Loss prevention standards

External Wall Insulation Systems

Guidance on the use and management of External Wall Insulation Systems

AVIVA

External Wall Insulation Systems

Introduction

External Wall Insulation (EWI) systems were initially developed in Europe after World War II to retrofit solid masonry walls with insulation. The systems were introduced to North America during the 1960s and were soon used to overclad timber stud-framed walls as well as traditionally masonry walls. Such systems are now commonly used throughout Europe and the United States, both for new properties and also as part of a retrofit.

They are applied to external walls on a wide range of buildings including: residential properties/apartments, high-rise structures, offices, shopping centres, schools, hotels, etc., and are often used to create unusually shaped walls or facades, and for decorative purposes, e.g. to appear like stone, brick, or to create signage and artwork.

EWI systems provide a lightweight, insulated, multi-layered and waterproofed finished surface to exterior walls, offering an alternative insulation method to internal or cavity wall insulation. They can be installed on existing walls to improve appearance, without causing disruption to business operations or without requirement for the existing services to be repositioned during the work. Whilst often referred to in the UK as EWI systems, they are commonly known in the United States as Exterior Insulation Finishing (EIF) systems. Depending on the property there are a number of different types of insulation material available as part of this built-up system, each of which have different fire performance ratings, including:

- Expanded polystyrene (EPS)
- Extruded polystyrene (XPS)
- Mineral fibre/glass wool
- Phenolic
- Polyurethane
- Polyisocyanurate
- Cork

The chosen insulation material should be non-combustible, for example, mineral fibre/glass wool, or other materials with proven fire performance rating which meet the requirements of an accredited third party approval scheme, such as that offered by the Loss Prevention Certification Board (LPCB) via standards LPS 1581 and LPS 1582. Using approved insulation systems can significantly improve the fire resisting performance of a property as well as improving the operational resilience of a business.

Refer to RedBookLive for examples of approved products.

As properties over 18m in height present a number of challenges with regards to fire safety (e.g., escape strategy, fire-fighting access, proximity to other structures, etc.), in England, Wales, Northern Ireland and Scotland, EWI systems applied to structures in excess of 18m-high have to meet certain fire classification requirements – refer to the appropriate Building Regulations for further guidance.

The insulation material is normally applied onto a variety of substrates, for example, solid block work (either by cement or an epoxy adhesive bonding agent - see installation details below) or other supporting materials such as timber or lightweight metal frames, prior to being covered by a reinforcing mesh and a rendered water-resistant finish.

Buildings fitted with a lightweight EWI system are often difficult to identify and appearances can be deceiving, so often there is a need to physically touch and tap the wall and to investigate further to confirm the findings. Such enquiries are essential, as the insulation material contained within an EWI system may ultimately determine whether insurers classify the property as non-combustible or combustible as part of acceptance and rating considerations.

On first inspection, EWI systems can look like traditional plaster (stucco) or concrete and is sometimes known as or called 'synthetic stucco'. However, EWI is not stucco. Traditional plaster/stucco is a centuries-old non-insulating material, alternatively known as Portland cement plaster. Stucco consists of sand, Portland cement and water, and is a hard, dense, thick, non-insulating material, which is applied in three layers. There are also 'specialty plaster/stuccos' that use synthetic materials, again with no insulation, but these are not EWI systems. A common example is known as one-coat stucco, which is a thick, synthetic stucco applied in a single layer. Whilst a basic EWI system includes only the insulation, adhesives and finished coating, other types of EWI systems may also include plastic edge trims, water-resistive barriers, drainage cavity, and other accessories.

EWI systems have a number of other features and benefits, such as:

- Transforms the appearance of a building
- Provides various textured finishes, including a smooth modern seamless look (control joints are required at regular intervals to prevent cracks from thermal expansion/contraction)
- Enables various coloured finishes and textures to be applied that can imitate other finishes such as concrete, marble, stone, etc.
- Reduces heat loss through walls
- It is a cost effective, lightweight construction which is easily applied to existing buildings
- Protects the structure, i.e. additional weatherproofing features

Concerns and Hazards

In respect of property loss prevention, the main hazard is the potential combustible nature of the insulation material and finishing system, and its proximity to exposures and ignition sources. If ignited, external cladding systems provide the opportunity for a fire to quickly spread throughout a building.

Some types of EWI may also include other combustible features such as: plastic edge trims, plastic vents, plastic water-resistive barriers, drainage cavity, etc., which increase the risk of fire spread.

