Mortar Industry Association

External thermal insulation composite systems - using renders

Effective thermal insulation

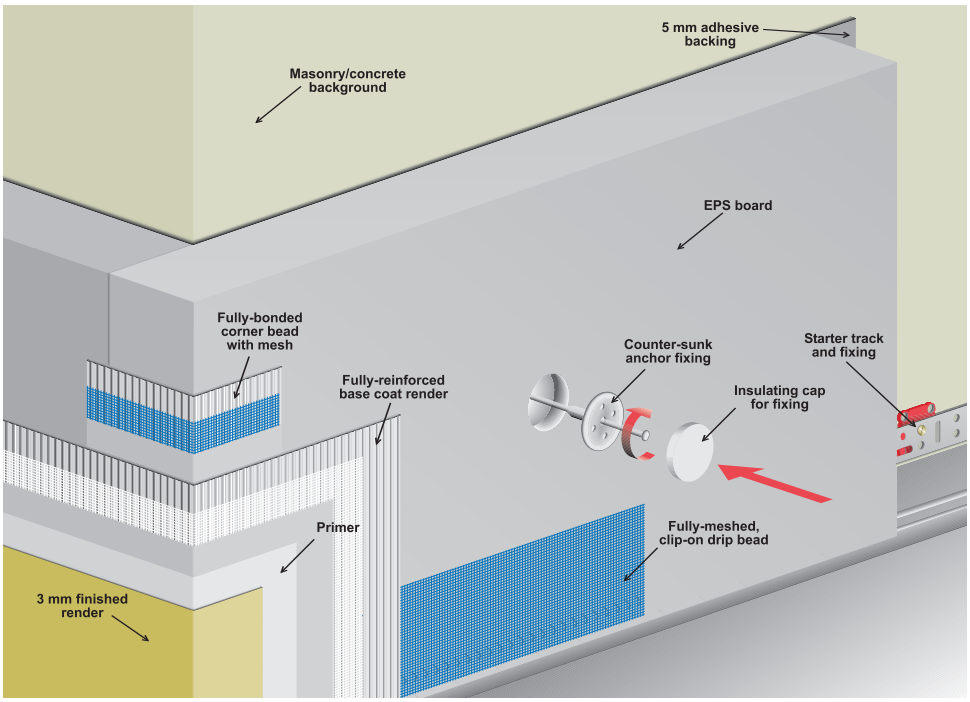
Increasing the thermal insulation of both existing and new buildings can be effectively achieved by the addition of external thermal insulation.

External thermal insulation composite systems – ETICS for short – are a means of applying layers to the outside of a building with the primary aim of improving thermal performance although other benefits generally result too. Overall benefits include:

- a reduction in heating and air conditioning running costs
- increased internal comfort
- a reduction in condensation where this has been present
- improved weather resistance
- better external appearance when added to an existing building
- no internal disruption to the structure or its inhabitants.

ETICS can be used on existing solid-walled construction and narrower cavity walls no matter if these are partly or completely filled with insulation.

How the systems work



There are different types of systems but the vast majority share a number of common features:

- an insulating layer – generally a board of expanded or extruded polystyrene, polyurethane, phenolic, isocyanurate or other lightweight material. This requires a fixing system to hold it to the masonry background and this could be an adhesive, physical connectors or a combination of both. In some cases a lightweight render may be used instead of a board, in which case additional fixing is not required
- a reinforcing layer – to protect the relatively vulnerable insulating layer against impact. This can be a metal or plastic mesh
- a finishing layer – to provide weather proofing and decoration and sometimes additional impact or abrasion resistance. This should be proof against water penetration but be

Where you can order

Factory-produced mortars and renders are available from MIA producer members. The panel below gives contact telephone numbers and website details for these producers who offer mainland UK coverage unless otherwise stated.

Suppliers

Breedon Aggregates Ltd
01332 694000 *(England)*
0845 270 7374 *(Scotland)*
www.breedonaggregates.com

CEMEX UK Materials Ltd **01932 568833**
www.cemex.co.uk

CPI Mortars Ltd **0845 850 9090**
www.euromix.com

Hanson UK **0845 845 6699**
www.hanson.biz

John Carr (Liverpool) Ltd **0151 2070067**
(Liverpool)

RTU **02890 851441**
www.rtu.co.uk *(Belfast)*

Remix Dry Mortar Ltd **01329 231200**
www.remixdrymortar.co.uk

Roadstone Dublin Ltd **00 35 31 4041200**
www.roadstone.ie *(Dublin)*

Smiths Concrete Ltd **01295 278177**
www.smithsconcrete.co.uk *(Oxfordshire)*

Tarmac Limited **08701 116 116**
www.tarmac.co.uk

www.mortar.org.uk
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moisture permeable to allow vapour in the structure to be released externally. This information sheet talks in more detail about the use of render as the finishing layer but, in some instances, a cladding material, hanging tiles or brick slips could be used. These would require an additional fixing or hanging system.

