WALLTITE is the most thermally efficient material available on the market for insulating existing cavity walls. BBA Certificate No. 13/5002.

**Pre-installation preparation**
Note the position and operation of any flues through or adjacent to a wall that is to be filled. Seal any gaps in the inner leaf to limit entry of foam system and vapours into the building. Brace window and door frames that cross the cavity to prevent possible distortion. Drill 12mm injection holes, through mortar joints if possible, following the hole pattern in the diagram. Modify the drilling pattern with extra holes around windows, doors, ventilators and eaves.

- Space saving and sustainable insulation for the life of the building
- Permanent adhesion over the whole surface area of a wall overcomes wall tie failure, weak mortar joints and other related structural problems
- Closed cell foam completely resistant to driving rain in any exposure zone
- Foam ed in situ prevents air leakage and air infiltration
- Totally inert material – does not contain fibres, formaldehyde or styrene
- Installed to BS 7456: 1991, Code of Practice
- No shrinkage or settlement with ageing
- Guaranteed CO₂ savings, year on year

**Drilling patterns for cavity widths between 40 mm and 150 mm**

**Criteria of suitability of external cavity walls**
The inner and outer leaves of areas to be insulated should be of masonry or concrete construction.
Structural faults due to movement or settlement should be remedied prior to installation. Where the outer leaf has been covered with a material of very low vapour permeability, the cavity should not be filled.
Where there are exposed ring beams or slabs it is essential to ensure water will not track back along the underside of the beam or slab.
If there are signs of water penetration or damp to the internal walls other than that caused by condensation, the cause of the problem should be ascertained and remedies applied or agreed prior to the installation of WALLTITE.
A free cavity of 40mm width should be available over the areas to be filled. Cavities up to 200mm can be filled provided the drilling pattern and injection sequence are modified to suit.

**Foam application**
When operating conditions with the equipment have been established, the operator should produce samples for quality checks. These should include appearance and reactivity.
Injection of foam should proceed on a horizontal front, ensuring no hole is missed and that the cavity is filled from the bottom upwards (see figure below). Indicator sticks are used to establish the presence of foam at each injection point.
WALLTITE foam should not be injected into a hole for longer than its cream time. Injection for longer may cause the foam to split and shrink. Care should be taken at particularly where the cavity is closed e.g. below window frames. Where a cavity wall extends over a gable end up to the ridge of a roof, it is essential to fit the whole of the cavity right up to the ridge.

**Post-installation activities**
Drill holes should be made good to match the wall finish as closely as possible.
All flues, air ducts and underfloor vents should be demonstrated as being clear of any blockage.

![Drilling patterns for cavity widths between 40 mm and 150 mm](image)

![Drilling patterns for cavity widths between 150 mm and 200 mm](image)
WALLTITE technical product information

Application
A Class 1 ODP Zero polyurethane spray system (in-situ foam) for the production of closed cell rigid foam. The system can be used to insulate and prevent condensation on a wide range of applications including roofs, walls, floors and soffits.

Chemical characteristics
A or Polyol component: A mixture of polyol, flame retardant, catalyst, stabiliser, and HFC blowing agent.
B or Isocyanate component: Polymeric diphenylmethane diisocyanate (MDI) (isoMDI 621-40).

Supply
The type of supply for the components will be decided after consultation with our Sales Office.

Storage, preparation
Polyurethane components are moisture sensitive. Therefore they must be stored at all times in sealed, closed containers. The A-component (Polyol) must be homogenised by basic stirring before processing. More detailed information should be obtained from the separate data sheet entitled 'Product Information'.

Waste disposal
More detailed information is provided in our country specific pamphlet.

Processing
WALLTITE spray foam systems can be processed through all standard two component equipment designed for this purpose. This unit must be capable of maintaining a 1:1 by volume ratio, temperatures between 30 and 60°C using pre-heaters and heated hoses and pressures between 50 and 80 bar (700 to 1200 psi). Self cleaning, impingement mix spray guns are recommended.

