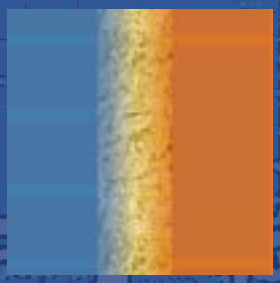
EURISOL
UK MINERAL WOOL ASSOCIATION



BBA

CAVITY WALL INSULATION
The benefits of mineral wool

EURISOL
UK MINERAL WOOL ASSOCIATION

Introduction

Mineral wool is the generic term used to describe insulation materials manufactured from glass, rock or slag. Mineral wool insulation is made from the earth's most abundant materials: rock, sand and minerals of various types.

Mineral wool is the most widely used insulation material for cavity wall insulation. It is the most cost-effective method of insulating a masonry cavity wall and can be installed in three ways:

- full fill built-in
- partial fill built-in
- injected.

The popularity of mineral wool is a result of its inherent performance characteristics. In particular:

- excellent thermal insulation
- non-combustible
- moisture resistant and water repellent
- cost-effective
- environmentally friendly
- resilient
- chemically inert.

The benefits of mineral wool insulation in these areas are explained later in the publication.

Quality control

Whatever type of cavity wall insulation is used, a good standard of workmanship is required to ensure that the wall performs as expected.

The manufacturers of mineral wool cavity wall insulation recognise this and, in conjunction with the British Board of Agrément (BBA), have developed quality control procedures and training courses for specialist approved installers.

Built-in cavity wall insulation, both full and partial fill is installed during the construction of the wall.

Authoritative guidance on detailing and workmanship is widely available in British Standards, from the Building Research Establishment, as well as from EURISOL members.

Aspects covered by the guidance include:

- installation sequence
- covering up batts at the end of the day
- incorporating cavity trays
- sloping wall ties marginally down towards the outer leaf.

Proven track record

Thermal performance

Fire resistant

Moisture resistant

Environmentally friendly

Cost-effective

Agrément Certificate

Water repellent

Chemically inert

Dimensionally stable

Non-combustible

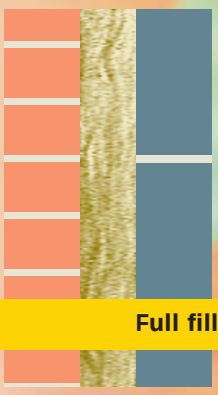
Resilient

CFC and HCFC free

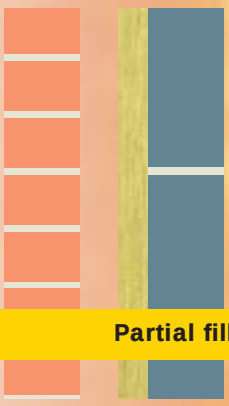
Field experience has proved that correct detailing and good standards of workmanship will ensure a successful installation and good performance.

Injected cavity wall insulation is installed only by approved installers who undergo extensive training by the system holders. There are also spot checks by the BBA to ensure that standards are adhered to.

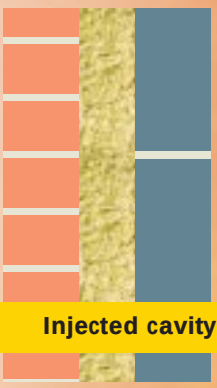
Prior to installation of any form of cavity wall insulation, a thorough pre-inspection survey of the construction takes place. This identifies issues such as cavities of inadequate width, bridging of the cavity and the exposure and build quality of the existing wall. The quality control continues with monitoring of injection patterns and insulation densities. These aspects are all covered by the relevant BBA certificate.



Full fill built-in



Partial fill built-in



Injected cavity wall insulation

EURISOL
UK MINERAL WOOL ASSOCIATION

EURISOL UK MINERAL WOOL ASSOCIATION

Thermal performance

The thermal conductivity of mineral wool products for cavity wall insulation is in the range 0.032 to 0.040 W/mK. The thermal performance is achieved through the entrapment of air within the material. The graphs opposite show that, contrary to some reports (see 'Misconceptions' below) the thermal conductivity varies little with moisture content.

The thermal conductivity of mineral wool does not deteriorate over time, unlike foamed plastic insulants, that are produced using blowing agents such as HCFCs, which are usually environmentally damaging gases, or Pentane, which significantly increases the fire risk.

With foamed plastic insulants, the blowing agent gradually escapes from the insulation, to be replaced by air in a continually ongoing process, known as ageing. This causes the thermal performance of the foamed plastic insulation to deteriorate over time. As CFC and HCFC blowing agents are phased out, some of their replacements have been shown to exhibit even more pronounced thermal deterioration.

Unlike rigid foamed plastic insulants, **the resilience of mineral wool means that the joints 'knit' easily and tightly together, reducing thermal bridging at critical joint locations.** Thermal bridging would reduce the overall effectiveness of the insulation system.