When a brick/block wall has an internal cavity, it is important that fire barriers are installed to reduce the possibility of fire traveling along and up/down the cavity.

Other problems started developing due to water penetrations/leakage in EWI-clad buildings. Although EWI is no more prone to water penetration than other exterior finishes, the barrier-type EWI system (non-drainage type) does not allow water that may penetrate the building's exterior surface to escape. In winter months any trapped water can potentially freeze, expand and cause cracking. When the frozen water starts to melt, the expansion recedes and further cracks can appear. This cycle allows more water to enter, and eventually the facing material can fall-off leaving potentially large surface areas of exposed combustible insulation.

EWI systems installed at lower building levels can be subject to impact damage and/or vandalism as the material is soft and can be chipped or carved, resulting in significant damage and exposing any combustible insulation.

It is important to carry out regular inspections of the condition of the wall facings, and complete scheduled maintenance, particularly on older premises.

Failures of EWI systems have been blamed on poor installation, craftsmanship and architectural detailing at the perimeter of the system. Some building design standards/codes, in particular the US building codes, have been revised and now require EWI to have drainage on timber framed buildings and the completion of additional on-site inspections.

Typical EWI System Installation Methods

EWI is usually installed at the construction site by hand, by professional plasters. EWI can also be delivered to site pre-made as composite panels. The factory-made composite panels typically have a lightweight welded metal or timber sub-frame and are delivered to the building site, raised and located using a crane, and attached to the building frame.

EWI is attached to the outside face of exterior walls with an adhesive, usually a cement based bonding or acrylic based bond. Mechanical fasteners such as nails, screws, etc. should not be used directly to support the insulation, as they are likely to allow water ingress unless used/sealed with foam shape caps beneath the reinforcing mesh and finished coating. The exterior wall surface to be insulated is typically continuous and flat (not open framed), and can be a solid material, or some type of covering that is attached to studs. There are various different types of external surfaces that the insulation can be fitted to, such as: concrete, concrete block work, brick, cement board, exterior grade gypsum board, glass fibre-faced gypsum board, oriented strand board (OSB), etc.

EWI systems consist of a number of layers, and the most basic system (a barrier EWI system) comprises three layers, as follows:

- First stage: consists of a layer of foam plastic insulation supplied in various thicknesses and usually sized 600 x 1200mm, which is bonded to the external wall. If an adhesive is used to attach the insulation, it is applied manually to the foam using a trowel. The adhesive has to be compatible with the substrate. The type of insulation typically used is expanded polystyrene (EPS). The usual range of thickness for the wall insulation is 20 to 100mm, although thicker pieces are sometimes cut and used for unusual shaped walls, e.g. long radius bends in the wall.
- Second stage: consists of a fibreglass reinforcing mesh embedded in an adhesive that is manually applied onto the face of the insulation with a trowel. The fibreglass mesh is supplied in rolls of various lengths, widths and weights. The heavier the weight, the better the impact resistance of the mesh. The standard weight is 28g and the higher resistant mesh weights can go up to 400 or 560g. This two-part layer is called the base coat.
- Third stage: consists of a final decorative, weather proof finish coat or top coat, which is a smooth or textured cement or non-cement based paste that can be provided in various colours. It is applied manually using a plaster's trowel or can be spray applied (not very common). The hand-applied trowel (floating) application method allows a number of differing finishes and textures.

If the EWI requires some form of drainage to permit trapped water to escape (helping to eliminate moisture), when used on a wood frame construction that may be required by local or national building codes/regulations, then a water-resistive barrier (WRB) is first installed to the external wall. The moisture barrier is applied to the entire wall surface with a mesh tape over joints and a liquid-applied membrane, or a protective cover such as Tyvek or felt paper. A drainage cavity is then created (usually by adding some sort of space between the insulation foam and the WRB), and the other three layers as described above are provided. Maintenance of the EWI system is critical to the performance of the water-resistive abilities of the system.

Adhesives and finishes are water-based, and thus must be installed at temperatures well above freezing. Two types of adhesives are generally used with EWI systems; those containing Portland cement and those that have no cement. Adhesives containing Portland cement harden by the chemical reaction of the cement with water. Adhesives and finishes that have no cement harden by the drying/evaporation of the water. The most common adhesive is a paste in a sealed plastic container, to which Portland cement is added. Adhesives are also available as dry powders supplied in sacks, to which water is added. Finishes come ready mixed for use, like a paste in sealed plastic containers. Insulation comes as pre-cut boards, usually 610 x 1200mm or 1200 x 2400mm and in various thicknesses from 20 to 200mm. The pieces are trimmed to fit the contour of the wall at the construction site.

