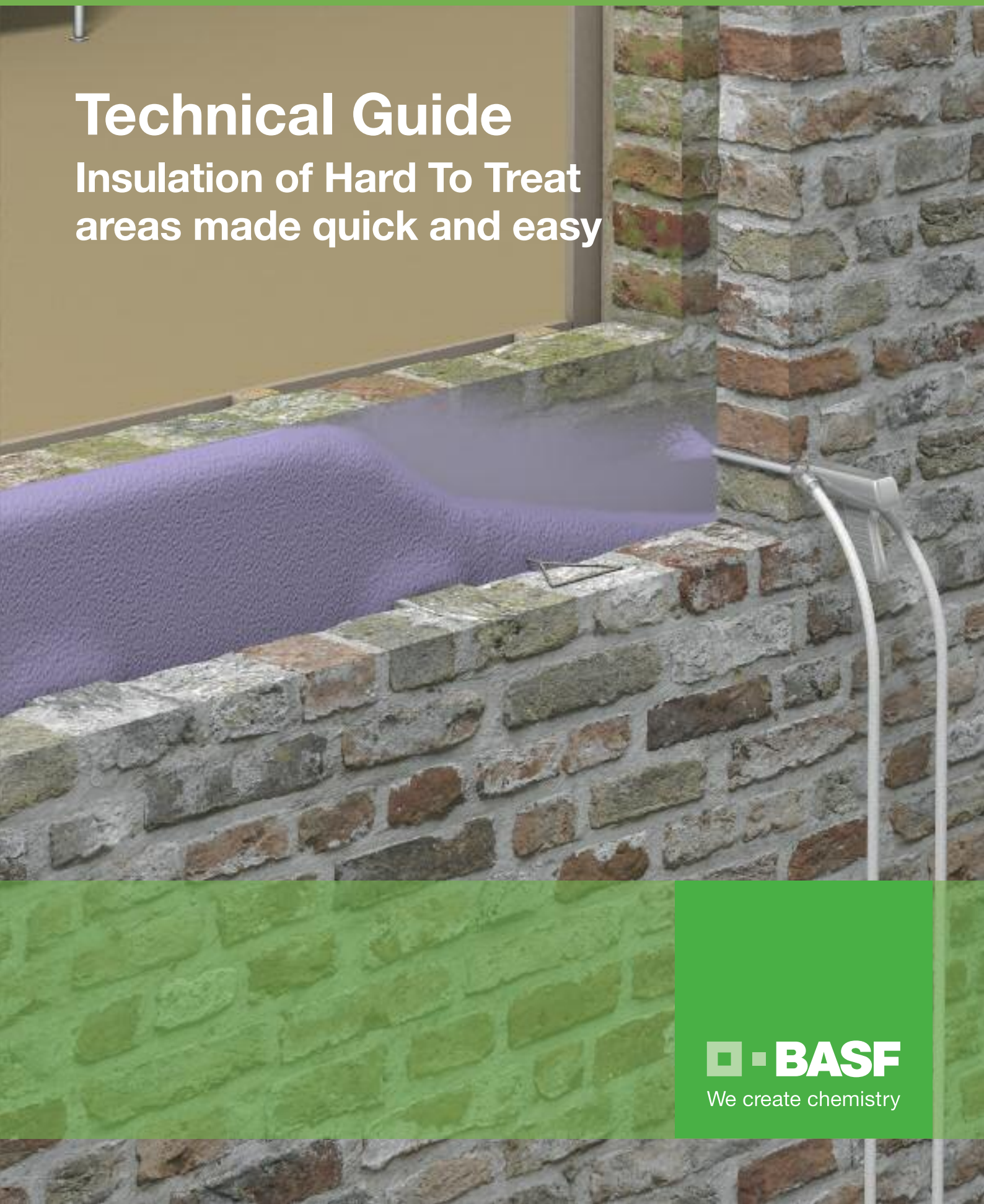
CI/SfB | | | Yn6 | (M2)|
October 2014

WALLTITE®

The airtight insulation solution

Technical Guide

Insulation of Hard To Treat areas made quick and easy



BASF

We create chemistry

Description and benefits

- ✓ 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
- ✓ Foamed 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 CO_2 savings, year on year

Ideal for the following hard to treat homes (subject to survery)


Occupied housing stock


Houses with no damp proof course or defective wall ties


Narrow, variable width and standard cavities


Properties at risk of flooding


Buildings more than three stories high


Random stone houses


Properties exposed to high levels of wind and rain



WALLTITE CV 100 polyurethane foam system may be used to treat a masonry cavity wall by injecting the liquid polyurethane system through properly spaced holes in the outer leaf.

The WALLTITE foam system expands in the cavity and sets to become a substantially closed cell cross-linked rigid polyurethane foam which is strongly adhered to the inner and outer leaves, so that these leaves become bonded together.

