Composite Insulated Panels (CIPs): An Overview and an Understanding of Property Insurers' Attitudes

This is a summary of a much lengthier article/paper on Composite Insulated Panels (CIPs) which I have put together over the last number of years. The main article deals with LPC standards/requirements and technical issues in terms of testing and fire performance etc. The article also touches on Grenfell and Policy Liability in terms of warranties and recent trends and developments and in particular Insurers attitude in relation to risks that have a composite panel feature.

If you wish to receive the full article, please email me at alan@fcla.ie but hopefully the following will give a quick overview and a basic understanding in terms of the types of panels involved and the potential issues.

What is a Composite or Insulated Sandwich Panel (CIP)?

CIPs, also known as insulated or sandwich panels, feature two outer protective skins (metal or PVC-coated) bonded to a rigid internal core. The core material is critical, as it can significantly influence fire and damage risks. Commonly used in construction for over 40 years, the main types of CIPs are:

1. **Polystyrene**: Includes Expanded Polystyrene (EPS) and Extruded Polystyrene (XPS).
2. **Polyurethane (PUR)**: Previously common but phased out in the UK and Ireland by 2003/2004.
3. **Polyisocyanurate (PIR)**: A higher-performance alternative to PUR.
4. **Modern Systems**: Enhanced PIR-based options like Kingspan's Quadcore.

The photo accompanying the full paper illustrates the distinctions between these core materials.

Regulations, Standards, and Grades

This section highlights the regulatory and performance standards governing CIPs, with a focus on minimizing fire-related risks. Relevant standards include the **Building Regulations** and **BS476**, the British Standard for testing building material performance.

Historically, the **Fire Officers Committee (FOC)** classified buildings based on fire resistance into five standards. "Standard 5" aligned with typical residential construction, offering minimal fire resistance and deemed suitable only for low-hazard applications such as offices and shops. Buildings with lower resistance than Standard 5 were labelled "non-standard."

In 1985, the **Loss Prevention Council (LPC)**, partly funded by the insurance industry, succeeded the FOC and adopted a performance-based approach. The LPC, in conjunction with the **Building Research Establishment (BRE)**, introduced construction grades aimed at grading fire resistance in structural components to mitigate risks like the Estimated Maximum Loss (EML).

Reducing the Estimated Maximum Loss (EML) often involves dividing buildings into smaller compartments. Fire Surveyors can evaluate fire risk by referencing construction grades for floors, walls, and roofs. These grades establish benchmarks, helping insurers classify acceptable risks and identify necessary improvements.

The standards and grades remain vital for underwriting decisions, offering a structured approach to assess risks associated with Composite Panels.

History/Background

Since 2004, major UK and Irish manufacturers have predominantly used PIR-insulated cores in Composite Insulated Panels (CIPs). PIR panels comply with key aspects of BS476, particularly regarding fire safety, as they prevent flashover—a phenomenon where heat causes ignition on the opposite side of a barrier.

The ABI Technical Brief on Sandwich Panel Systems (2003, updated) outlines insurers' attitudes toward composite panels, recognizing LPCB-certified panels as the industry standard. LPCB-approved products, certified under LPS 1181 and BS476, meet rigorous performance and manufacturing criteria. These panels are considered acceptable in most scenarios, excluding high-risk cooking areas.

Polystyrene (EPS/XPS): “The Problem Panel”

Polystyrene panels are most often found in buildings over 30 years old (e.g., food storage facilities, bakeries), are not LPCB-approved and have been linked to rapid fire spread. The ABI highlights that poor use and management of these panels in food factories have caused severe fires, contributing to the negative perception of composite panels.

These panels are easily identified by their plastic bead infill. Under fire, the core melts into liquid, compromising the panel’s integrity and causing collapse. Polystyrene’s significant fire risks make it unsuitable for modern applications.

Polyurethane (PUR) Panels

PUR panels succeeded polystyrene systems, offering better fire performance by maintaining structural integrity until the framework collapses. However, PUR panels were largely produced before 2004 and lack LPCB certification. Despite this, their fire performance is comparable to PIR panels, suggesting they should be considered similarly from an underwriting perspective.

Polyisocyanurate (PIR) Panels and Modern Adapted Systems

PIR panels, widely used since 2004, are LPCB-approved and meet Class O fire ratings under BS476, indicating no flame spread on the external face. This makes PIR panels a standard in modern, fire-resistant construction.

Other Products in Use

Modern construction has introduced additional insulated panel systems:

1. **Kingspan King Zip Roof System**: A standing seam roof system with an insulated core, commonly used in architect-designed homes.
2. **Structural Insulated Panels (SIPS)**: Widely used insulated core panels for structural purposes.
3. **Aluminium Composite Material (ACM)**: Primarily aesthetic, these panels are often used as rainscreen facades.
4. **Quadcore**: An advanced insulated panel system offering maximum fire performance for combustible materials. It minimizes smoke, flaming particles, and flashover risks, paralleling PIR performance.

Outdated Definitions in Policy Wordings

Many policies still reference "standard construction," defined as roofs made from slate, tile, or concrete, reflecting outdated Fire Officers Committee (FOC) Standards. This legacy terminology excludes modern materials like mineral fibre panels and the King Zip System, which are non-combustible and more aligned with contemporary methods.