In addition to these normally included features, other elements may be required. These include:

- special trims, cill additions, beads and similar accessories to detail and finish aspects of the systems
- movement joints/sealants for larger areas.

Specialist render types

Specialist renders, available from Mortar Industry Association members, are required for ETICS.

They must be able to resist thermal shock, adhere to the special backgrounds used and have an acceptable impact resistance. They usually contain relatively large amounts of polymeric materials.

Render may contain a lightweight mineral aggregate such as perlite, vermiculite or expanded or sintered clay or an organic product such as expanded polystyrene.

Both wet-dashed and dry-dashed renders are used in ETICS, although in general the render coats used contain smaller-sized aggregates than would be the case with such materials. Both organic and inorganic cementitious binders are used.

Selection of colour and finish of renders may be dictated by local planning requirements.

ETICS benefits

Energy savings

Addition of insulation to the external wall of a structure can make a major contribution to reducing the amount of energy needed for heating.

Today, thermal values can be built into the design of new structures but the UK has a considerable stock of existing buildings where effective insulation is lacking.

At a time when air conditioning is also requiring additional energy, excellent levels of insulation are essential to reduce further the UK's emissions of carbon dioxide.

Improved comfort

Reducing total energy consumption means it is viable to heat a structure to a higher degree while still reducing energy input.

External insulation also means that the main mass of a building – generally brick and block masonry – will absorb heat at its working temperature, effectively acting as a heat sink. When heating is switched off the temperature will not drop suddenly because the main fabric of the building acts rather like the bricks in an electric storage heater. It emits the heat back into the interior of the building. Without rapid heat loss and subsequent cycles of heating and cooling, occupants of the structure experience a more comfortable environment.

ETICS avoids cold bridging – when an element of a structure passes continuously from the outer face to the interior. Through conduction, the internally located part of the element remains at a temperature close to that of the exposed part. In practice this means in weather extremes an inner structure can be at a much lower temperature than desirable or in hot weather, much hotter.

ETICS overcomes these problems and hence has an important role to play in hot weather by keeping temperatures within buildings lower. Its use may, in some cases preclude the need for air conditioning but, if required, it will be at far lower level than in an un-insulated building, with associated energy savings.

Condensation reduction

Condensation occurs when water vapour produced in a structure condenses on a surface at or below a critical temperature, known as the dew point. The naturally occurring levels of humidity within a building and cold bridging will bring about condensation, again an occurrence remedied by external insulation.

Aesthetic appeal

ETICS can play an important role in improving the external appearance of buildings of all kinds and ages. Its use will not only upgrade thermal and related issues but through careful choice of the finishing layer will successfully refresh the external face of a structure.

Indeed, correctly designed and detailed ETICS will retain a fresh, clean appearance for a considerable period of time.

Weather proofing and general repair

Application of ETICS provides a weatherproofed structure, overcoming difficult or complex problems of water ingress that may be too expensive to repair in isolation.

Internal space saving

An option for upgrading a building's thermal performance is placing an insulated board on internal walls. Not only does this fail to capitalise on the thermal mass of a structure, it also impinges on the internal dimensions.

Furthermore, fixing of internal insulation is difficult because of the location of such everyday elements such as kitchen units, baths and basins. ETICS takes all of these factors out of the thermal upgrading equation.

Acoustic issues

A major benefit to users of a structure upgraded by ETICS is much improved acoustic properties.

Technical requirements

Care must be taken in designing the application of ETICS around window reveals, cills and returns. There may be a need for accessories to extend and improve these elements and this should be considered in detail at the preliminary design stage.

The European Organisation for Technical Approvals (EOTA) has produced technical requirements for ETICS although it is likely these will be superseded by European standards.

Requirements include:

- Mechanical resistance
- Fire resistance
- Indoor moisture condition
- Safety
- Acoustic issues
- Energy consumption and insulation
- Durability.

Tests for these are set out in an EOTA publication, ETAG 004, March 2000. The tests differ from those for mortars described in CEN/BSI publication BS EN 998-1 and 998 2 and many require specialist equipment.

Tests listed in ETAG 4 include:

- Fire resistance
- Water absorption
- Water tightness
- Hygrothermal behaviour (resistance to heating and wetting cycles)
- Freeze-thaw resistance
- Impact resistance (hard body)
- Resistance to perforation
- Water vapour permeability
- Release of dangerous substances
- Bond strength
- Fixing strength
- Resistance to wind load
- Thermal resistance.

The comprehensiveness of the tests required illustrate that ETICS should be regarded as an integrated system, not a selection of components – with their own separate needs - that can be brought together to form the complete job.

www.mortar.org.uk

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