The operation consists on site of continuously mixing two components correctly and injecting the resultant foam system into the cavity.

Because the strength of the rigid polyurethane foam is significant the system has been widely used for the restoration of the integrity of cavity walls in which the wall ties have become ineffective due to corrosion. The installed foam thus confers two benefits namely insulation and interleaf bonding.

With current environmental emphasis being based on carbon and energy savings, the insulation benefits of a full fill cavity insulation system such as WALLTITE are now more recognised, the focus now being on Hard to Treat (HTT) rather than standard cavities.

WALLTITE CV 100 is suitable for:

- Masonry cavities less than 50mm wide
- Prefabricated concrete construction systems with cavities
- Metal frame construction systems with cavities
- Random stone cavities
- Buildings more than three storeys tall
- Walls exposed to severe wind driven rain

Grammar School Refurbishment

Location: **Croydon**

Client: **Kier**

Project: **Refurbishment of a listed Edwardian grammar school**

WALLTITE CV 100 was specified for The Crescent Primary School as part of the £5.5 million refurbishment of a listed Edwardian grammar school in Selhurst, Croydon. 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.

A challenge existed for Kier as the outer leaf of brickwork was tied to the inner with brick stretchers. Consequently, this ruled out most of the cavity fill products on the market.

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.

The Senior Site Manager for Kier comments, "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."

Performance and properties

University Refurbishment

Location: **Bristol**

Client: **Bristol University**

Project: **Improving the thermal insulation of the cavity wall of the HH Wills Physics Building**

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 CV 100 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. 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 failing wall ties.

Architect Steve Lee explained the specification decision: “We had a CPD from WALLTITE and found that the product met our primary concern for improved thermal performance and had the added benefit of strengthening the wall construction.”

Typical physical properties

	Unit	Measured value	Method
Density (core)	kg/m³	29.9	BS 7457 Annex D
Compressive strength	kPa	182	BS EN 826
Water vapour resistance	μ (hm²Pa)/mg	132 10.65	BS EN 12086 Method A
Shear strength	kPa	169,002.0	BS ISO 1922
Thermal conductivity 0-80mm 80-120mm 120mm+	W/mK (90/90)	 0.028 0.027 0.026	BS EN 12667
Tensile adhesion strength Brick Brick 56 days @80°C Brick 28 day water soak @23°C Breeze block Aerarted concrete	kPa	 231 222 180 200 214	EN 14318 Annex B
Closed cell content	%	> 95	ISO 4590

The above properties are typical of what can be expected when WALLTITE is processed using recommended procedures.

The values above were obtained by foam samples produced in BASF’s laboratories.

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.

Only 90/90 values should be used by designers when carrying out U-value calculations.



Declared $\lambda_{90/90}$ values

		Declared $_{90/90}$ (W/mK)		
λ_{mean} (W/mK)	$\lambda_{90/90}$ (W/mK)	<80mm	80mm to <120mm	≥120mm
0.02143	0.02197	0.028	0.027	0.026

Processing

WALLTITE CV 100 system is injected via plural component equipment.

The following parameters should be observed when processing the material with a machine:

- Component temperature: 40 to 50°C
- Pressure 700 to 900 psi.

The following procedure is used to fill hollow spaces:

Firstly the volume of the space to be filled has to be calculated. the volume multiplied by the desired density results in the weight of product that has to be injected.

Weight = Volume x Density

Secondly in order to avoid any irregular development in the reaction, the material must be injected before the material starts to expand (before the cream time). When processing the components with a machine the output rate must be considered:

Injection Time < Cream Time

Injection Time = Weight/Output Rate

Also the pressure exerted by the expanding foam has to be considered. Care should be taken when the completion of injections is approaching soffit level or below any cavity closers such as window cills.

Final Density/Free Rise Density = Densification Factor

Normally a densification factor between 1.3 and 1.5 (final foam density of 40 to 50kg/m^3) is used with this system. In this range pressure exerted varies between 1 and 1.5kg/cm^2.

In order to guarantee a good dimension stability of the foam, and to avoid possible contraction, it is important to inject a density of no less than 35kg/m^3 (internal density without skin).

When the foam cannot expand freely, and is restrained by walls, or is forced into small cavities, the overall density increases. This is due to the loss of reaction heat, and the friction forces that are created.

The friction effect produced by the walls of the space to be filled increases in magnitude as the surface area to volume ratio increases. The path the foam has to follow during its expansion also has an effect on the densification. The foam should always be injected such that the path is as short as possible.