Propane Torch Test: PIR Performance

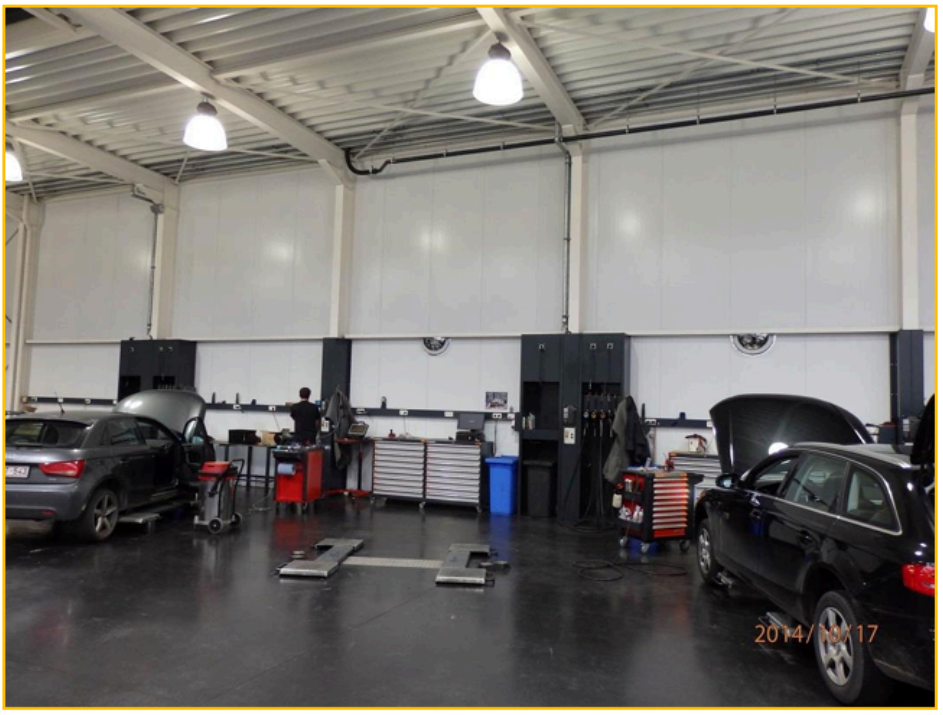
Under BS476, the Propane Torch Test demonstrates PIR's fire resilience. Exposed to temperatures over 1,000°C for 30 minutes, PIR forms a robust carbonaceous char that protects its core, preventing ignition and reducing fire risk.

Real-World Performance

Photographs from a Kingspan case study on an Audi dealership in Belgium illustrate PIR's effectiveness. During an arson attack, six cars burned adjacent to PIR panels. Despite intense heat, the panels maintained their integrity, preventing heat transfer and internal damage.

External

Internal – showing opposite side of PIR panels on date of fire.



Overview of Composite Panel Systems

Composite panels remain a focal point in fire safety, especially for older buildings and high-risk environments. Below is a summary of key panel types, fire risks, and insurance considerations.

Key Panel Types

1. **Polystyrene (EPS/XPS):**
    - **High Fire Risk**: Found in food industries and cold storage facilities over 30 years old, these panels are highly combustible and prone to rapid fire spread and collapse.
    - **Extinguishing Challenges**: Fires spread internally, making suppression with water or sprinklers difficult.
    - **Insurer Concerns**: Non-LPCB-approved and a leading cause of severe fires in high-risk areas like kitchens.
2. **Polyurethane (PUR):**
    - **Moderate Fire Resistance**: Performs similarly to PIR but emits toxic fumes (e.g., carbon monoxide, cyanide) when burning.
    - **Not LPCB Approved**: No longer widely used after 2004, but older buildings may still contain PUR panels.
3. **Polyisocyanurate (PIR):**
    - **Fire Resistant**: LPCB-approved with a Class O fire rating under BS476, PIR panels limit flame spread and form a protective carbonaceous char under fire conditions.
    - **Preferred Choice**: PIR is widely used in modern construction, except in high-risk areas such as kitchens.
4. **Quadcore and Mineral Fibre Panels:**
    - **Advanced Systems**: Quadcore offers high fire resistance with limited combustibility, while mineral fibre panels are non-combustible and meet stringent modern safety standards.

Fire Risk and Regulatory Concerns

- **Panel Identification**: Modern systems are marked with LPCB plaques, UV ink, or detailed in architects' drawings to aid risk assessment.
- **Firefighter Challenges**: Combustible core materials, particularly polystyrene, complicate fire suppression and can cause early building collapse.
- **External Cladding Risks**: The Fire Protection Association (FPA) highlights arson as the primary cause of cladding fires.
- **Grenfell Implications**: The Grenfell Tower tragedy emphasized flaws in design, installation, and regulation rather than insulation type alone. Regulatory responses include stricter building codes for external cladding, particularly for buildings over 18 meters tall.

Policy Liability – Composite Panel Warranties

Composite Panel Warranties aim to manage risks associated with panel systems, but the nuances of panel type (e.g., polystyrene, PUR, PIR) and location (internal vs. external) must be considered case-by-case.

Recent Professional Indemnity (PI) policies introduce Fire Safety Exclusions, broadly excluding claims arising from combustibility in cladding or composite panels. Unfortunately, these definitions often encompass all panel types, creating challenges for risk assessment and liability coverage.

Conclusion

In the conclusion section of the "*Technical Paper"*, I suggest Composite Panels be viewed in the context of the type of panel and risk or fire load involved and that again the big issue for Insurers has and always will be the existence of polystyrene panels but that the overriding message should be that each risk is assessed and indeed surveyed and considered on its own particular merits.

As indicated at the outset the paper/bulletin is very detailed and has taken a number of years to put together and if you would like a full copy of the paper, please email me at alan@fcla.ie

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