Possible hazards
The B-component (Isocyanate) irritates the eyes, respiratory organs and the skin. Sensitisation is possible through inhalation and skin contact.

MDI is harmful by inhalation. When processing MDI, take note of the necessary precautionary measures described in the Material Safety Data Sheets (MSDS). This applies also for the possible hazards in using the A-component (Polyol) as well as any other components.

See also our separate information sheet ‘Safe Handling of Isocyanate’.

Typical component data

| Density (20°C) | g/cm³ | 1.21 | 1.24 | G 130-08 |
| Viscosity (20°C) | mPa.s | 200 | 220 | G 133-07 |
| Storage stability | Days | 90 | 180 | |

Typical processing data

| Cup test | Unit | Value | Method |
| Component temperature | °C | 20 |
| Mixing ratio | by weight by volume | A:B = 100:103 |
| Mixing weights | g | A = 28.0 |
| Cream time | s | 4 |
| String time | s | 9 |
| Rise time | s | 18 |
| Free rise density | kg/m³ | 34 |
| Machine processing | Unit Value |
| Mixing ratio | by volume | A:B = 100:100 |
| Mixing pressure | Bar | 50 - 80 |
| Component temp. | °C | 30 - 60 |

Typical physical properties

| Unit | Measured value | Method |
| Density apparent overall | kg/m³ | 40 - 45 |
| Thermal conductivity (initial) | W/m K | 0.0209 |
| Compression strength | N/mm² | 260 |
| Tensile adhesion strength to concrete | kPa | 232 |
| to breather membrane | kPa | 136 |
| to timber | kPa | 160 |
| Dimensional stability | % | < 1 |
| Closed cell content | % | > 95 |
| Water vapour transmission | g/(m².h) | 1084.68 |
| Water vapour resistance | m².h.Pa/g | 2.21 |
| Water vapour permeability | m³/(m².h.Pa) | 0.0115 |
| Water vapour diffusion resistance factor | μ | 61.12 |
| Spread of Flame | Class | 1 BS 476 Part 7 |
| Air leakage | Ø50 pascals | 0.0033 |
| Short term water absorption | g/m² | 0.05 |

Highly efficient thermal insulation with WALLTITE: Declared thermal conductivity values

The system uses ‘permanent’ type blowing agents and has a closed cell content of over 90%. Values are derived using the ‘fixed increment’ procedure after undergoing Normality checks at the BBA.

Covered by test reports 5874 BN & 5874 BAN.

BA SF Polyurethanes U.K. Ltd. is one of the worldwide leaders in polyurethanes (PU). As part of the BASF Group, we have over 40 years experience in the PU industry.

BASF is the market and technology leader for polyurethane systems and polyurethane special elastomers, as well as the leading supplier of polyurethane basic products.

For diffusion open faces:

Thickness (mm) | Conductivity (W/mK)
--- | ---
Less than 80mm | 0.0269
80mm to 120mm | 0.0257
Over 120mm | 0.0247

Sprayed onto diffusion tight substrate:

Thickness (mm) | Conductivity (W/mK)
--- | ---
Less than 40mm | 0.0269
40mm to 60mm | 0.0257
Over 60mm | 0.0247

Test reports and project-specific U-value calculations available on request.

Lambda 90/90

Our thermal conductivity values are based on statistical analysis of actual independent test results. This process ensures that our declared values relate to 90% of BASF production within a 90% confidence level and can be used as a design value over a 25 year life span.

Lambda 90/90 allows for a consistent approach to declaring thermal performance and is the most representative value available.