Mineral wool cavity wall insulation does not need foil facings to stabilise its thermal performance, unlike some foamed plastic insulants, where foil facings are used to prevent the release of gasses, which causes thermal deterioration. Furthermore, the joints of foil faced insulants should be sealed with foil tape to maintain a continuous barrier. The thermal performance of foil facings can also deteriorate over time "...surface oxidation, dust accumulation and other factors that change the condition of the low emittance surface can reduce the thermal effectiveness of these systems. Deterioration results from contact with... wet cement mortar." [2]

Misconception

The thermal conductivity of mineral wool cavity wall insulation increases dramatically, up to 75-100% is claimed in one report, as a result of moisture entering the wall cavity.

The thermal resistance of mineral wool in cavity walls is the result of three heat flow mechanisms:

- heat flow caused by a temperature gradient across the insulation
- convective heat transfer by air flow
- heat transfer resulting from phase change.

According to Sandberg [1] the thermal conductivity of mineral wool insulation increases only marginally with increased moisture content in the hygroscopic range. Convective heat transfer is estimated to be less than 0.5% of total heat flow and can be ignored in any calculations.

The effect of phase change can be substantial, but only for short periods and the influence over a longer period (eg a heating season) are typically small. Estimates by Sandberg [1] for mineral wool used to insulate the outside of a basement wall, (a much more severe position than in a masonry wall cavity), are that the thermal conductivity increases by about 0.002 W/mK. (i.e. about 6%).

Moisture resistance

All mineral wool products used for cavity wall insulation contain water repellent additives. These together with the orientation of the mineral wool will restrict the penetration of wind driven rain to the external leaf.

Tests carried out by the BBA show that mineral wool cavity insulation will not transmit water to the inner leaf, nor will it transmit moisture by capillary action across the cavity or from below dpc level. These tests have been confirmed by independent research conducted for the Government's Energy Efficiency Office, which shows that **cavity wall insulation does not add to the risk of water penetration, in fact it slightly reduces it.**

Misconception

Fully filling the cavity increases the likelihood of dampness from rain penetration.

In 1993-4 the Government's Energy Efficiency Office commissioned the largest ever study (over 30,000 homes) into rain penetration of fully filled and unfilled cavity walls. The main findings were:

"the risk of rain penetration is very low"

There is no statistical evidence that cavity wall insulation increases the risk of rain penetration – less than 3 houses in a thousand (0.26%) with cavity insulation suffered from rain penetration compared with 0.22% for unfilled cavities.

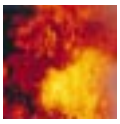
The survey revealed that most of the reasons for rain penetration, such as too severe an exposure to wind-driven rain and existing building defects, should have been identified at the pre-inspection stage.

1. Sandberg. P. I. "Thermal Resistance of Wet Mineral Fiber Insulation", *Thermal Insulation: Materials and Systems. ASTM STP 922*, F. J. Powell and S. L. Matthews, eds., American Society for Testing Materials, Philadelphia, 1987, pp.394-404.

2. ASHRAE Handbook of Fundamentals.

- ✔ Mineral wool is the most widely used insulation material for cavity wall insulation.
- ✔ Mineral wool is the most cost-effective method of insulating a masonry cavity wall.
- ✔ Injected cavity wall insulation is installed only by approved installers.
- ✔ The thermal conductivity of mineral wool does not deteriorate over time.
- ✔ The resilience of mineral wool means that the joints 'knit' easily and tightly together, reducing thermal bridging at critical joint locations.
- ✔ All mineral wool products used for cavity wall insulation contain water repellent additives.
- ✔ Cavity wall insulation does not add to the risk of water penetration, in fact it slightly reduces it.
- ✔ All mineral wool products used for cavity wall insulation are non-combustible.
- ✔ Mineral wool does not constitute a toxic hazard in fire conditions.
- ✔ In studies undertaken to date, mineral wool has been shown to be more environmentally friendly than most insulating materials.
- ✔ Mineral wool has lower embodied energy than foamed plastics, contains no CFCs, HCFCs or other material with ozone depletion potential and uses abundantly available materials in its manufacture.
- ✔ Mineral wool is bio-degradable.
- ✔ Mineral wool insulation products are chemically inert.
- ✔ Mineral wool is rot-proof, odourless, non-hygroscopic, does not sustain vermin and will not encourage the growth of fungi, mould or bacteria.
- ✔ Mineral wool cavity wall insulation has been proven in service for over 25 years.
- ✔ Injected mineral wool products are guaranteed by the Cavity Wall Insulation Guarantee Agency (CIGA) for existing homes and by individual member companies for new-build properties.

EURISOL
UK MINERAL WOOL ASSOCIATION



Fire

All mineral wool products used for cavity wall insulation are non-combustible when tested to BS 476: Part 4: 1970 (1984). The composition of mineral wool also means that **it does not constitute a toxic hazard in fire conditions.**

This is in contrast to petro-chemical based insulation materials, such as polyurethane foam, expanded and extruded polystyrene and phenolic foam, which are inherently combustible and release toxic combustion products and smoke in a fire.