Typical component data (at 20°C)

	Unit	A -Comp	B -Comp.	Method
Viscosity	mPas	470	300	G 133-07
Density	g/cm^3	1.14	1.23	G 133-08
Shelf life	months	3	6	

Typical processing data

Cup test at 20°C	Unit	Value	Method
Mixing ratio, A/B	Parts by volume	100/110	G 132-01
	Parts by weight	100/110	G 132-01
Cream time	seconds	34-46	G 132-01
String time	seconds	119-153	G 132-01
Rise time	seconds	178-240	G 132-01
Free rise density	g/l	31.2-39.2	G 132-01

Application

Description

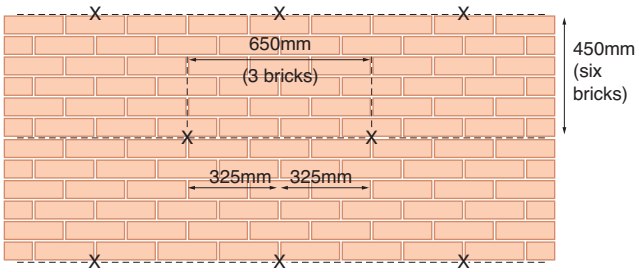
WALLTITE injection grade rigid closed cell polyurethane foam, has been widely used to restore the integrity of masonry cavity walls suffering from wall tie failure. In addition, WALLTITE is the most thermally efficient material available on the market for insulating existing cavity walls.

BBA certification pending.

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.



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 all times to prevent over-pressurisation of the cavity, 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 fill 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.

Criteria of suitability of external cavity walls

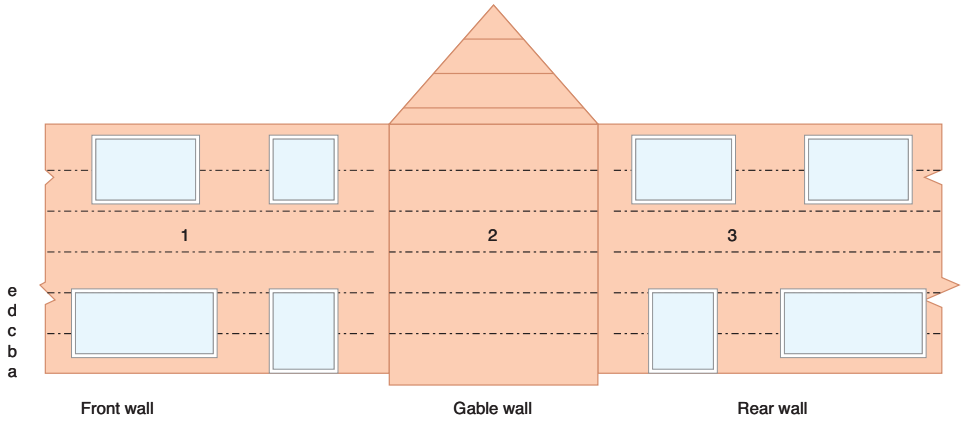
The inner and outer leaves of areas to be insulated should be of masonry or concrete construction.

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 25mm width should be available over the areas to be filled. Cavities in excess of 100mm can be filled provided the drilling pattern or injection sequence is modified to suit.



Note: Injection of foam is undertaken in horizontal bands, e.g. a, b, c, d, e as indicated working from left to right at each level.

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 plc 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.

Approved Contractors

foam masters™
BASF Approved Spray Foam Contractor

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.

The Green House Project

Location: **St. Ives and St. Neots**

Client: **Huntingdonshire County Council**

Project: **Retrofit**

WALLTITE cavity wall insulation and WALLTITE spray foam insulation from BASF plc have been used to form an airtight thermal efficient solution in both properties. In the St Neots house, the existing cavity fill in the external walls was removed and replaced with 70mm WALLTITE cavity injection insulation. Durable and sustainable, WALLTITE cavity wall insulation provides permanent adhesion over the whole surface area of the walls and overcomes wall tie failure, weak mortar joints and other related structural problems. The foam seals the cavity, does not shrink or allow air to pass through it, therefore air leakage through the cavity is reduced to zero. The U-value achieved using cavity injection foam and internal insulation is 0.23W/m²K. In addition, the existing loft insulation was replaced with 60mm WALLTITE spray foam insulation between the rafters to achieve a U-value of 0.16W/m²K when combined with 150mm mineral wool. The loft area has been weatherproofed under the tiles, with a non-breathable HR type membrane.

At the St Ives house, the cavity walls were injected with 65mm WALLTITE cavity insulation in the existing walls and 150mm cavity wall in the new extension, used to maximise the thickness of wall insulation, seal the house from draughts around window and door frames and reduce carbon emissions for the life of the property.

As part of the Code for Sustainable Homes (CSH), enabling sustainable refurbishment through first improving the fabric though insulation such as WALLTITE increases the benefits of thermal efficiency prior to implementing more expensive measures such as micro-renewables, ventilation systems and other costly materials. With the right approach and commitment, refurbishment is a far more cost effective approach to achieving a sustainable building lifecycle, as opposed to starting from scratch, as can be exemplified in both properties.

For more information, samples or if you would like to discuss a particular project please contact us at the details below:

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WALLTITE®

The airtight insulation solution