Declared λmean values (W/mK)

<table>
<thead>
<tr>
<th>W/mK</th>
<th>λmean</th>
<th>W/mK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 80mm</td>
<td>0.0209</td>
<td></td>
</tr>
<tr>
<td>80mm to 120mm</td>
<td>0.0207</td>
<td></td>
</tr>
<tr>
<td>Over 120mm</td>
<td>0.0206</td>
<td></td>
</tr>
</tbody>
</table>

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WALLTITE technical product information (continued)

Test regimes

<table>
<thead>
<tr>
<th>Test name</th>
<th>Measured property</th>
<th>Standards</th>
<th>Testing authority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adhesion to various substrates</td>
<td>Maximum load, stress at maximum load</td>
<td>ETA 2004, EOTA TR004</td>
<td>BBA</td>
</tr>
<tr>
<td>Hard body impact</td>
<td>Diameter of indent</td>
<td>NA</td>
<td>BBA</td>
</tr>
<tr>
<td>Compressive strength</td>
<td>Compressive strain, stress</td>
<td>BS EN 826:1996</td>
<td>BBA</td>
</tr>
<tr>
<td>Compressive creep</td>
<td>Stress applied, compressive creep</td>
<td>BS EN 1606:1997</td>
<td>BBA</td>
</tr>
<tr>
<td>Compression behaviour</td>
<td>BS EN 826</td>
<td>BITS</td>
<td></td>
</tr>
<tr>
<td>Dimensional stability</td>
<td>BS EN 1604</td>
<td>BITS</td>
<td></td>
</tr>
<tr>
<td>Water vapour transmission</td>
<td>BS EN 12086</td>
<td>BITS</td>
<td></td>
</tr>
<tr>
<td>% closed cell</td>
<td>BS EN ISO 4590</td>
<td>BITS</td>
<td></td>
</tr>
<tr>
<td>Fungal resistance</td>
<td>BS EN ISO 846:1997</td>
<td>PRA</td>
<td></td>
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<tr>
<td>Emission of VOC</td>
<td>CertiPUR label for Flexible Polyurethane Foams</td>
<td>PRA</td>
<td></td>
</tr>
<tr>
<td>Air leakage</td>
<td>At 50 pascals m².h⁻¹.m⁻²</td>
<td>BSRIA</td>
<td></td>
</tr>
<tr>
<td>Surface spread of flame</td>
<td>BS 476: Part 7:1997</td>
<td>Bodycote</td>
<td></td>
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<tr>
<td>Moisture performance</td>
<td>BS EN ISO 15026</td>
<td>Glasgow Caledonian University</td>
<td></td>
</tr>
<tr>
<td>insulated with sprayed polyurethane foam</td>
<td>BS EN ISO 13788</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short term water absorption</td>
<td>BS EN 1609</td>
<td>BBA</td>
<td></td>
</tr>
</tbody>
</table>

WALLTITE has also been thoroughly assess by condensation risk, SAP and WUFI simulations. For further information please contact our technical staff or send an e-mail to walltite-uk@basf.com.

Support services

Design and technical services

The WALLTITE team would be pleased to assist with any technical queries that may arise, if you are thinking of using a WALLTITE insulation and air barrier system.

There is a dedicated team based at our manufacturing plant in Derbyshire, a range of external consultants are on hand, plus the Global experience provided by the BASF sprayfoam network.

They can provide much of the information needed to provide detailed specification options including:

- statutory requirements, planning regulations and product standards
- cost benefits over other insulations
- design ideas along with structural implications and requirements
- thermal performance calculations
- condensation risk analysis.

Project specific help and advice

BASF Polyurethanes U.K. Ltd are happy to help with any specific queries regarding thermal performance or condensation risk.

To enable us to carry out these tasks we just need to know the construction details of the building section you are proposing to insulate, layer by layer, the thickness of each layer and the target U-value.

The results can then be emailed to you.

FOAM MASTERS
Approved Contractors

The WALLTITE Approved Contractors scheme (FOAM MASTERS) ensures that contractors who install our products are fully trained and supported by our technical team.

Contractors must attend courses at our training centre in Alfreton and, on completion, the contractor’s details are entered onto our database and a photo identity card is issued.

Once a trained FOAM MASTERS contractor, our technical team will help to ensure compliance with installation methodology and to offer advice on correct application, intricate interfacing with other construction elements.

Also BASF’s technical staff supports contractors to be fully compliant with British Standards, Code of Practice and Building Regulations.

Technical queries from contractors, architects and specifiers are dealt with by our office based team, who use their expertise to ensure the best and independent advice is given in a clear and concise way.

