Beyond the Label

The question every technical audience should ask about combustible insulation claims

A TECHNICAL FIRE SAFETY REVIEW

FALSE MYTHS ABOUT COMBUSTIBLE INSULATION
A TECHNICAL REVIEW OF COMMON MISCONCEPTIONS IN FIRE SAFETY

Polymer-based insulation has long been an accepted choice in building facades and flat roofs. Fire performance is a property of the complete building assembly — insulation, protective layers, fixings, fire barriers and installation acting together — not of any single material in isolation. This review examines seven widely circulated claims about combustible insulation and separates the accurate core of each from the broader conclusion typically attached to it.

"Reaction to fire class" of a material is one input into fire safety — not the verdict on it.

Myth 1. Combustible materials result in unsafe buildings

Does the combustibility class of a single material determine whether a building is fire-safe?

Combustibility classes alone do not determine fire safety.

Under EN 13501-1[1], materials are classed A1–F by combustion and heat release. Even A1 materials aren't fully non-combustible — A1/2 mineral fibre insulation can smoulder, in some cases reaching 500°C or more[2]. Fire performance is a property of the complete assembly — insulation, protective layers, fixings, fire-stopping and installation quality — which is why full-scale system testing is required[3].

Myth 2. Plastic foam burns

Does the combustibility of plastic foam insulation make its use inherently hazardous?

Plastic foam can burn — but the assembly it is installed in may not.

Plastic foam ignites under a sufficiently powerful, sustained heat source, but insulation is rarely left exposed. In ETICS, insulated roofing and cladding, protective coatings, boards, membranes and fire-stopping restrict propagation, as full-scale testing confirms[3]. Evidence supports careful design — tested assemblies, surface protection, fire breaks and maintenance[4] — not a blanket conclusion against the material.

Myth 3. Non-combustible materials inherently confer fire resistance

Does a non-combustible insulation material inherently confer a fire-resistance rating?

Non-combustible products may offer comparatively little fire resistance.

Reaction to fire (EN 13501-1[1]) and fire resistance (EN 13501-2, tested to EN 1364/1365 or ISO 834[5]) are separately regulated properties; the latter is a time-based rating that applies only to a complete, tested assembly, never a raw material. Some A1/2 materials contribute little to an assembly's fire resistance, while some Euroclass B–F materials contribute a great deal.

Myth 4. Grenfell proves combustible insulation alone causes catastrophe

Did the Grenfell Tower fire establish that combustible insulation alone causes catastrophic spread?

The predominant cause of Grenfell's flame spread was the PE-cored ACM cladding, not the insulation.

Grenfell Tower's wall system combined PE-cored ACM cladding with combustible insulation, but the Inquiry found the PE core of the ACM panels — not the insulation — was the predominant cause of the speed and extent of flame spread[6]. MHCLG testing[7] and further research[8,9] show the outcome would have been the same with non-combustible insulation, a finding echoed by the Valencia high-rise fire of 22 February 2024.

Myth 5. Combustible insulation produces toxic smoke

Does non-combustible insulation produce less toxic smoke, making constructions inherently safer?

All fires produce toxic smoke; this is not defined by insulation combustibility.

Smoke toxicity depends on the materials burning, their configuration, proximity to other combustibles, and ventilation conditions — not simply on whether insulation is combustible. In most fires, the bulk of early-stage hazard comes from room contents and decoration[10], not the building fabric or any insulation within it.

Myth 6. Flame retardants make insulation toxic by default

Does the need for flame retardants make combustible plastic-based insulation inherently problematic?

Risk depends on the specific chemistry, not the mere presence of a flame retardant.

Some legacy halogenated retardants, such as HBCDD, have been substantially restricted under the Stockholm Convention[11] and largely superseded by other chemistries. Toxicological risk depends on the specific compound, its persistence and bioaccumulation potential — not on the fact that a flame retardant is present.

Myth 7. Installation of PV panels on roofs results in a higher fire risk

Does combining photovoltaic panels with combustible insulation constitute a major, insulation-driven fire risk?

Added risk is inherently due to the PV system — the insulation can be irrelevant.

Most PV-related fires originate from electrical faults, DC-side connector or arc faults, and installation defects — not from the insulation or substrate beneath the panels. Roof fire performance depends on the overall build-up and any mitigation layer present[12]. Evidence[13–19] shows flat roofs with combustible insulation, properly protected, can perform as well as or better than roofs insulated with some A1 materials.

Endnotes

1. EN 13501-1: Fire classification of construction products — Reaction to fire.

2. Leppanen & Malaska (2019), Smouldering combustion of mineral wool insulation in chimney penetrations. (source)

3. BS 8414-1/2; EN 13785-1/2 — fire performance/reaction-to-fire test methods for facades and cladding systems.

4. McLaggan et al. (2021), Fire performance assessment of façade systems. (source)

5. EN 13501-2: Fire resistance classification; test methods EN 1364, EN 1365, ISO 834.

6. Grenfell Tower Inquiry, Phase 1 and Phase 2 Reports.

7. UK MHCLG, ACM cladding fire test reports. (source)

8. Guillaume et al. (2019, 2020), Reconstruction of the Grenfell Tower fire, Parts 3–4, Fire and Materials. (source)

9. OFR (2025), Fire safety: smoke and toxicity. (source)

10. Stockholm Convention on Persistent Organic Pollutants — HBCDD listing.

11. Jomaas & Kristensen (2018), Fire behaviour of flat roofs with multiple PV panels, Fire Technology. (source)

12. Kingspan (2025), PU Europe (2022), and KIWA BDA (2025) large-scale fire test reports and white papers on flat roofs combining PV systems with PIR, EPS and mineral wool insulation.

Further study

- SFPE Handbook of Fire Protection Engineering
- International Building Code (IBC)
- ISO 9705: Full-Scale Room Fire Test
- FM Global Property Loss Prevention Data Sheets
- EU Fire Safety Guide, Modern Building Alliance
- DBI, Large-scale tests of flame spread on roof build-ups with PV systems, Phases I–II and White Paper (2025–2026)

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