Loss Prevention Measures

Some of the key loss prevention measures for EWI systems include:

- Ensuring that insulation materials used are non-combustible or have proven fire performance rating which meet the requirements of an accredited third party approval scheme
- Understand, detail and accurately record where these systems are in place
- Inspect and maintain on regular frequency
- Have appropriate impact protection in front of these systems (e.g. from vehicles)
- Ensure all penetrations are appropriately sealed
- Repair any damage immediately
- Do not fix anything to the insulation system
- Manage ignition sources such as external smoking booths and shelters, lighting & other electrical equipment
- Do not allow hot work to be completed on or within 10m of the system
- Have appropriate segregation from external or exposing fire loads such as waste bins, skips, yard storage, etc.

Checklist

A generic External Wall Insulation Systems Checklist is presented in Appendix 1 which can be tailored to your own organisation.

Specialist Partner Solutions

Aviva Risk Management Solutions can offer access to a wide range of risk management products and services at preferential rates via our network of Specialist Partners.

For more information please visit:

Aviva Risk Management Solutions – Specialist Partners

Sources and Useful Links

- Loss Prevention Standard LPS 1581: Requirements and tests for LPCB approval of non-load bearing external cladding systems applied to the masonry face of a building
- Loss Prevention Standard LPS 1582: Requirements and tests for LPCB approval of non-load bearing external cladding systems fixed to and supported by a structural steel frame
- BR 135: Fire performance of external thermal insulation for walls of multi-storey buildings (produced by BRE Global Ltd)

Additional Information

Relevant Loss Prevention Standards include:

- Composite Panels
- Fire Safety Inspections
- Hot Work Operations
- Housekeeping – Fire Prevention

To find out more, please visit Aviva Risk Management Solutions or speak to one of our advisors.

Email us at riskadvice@aviva.com or call 0345 366 6666.*

*Calls may be recorded and/or monitored for our joint protection.

Appendix 1 – External Wall Insulation Systems Checklist

Location	
Date	
Completed by (name and signature)	

	External Wall Insulation Systems	Y/N	Comments
1.	Has the type of external wall insulation (EWI) material been confirmed?		
2.	Is the EWI material non-combustible, or does it have proven fire performance rating which meet the requirements of an accredited third party approval scheme?		
3.	Has the substrate wall which supports the insulation been confirmed? • Non-combustible brick/block work? • Combustible, timber framed?		
4.	Does the wall have internal open cavities? Are the cavities fitted with suitable fire barriers?		
5.	Are all combustible wall systems formally recorded in appropriate drawings and documentation?		
6.	Is the condition of the wall insulation good with no exposed fixings, cracking or evidence of exposed foam or other types of combustible materials?		
7.	Are there any exposed vents, pipes, cables or fixings that penetrate the wall/insulation material? • Are any of these combustible? • Can they be replaced or be encased with non-combustible materials?		

	External Wall Insulation Systems Contd.	Y/N	Comments
8.	Are any walls protected against potential impact damage including vehicular?		
9.	Have there been instances of malicious damage or arson in the area? Are security precautions appropriate to reduce potential malicious damage or arson attack?		
10.	Is the condition of the EWI system included in regular formal self-inspection regimes?		
11.	Are cracks and damage identified, and formally tracked through to repair completion? Are repairs treated quickly and as a matter of urgency?		
12.	Are all wheelie bins, skips and waste materials maintained at least 10m from any identified EWI systems?		
13.	Is all yard storage maintained at least 10m from any identified EWI systems?		
14.	Is smoking and are smoking shelters prohibited from within 10m of any identified EWI systems? *In no instances should cigarette waste material holders be mounted onto EWI systems.*		
15.	Are all forms of hot work prohibited on or within 10m of any EWI systems?		
16.	Additional comments:		

Please Note

02/03/22 V1.3

Aviva Insurance Limited, Registered in Scotland Number 2116. Registered Office: Pitheavlis, Perth PH2 0NH.
Authorised by the Prudential Regulation Authority and regulated by the Financial Conduct Authority and the Prudential Regulation Authority.