If you require the services of a BASF Approved Spray Foam Contractor, please contact us on 01733 601166.
**Frequently Asked Questions**

**How are polyurethane foams applied?**

Our systems are spray-applied, two-component products that include a hardener (A-Side Component) and a resin (B-Side Component). These are not pre-formed, friction-fit batts or boardstock insulations. It is not a wet application – no water is used. During application, there is a chain reaction between the two components that creates a bond to the substrate as it foams up. It dries, cures and hardens within 3-5 seconds. This product should always be installed by a trained applicator.

**What equipment is required?**

Spray-applied polyurethane foam systems require specific application equipment, including pumps, proportioners and spray guns. BASF is pleased to advise on the best equipment for processing their insulation systems.

**Are there any special handling considerations?**

Always use personal protective equipment, avoid all contact with skin and eyes and do not inhale the vapours of the hardener. Before opening the resin, unscrew the bung slowly to release the gas pressure in the drums. While spraying, always work with adequate ventilation. Protective gloves and face mask are strongly recommended. When atmospheric levels may exceed the occupational exposure limit (PEL or TLV), approved air purifying respirators equipped with an organic vapour sorbent and particulate filter can be used as long as appropriate precautions and change-out schedules are in place. Persons with known respiratory allergies must avoid exposure to the A component.

For more information, please ask for our material safety data sheets. Contact us on +44 (0)1773 601166.

**What is the insulation U-value of your systems?**

BASF will calculate the U-value of any structure that uses WALLTITE insulation foam. All we need is the thickness of each layer through the structure and your target U-value.

**What are the differences between roofing foams and wall foams?**

Polyurethane foams are plural-component products engineered on the molecular level for a specific purpose and application. Externally applied roofing foams tend to offer higher compressive strengths and smoother surfaces, while foams for timber framed walls and between rafter roof insulation, tend to offer faster reaction rates, higher yield and superior insulation values. All of our polyurethane technologies are closed-cell foams.

**What are the differences between closed-cell and open-cell foams?**

There are three major differences. First, BASF uses the versatility of chemistry to offer a closed-cell-content of greater than 90% for all of its formulations, and open-cell foams commonly used as insulation systems have approximately 60 percent open-cell-content. Second, closed cell content offers a thermal conductivity of between 0.028W/mK and 0.025W/mK, depending on the thickness applied. Open cell offers 0.035W/mK. Third, closed cell foam is virtually impermeable to air, while open cell foam allows far more air and vapour into the building interior.

**What is an insulating air barrier system?**

A closed-cell, spray-applied polyurethane foam wall system that combines superior insulation values and near-zero air permeability in a single application to improve building durability, energy efficiency and occupant comfort, health and safety.

**Does polyurethane technology control air leakage?**

Our polyurethane foam roof and wall systems have been tested and are certified to be an air barrier at an application of 25mm thickness. Once applied, our roof and wall systems are fully-adhered and do not allow air to flow around, behind or through the insulation system. Most open-cell foams have not been tested and therefore do not qualify as air barrier systems. One open-cell foam manufacturer’s product requires an application of 125mm to pass the minimum requirements of the air barrier test.

**Can an insulation system add structural strength?**

Spray-applied closed-cell polyurethane foam is the only insulation material that adds structural integrity throughout the wall system. Testing shows spray-applied polyurethane foam insulation between wood- and steel-stud wall panels increased rack and shear strength two to three times compared with standard stick-built components with glass fibre insulation when sprayed onto gypsum wallboard and vinyl siding, and increased racking strength when sprayed onto oriented strandboard (OSB).

**What about mould?**

Mould requires three things to grow: moisture, warm temperatures and a food source. Polyurethane foam insulation has no nutritional value and is not considered a food source for mould. The use of polyurethane as insulation eliminates condensing surfaces and reduces the interior to accumulate moisture. It also eliminates air movement within the wall cavity. Other insulations are less successful at controlling air infiltration and providing adequate insulation to eliminate condensing surfaces, thus increasing the possibility of an environment susceptible to mould.