Environmentally friendly

The impact that a material has on the environment is becoming an increasingly important consideration for specifiers. To assess the full impact of a material is a complex issue, involving as it does the entire life-cycle from the extraction of raw material, transportation, manufacture, use and final disposal.

In studies undertaken to date, mineral wool has been shown to be more environmentally friendly than most insulating materials.

Mineral wool has lower embodied energy than foamed plastics, contains no CFCs, HCFCs or other material with ozone depletion potential and uses abundantly available materials in its manufacture.

Mineral wool is bio-degradable, unlike foamed plastic insulants where it is recommended that landfill or incineration should be the disposal route.

All mineral wool insulation products conserve energy and therefore assist in reducing demand for heating and air-conditioning in buildings and so reduce the emission of the major greenhouse gas, carbon dioxide. It is therefore also important to consider the energy embodied in various insulants, calculated 'cradle to grave', when specifying cavity wall insulation.

The graph opposite shows that mineral wool requires far less energy for its creation than the products against which it competes. For every kWh of energy used in the manufacture of mineral wool, it is estimated that over 200 kWh will be saved in reduced heating bills over a 50 year period.

Chemically inert

Mineral wool insulation products are chemically inert and do not react with wire, plastic or metal wall ties, nor will they cause loss of plasticiser from PVC cables and pipes. Solvent based adhesives will attack foamed plastic insulants, causing them to degrade.

Mineral wool is rot-proof, odourless, non-hygroscopic, does not sustain vermin and will not encourage the growth of fungi, mould or bacteria.

Cost-effective

Mineral wool cavity wall insulation is the most economic way of insulating cavity masonry walls [3].

Proven track record

Mineral wool cavity wall insulation has been proven in service for over 25 years in all types of climates and degrees of exposure. It is estimated that in the UK, 3 million homes benefit from mineral wool cavity wall insulation, 25 % of the total housing stock with cavity walls.

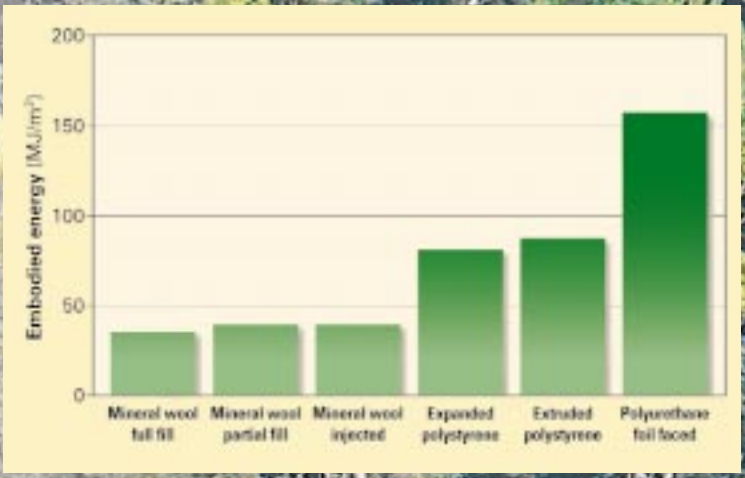
BBA Certificates: The BBA assess the suitability of materials for specific uses. The Building Regulations require that all cavity wall insulation products should have a BBA certificate.

The first BBA certificate for mineral wool cavity wall batts was obtained in 1975 and for injected mineral wool insulation in 1980. All EURISOL member companies have BBA certificates for their full range of cavity wall insulation products, unlike foamed plastic insulants, which do not have BBA certification for full fill applications.

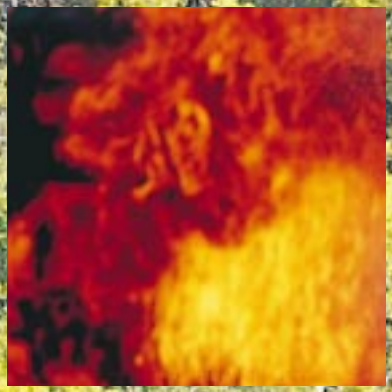
Guarantees: Injected mineral wool products are guaranteed by the Cavity Wall Insulation Guarantee Agency (CIGA) for existing homes and by individual member companies for new-build properties.

3. *Fuel Poverty: The New HEES – a programme for warmer, healthier homes*, DETR, May 1999, pp50, Section C20.

Embodied energy of insulation materials



Sources: Foamed plastics: Dr. J. Boustead *A report for the European Isocyanurate Producers Association* ISOPA, Sept 1997.
Mineral wool: *Insulation Materials: Environmental Comparisons*, Environmental Building News, Volume 4, No 1–January/February 1995.



BBA

EURISOL
UK MINERAL WOOL ASSOCIATION

EURISOL
UK MINERAL WOOL ASSOCIATION

Eurisol UK Limited,
39 High Street, Redbourn,
St Albans, Herts AL3 7LW
Telephone: 01582 794624
Fax: 01582 794300