**Is polyurethane good for the planet?**

Our polyurethane technologies are formaldehyde-free formulas that emit no volatile organic compounds (VOCs) and use zero ozone depleting blowing agent technology. Plastic building products, including polyurethane foam, use less energy from all sources than alternative products during production. Spray-applied polyurethane foam insulation saved 3.4 trillion BTUs in manufacturing energy over glass fibre in 1990. Our systems also increase building energy efficiency and reduce waste. For more information on how our polyurethane technologies help make buildings better visit www.walltite.basf.co.uk.

**Can polyurethane foam systems be used in a chemically sensitive environment?**

Yes. Our systems do not emit Volatile Organic Compounds (VOCs). Off-gassing from this product has been measured at 0.000 parts.

**Are there any fire protection requirements?**

Polyurethane insulation meets Class 1 surface spread of flame rating when tested to BS 476: Part 7. Once installed, if 30 minute fire resistance is required, it must be covered by plasterboard, or similar thermal barrier.
Located on the site of an existing single storey property in a prestigious area of East Sussex, local architects Felce and Guy Partnership were commissioned to design a new mixed-use five storey property comprising ground floor and basement retail and office areas with residential accommodation above. The residential accommodation incorporates six two-bedroom flats and a penthouse flat with unparalleled views across Palmers Square. With over 60 years experience in construction in the South East, the building and renovation work was completed by Brighton based A&P Pilbeam.

As part of this Code for Sustainable Homes Level 3 development, all insulation elements and services have been designed to minimise carbon emissions and reduce energy bills including installation of photovoltaic solutions, effective thermally insulated building fabric, ground source heat pumps or to add in some green spaces. Meeting the principles of this single national standard ensures that continuous improvement and greater innovation is delivered in this project and key performance information on the energy efficiency and carbon performance of the home is provided to the home owner.

The curved nature of the roof in the penthouse flat presented an issue in relation to the original insulation specified as this could not achieve the radius required. Certain traditional mineral fibre solutions are not guaranteed to stay in place due to the curved nature of the roof and the required U-value of 0.1 W/m²K. A spray foam insulation would be the ideal solution.

In order to meet the planning condition required to achieve Level 3 of the Code for Sustainable Homes, a low U-value was important. Due to the nature of the site, there were constraints on how this could be achieved. The simplest way was to decrease the U-values of the various elements, of which the roof was one.

The Code measures the sustainability of a home against design categories, rating the ‘whole home’ as a complete package. The sites boundaries are the external walls and so there was no opportunity to utilise other elements outlined in the Code such as greywater, recycling facilities, ground source heat pumps or to add in some green spaces. Improving the insulation with a better U-value was the answer.

WALLTITE spray foam insulation has been installed by Portsmouth based Isotech Sprayfoam contractors to form an airtight thermal efficient solution in the property. Isotech has been installing polyurethane foam systems into residential and commercial premises throughout the UK since 1992 and is an authorised BASF spray foam contractor. Members of the FOAM MASTER Academy, Isotech has attended courses with BASF trained professionals to ensure a safe and accurate application is achieved. WALLTITE can only be applied by fully trained and qualified spray foam operatives from BASF approved contractors.

WALLTITE has been applied to the curved penthouse flat roof on the fifth floor. The area is approximately 144m² and was sprayed to a depth of 235mm to fill a void of 300mm. The ceiling linings were then tacked onto the joints to seal the gap. The fast applied, seamless, airtight solution left a minimal amount of surface area without insulation. By virtually eliminating air leakage, WALLTITE with its closed cell structure helps control the movement of vapour and moisture throughout the building, reducing energy loss in line with Part L. Created to aid sustainable solutions, WALLTITE PU spray foam does not deteriorate with age and its thermal properties are therefore maintained over the life of the building.

Because of its spray application method, WALLTITE will mould itself to any wall shape or any surface irregularities, ensuring there is no possibility of gaps that would compromise air tightness performance. This is particularly valuable at vulnerable points of a structure such as the joints where wall insulation meets the insulation of the roof and the technical team at WALLTITE can provide standard specification details that outline how these areas should be treated.

Using a spray foam insulation also allows for flexibility in specification. The U-value of the wall structure will vary depending on the thickness of the WALLTITE layer applied. For Premier Penthouses, application advice has been issued that demonstrates how to achieve a U-value of 0.25 W/m²K (95mm of WALLTITE), 0.22 W/m²K (113mm of WALLTITE) and 0.20 W/m²K (133mm of WALLTITE).

Richard McAlister MD of Premier Penthouses has made the decision to use WALLTITE on all new developments. “We find that using spray foam rather than installing board is a far quicker solution. In some of our developments it takes as little as a single day to apply the insulation where cutting and fitting insulation board is a much more time-consuming process. More importantly, the spray foam solution ensures that we can be totally confident that we have a consistent, airtight insulation layer.”

Project: A new five storey mixed use development comprising ground floor/basement retail and office accommodation with residential flats above
Spray Foam Contractor: Isotech Sprayfoam
Architect: Felce and Guy Partnership
Main Contractor: A&P Pilbeam Construction
Year completed: 2011
Products used: WALLTITE CL100 spray foam insulation

Scope of project: Various low-rise apartment blocks
Year completed: Ongoing
Products used: WALLTITE spray foam insulation

Case study
Residential developments, South East England
The new Jaguar Land Rover Technical Academy occupies a floor area of over 4,000m² including a 60 metre workshop and training zone equipped with vehicles, components and systems for hands-on training. The facility also has 16 classrooms, including four that can accommodate vehicles.

The installation of WALLTITE spray foam insulation to the roof and walls of this prestigious new training academy provided dual benefits. That of converting a leaky and poorly insulated building into a state of the art training centre under significant time constraints. Luwoge Consult, an energy consultancy team of BASF, carried out a thermally assessing the building which revealed that, without improvement it would emit 418 tonnes of carbon dioxide per year. The building in its existing state had an estimated U-value of 1.87 W/m²K.

The client was faced with executing the total refurbishment of a dated, leaky and poorly insulated building into a state of the art training centre under significant time constraints. Luwoge Consult, an energy consultancy team of BASF, carried out a thermal assessment of the building which revealed that, without improvement it would emit 418 tonnes of carbon dioxide per year. The building in its existing state had an estimated U-value of 1.87 W/m²K.

The challenge was therefore to source products that would provide for a sustainable, energy efficient building that satisfied all local planning laws and the needs of the client’s insurance company. Together with BASF Group, Jaguar Land Rover looked at a vast range of energy efficient and sustainable construction products. One vital aspect of the project was to upgrade the insulation on the roof and walls and make the building airtight. For this aspect they chose a seamless, airtight insulation, Class 1 fire-rated solution – WALLTITE. WALLTITE is a spray foam insulation system which enables it to be applied directly onto the existing laminate board insulation, with very little preparation. The in-situ applied foam expanded as soon as it hit the substrate, sealing it completely and preventing air leakage.

The roof structure was therefore designed with a combination of PIR board above and a 105 mm layer of WALLTITE between the rafters. The Spray Foam Contractor was Isotech Sprayfoam Ltd.

The spray foam insulation ranged from 75 mm thickness on the roof to 35 mm on the walls. The insulation foam was applied at a rate of 1,000 m² per week and this part of the project took four to five weeks to complete.

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The owner of this magnificent new five-bedroomed house near Poole in Dorset set out with the intention of building a home that would run with near-zero energy costs. The building industry professional, he decided to use the German Passivhaus method of construction to achieve this end and, in the process, to become the owner of the first Passivhaus accredited house in Dorset.

The principle of Passivhaus design is to produce a super insulated and airtight structure that capitalises on passive solar gain and requires essentially no energy to heat the space. According to the Passivhaus standard, the building must have a total primary energy consumption (i.e. energy for heating, hot water and electricity) of no more than 120 kWh/m² per year. Achieving this result requires exceptionally high levels of thermal insulation (U-values in the range of 0.10 to 0.15 W/m²K).

The Passivhaus standard also specifies a rigorous level of air tightness. The Passivhaus standard actually specifies a rigorous level of air tightness. The building fabric must not leak more than 0.6 times the house volume per hour (h50 ≤ 0.6/hour) at 50 Pa (N/m²) as tested by a blower door.

The performance level will be achieved by the application of various materials and techniques throughout the house, but a particular challenge was posed by the roof space.

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The Passivhaus standard also specifies a rigorous level of air tightness. The Passivhaus standard actually specifies a rigorous level of air tightness. The building fabric must not leak more than 0.6 times the house volume per hour (h50 ≤ 0.6/hour) at 50 Pa (N/m²) as tested by a blower door.

The performance level will be achieved by the application of various materials and techniques throughout the house, but a particular challenge was posed by the roof space.
The HH Wills Physics Building forms one block of the Physics Department at Bristol University. Built in the 1960s, the Physics Building is constructed from reinforced concrete with a masonry cavity wall. During 2012 a major refurbishment of the façade was commissioned to improve both the aesthetics and performance of the building structure.

The objective of the refurbishment project was to provide a facility fit for purpose and performing to modern building standards. A primary focus for specifiers Oxford Architects was to improve the thermal insulation of the external envelope without disrupting the external surface of the façade.

The 1960s structure was constructed from reinforced concrete with a masonry cavity wall incorporating a 100mm wide spandrel wall cavity that did not incorporate any insulation and was therefore thermally inefficient. WALLTITE CV100 injection grade foam insulation was injected into the spandrel cavity, below the windows, sealing the cavity. The result was reduced thermal transmittance and a reduction in air leakage.

WALLTITE is an ideal solution for this situation because it is injected in liquid form and expands when it makes contact with the substrate – this means that it will mould itself to any contour or uneven surface and bonds direct to the substrate. The robust, closed-cell insulation adheres to the inner surfaces of the cavity and provides a continuous structural connection between the two leaves.

Although thermal insulation was the primary objective of the installation, the fact that the application of WALLTITE provides enhanced structural stability is an added benefit that is particularly attractive in older buildings where the wall structure may be affected by falling wall ties.

The major refurbishment of the HH Wills Physics building included an extension of the main entrance and the replacement of all the existing windows. The reconstituted stonework was cleaned and the previous mosaic façade finish was rendered over. The building is home to state-of-the-art research laboratories which now have the benefit of enhanced thermal performance and a more rigid structure to house them.

WALLTITE C V100 injection grade foam insulation was injected direct to the substrate. The robust, closed-cell insulation adheres to the inner surfaces of the cavity and provides a continuous structural connection between the two leaves.

The quick application of WALLTITE injection grade rigid closed cell polyurethane foam prevents air leakage and air infiltration. Post-installation, the foam will not shrink or settle over time, providing a sustainable insulation for the building’s life span.

The installation of cavity wall insulation together with the complete window replacement and new roof insulation will result in a refurbished building that is approaching levels of performance required for new build.

Project: HH Wills Building, Bristol University
Client: Bristol University
Architect: Oxford Architects
Spray Foam Contractor: Cosyhome Insulation Ltd.
Scope of project: Improving the thermal insulation of cavity wall
Year completed: 2012
Products used: WALLTITE CV100 injection grade

WALLTITE C V100 was specified for The Crescent Primary School as part of the £5.5 million refurbishment of a listed Edwardian grammar school in Selhurst, Croydon.

The new school will cater for 630 pupils with three form entries to address the shortage of quality school places in the Croydon area. Kier began the work in March 2010 on the external envelope of the school building. WALLTITE spray foam injection was specified to significantly upgrade and insulate the walls to meet the needs of modern day pupils by providing an exemplary environment for education.

Guy Shackle, Senior Associate at Curl la Tourelle Architects explains the developments at the school, “WALLTITE spray foam injection was the perfect solution for this project as it was the only product that would work well with the cavity wall structure. As this is not a new build project the only requirement from Building Control was that 10% of the contract sum was expended on improvements to energy efficiency. However to create a learning environment suitable for the 21st century and to reduce future carbon emissions the decision was taken to target significant improvements to the building’s energy efficiency.”

Mike Devaney, Senior Site Manager for Kier adds, “WALLTITE spray foam injection allows the insulation to be retrospectively fitted to an existing building. There are many other benefits to this product, for example, it creates an air seal by filling the gaps and as a result, the heating system will work more economically and efficiently. Warmth is increased in the external walls and this will greatly reduce the levels of condensation in the building. The installation will also significantly reduce any noise transfer at Crescent Primary School. All of these benefits are incredibly important for a schools project like this.”

Project: The Crescent Primary School, Croydon
Client: Kier
Architect: Curl la Tourelle Architects
Spray Foam Contractor: Modern Plan Insulations
Scope of project: Refurbishment of a listed Edwardian grammar school
Year completed: June 2012
Products used: WALLTITE CV100 injection grade
Glossary of terms

Cold bridging
Occurs between building materials and is a major cause of condensation and mould growth in buildings. There are several varieties of mould that can grow on the inside surface of buildings in certain conditions and some can be toxic. Products with little or no cold bridging thus provide a healthy environment by reducing moisture and mould growth.

Compressive strength
The maximum compressive stress a material can withstand without failure. Materials with high compressive strength thus have good load bearing capacity.

k-value or λ (lambda) value
The thermal conductivity of a material, the lower the value the better the material is at storing heat and retaining temperatures. Expressed in Watts per metre per degree Centigrade or Kelvin (W/mK).

Thermal bridging
A thermal bridge is a localised area of lower thermal resistance in the building envelope resulting in higher heat flow and lower internal surface temperatures. As well as increasing heat loss from the building envelope, thermal bridging can cause localised condensation as surface temperatures may be reduced below the dew point (condensation temperature) of the air in the space. This is a particular danger in buildings where the Relative Humidity (RH) may be high, such as canteens, laundries, swimming pools and some factories.

Thermal conductivity
Measure of the ability of a solid or liquid to transfer heat. Thermal conductivity is a material property. It will not differ with the dimensions of a material, but it is dependent on the temperature, the density and the moisture content of the material. The thermal conductivity normally found in tables is the value valid for normal room temperature. Generally light materials are better insulators than heavy materials, because light materials often contain air enclosures. Dry still air has a very low conductivity. A layer of air will not always be a good insulator though, because heat is easily transferred by radiation and convection.

When a material, for instance insulating material, becomes wet, the air enclosures fill with water and, because water is a better conductor than air, the conductivity of the material increases. That is why it is very important to install insulation materials when they are dry and take care that they remain dry.

Vapour permeability
‘Breathable’ is used as a short way of saying ‘a high level of water vapour permeability’.

U-value
The U-value concept is used to quantify heat loss through plane elements of the building envelope or shell. U-value is defined as the overall thermal transmittance of a particular construction element (a wall or a roof for example), including the effect of surface resistance. It depends upon the thickness and thermal conductivity of its component layers and, in the case of air cavities, the emissivity of the surfaces.

Units of thermal transmittance are expressed in W/m²K.

The term ‘U’ represents overall thermal conductance from the outside to inside covering all modes of heat transfer. From the above equation, ‘U-value’ can be defined as the rate of heat flow over unit area of any building component through unit overall temperature difference between both sides of the component.

The U-value is an important concept in building design. It represents the air-to-air transmittance of an element. This refers to how well an element conducts heat from one side to the other, which makes it the reciprocal of its thermal resistance. Thus, if we calculate the thermal resistance of an element, or R-value, we can simply invert it to obtain the U-value.

R-value
Insulation is rated in terms of thermal resistance, called R-value, which indicates the resistance to heat flow. The higher the R-value, the greater the insulating effectiveness.

\[ R = \frac{l}{k} \]

Where: \( R \) = the thermal resistance per unit area of the piece of material (m²K/W), \( l \) = represents the thickness of the material (m), and \( k \) = represents the conductivity of the material (W/mK).

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