

FALSE MYTHS ABOUT COMBUSTIBLE INSULATION

The question every technical audience should ask about combustible insulation claims

Beyond the Label

Polymer-based insulation materials have been an accepted insulation choice in building facades and flat roofs for decades. This follows the principle of the seven layers of fire safety in buildings, where all safety layers are considered, ignition sources are separated, and installations are correctly detailed. The ultimate issue is the fire performance of the complete end-use system, not materials in isolation.

Most people assume a material's combustibility tells the whole story. It doesn't. Fire performance is an emergent property of the complete assembled system — insulation, protective layers, fixings, fire barriers, and installation acting together — not a property of any single component considered on its own. That distinction is the one that most often goes unexamined.

This review examines seven of the most widely circulated claims about combustible insulation, tests each against the standards and incident investigations behind it, and separates the accurate core of each statement 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

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

THE FACT

Under EN 13501-1¹, construction materials are classed from A1 to F, with each class permitting greater flame spread and heat release. A1/A2 materials do not sustain combustion; B–F materials can ignite and burn under the right exposure.

Euroclass	Reaction to fire
A1	Non-combustible; no contribution to fire
A2	Very limited contribution to fire
B	Combustible; very limited contribution
C	Combustible; limited contribution
D	Combustible; medium contribution
E	Combustible; high contribution
F	Easily flammable; no performance determined

The fire performance of a wall, roof, or floor is not a property of any single material. It is a property of the complete assembly: the insulation, the protective layers around it, the fixings, the fire-stopping details, and the installation quality all interact. That is precisely why full-scale, system-level testing is required² alongside — and independently of — the reaction-to-fire class of any one component. A combustible insulation core inside a tested, certified, well-detailed assembly is a different proposition from the same material left exposed.

MYTH 2

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

THE FACT

It is correct and uncontested that plastic-based foam insulation will ignite and sustain combustion when directly exposed to flame for a sufficient duration. However, insulation in buildings is rarely exposed. In external insulation systems, insulated roofing, and insulated cladding, the insulating material is enclosed by a protective coating, board, membrane, cladding layer, or fire stopping that restricts and limits surface flame spread. Full-scale fire testing of insulated systems² confirms this.

Research does not support a blanket conclusion that plastic insulation automatically causes uncontrolled fire to spread. It supports careful design: tested assemblies, robust surface protection, fire breaks and compartments, ignition-source control, and maintenance³.

MYTH 3

Does a non-combustible insulation material inherently confer a fire-resistance rating on the element it's installed in?

THE FACT

This conflates two separately regulated properties. Reaction to fire (EN 13501-1) describes how a material behaves when directly exposed to fire: ignitability, flame spread, heat release, and smoke. Fire resistance (EN 13501-2, tested under EN 1364, EN 1365, or ISO 834)⁴ is a time-based rating (for example, EI 90) that applies only to a complete, tested assembly — never to a raw material in isolation.

Some materials labelled "non-combustible insulation" smoulder — and smouldering is a form of dangerously slow combustion. "Based on reaction to fire performance, mineral wool is typically classified as a non-combustible material and in European standards it belongs to category Euroclass A1. However, mineral wool insulation products contain organic material, which smoulders and generates heat at temperatures between 200°C and 500°C"⁵.

The term "non-combustible insulation" does not, by itself, carry a fire-resistance rating; that rating belongs to a specific tested construction product that includes the insulation alongside its other layers and fixings. Saying a material "acts as a fire barrier for 90 minutes" conflates reaction-to-fire with fire resistance — two properties, two standards, two test methods.

MYTH 4

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

THE FACT

It is accurate that Grenfell Tower's refurbished wall system combined PE-core cladding panels with combustible insulation, consistent with the Grenfell Tower Inquiry's published findings. However, the Inquiry found that the predominant cause of the fire spreading was combustion of the PE core of the ACM panels — not combustion of the insulation⁶.

The UK's Ministry of Housing, Communities and Local Government (MHCLG) testing⁷ and other research^{8,9} have shown that, had the insulation been non-combustible, the result would likely have been the same — evident in a fire incident at a high-rise building in Valencia, Spain, on 22 February 2024.

The Grenfell Tower Inquiry report described a chain of interacting failures, not a single cause: the cladding panel choice, the "stay put" directive, the specific insulation and its behaviour, absent or inadequate cavity fire barriers, misrepresentation in product testing and certification, failures in building-control review, and wider organisational failures in risk assessment and management.

MYTH 5

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

THE FACT

Combustion toxicity is a legitimate concern. The amount of toxic fumes generated depends on several factors: the quantity of material burning, its configuration, the proximity of other combustibles, and ventilation conditions. The concentration of smoke gases depends on the volume of the compartments into which combustion products accumulate.

In most cases, the bulk of the early-stage fire hazard comes from combustion of room contents, occupant goods, and floor, wall, and ceiling decoration¹⁰ — not construction or insulation materials.

Smoke production is inherent in any fire scenario. Assessing the hazard posed by burning a specific material requires comparing products with differing compositions, burning behaviours, and environments — a task currently beyond the state of the art in fire science, and further complicated by the fact that finished products, not raw materials, are what actually burns.

MYTH 6

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

THE FACT

Most plastic-based insulation materials include flame retardants to meet fire classification requirements. Historically this often meant halogenated compounds; some, such as HBCDD, have since been substantially restricted under the Stockholm Convention on Persistent Organic Pollutants¹¹ and largely superseded by other chemistries, including polymeric and non-halogenated formulations that vary by product generation and region.

The presence of a flame retardant does not, by itself, establish that a product is environmentally or toxicologically problematic. The impact depends on the specific compound, its persistence, its bioaccumulation potential, and its current regulatory status. Lumping all flame retardants into a single hazardous category ignores important differences — and the progress made in replacing legacy substances that are now largely restricted or discontinued.

MYTH 7

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

THE FACT

PV systems on roofs introduce new and complex fire safety considerations — but they can be used in a tested roof system, in some cases protected by appropriate membranes. A PV array creates a cavity between panel and roof that supports heat feedback and heat build-up beneath the panel; the fire performance of any roof depends on its build-up and the presence of a mitigation layer.

In a peer-reviewed Fire Technology study, Kristensen and Jomaas tested flat-roof mock-ups with six PV panels and found fire spread beneath the PV array in all four tests, but no self-sustained fire spread beyond the PV-covered area¹².

Incident data show most PV-related fires originate from electrical faults, DC-side connector failures, DC arc faults, and installation defects — poor cabling, faulty mounting, or defective inverters — rather than from the insulation or substrate beneath the panels.

TALK TO US

If your organisation works with fire performance, building envelopes, or construction-product regulation, we'd like to hear from you. Get in touch to discuss membership or technical collaboration with the Modern Building Alliance.

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1. EN 13501-1: Fire classification of construction products and building elements — Reaction to fire.
2. BS 8414-1/2: Fire performance of external cladding systems; EN 13785-1/2: Reaction-to-fire tests for façades — Intermediate/large-scale test methods.
3. McLaggen, M. et al. (2021) Towards a better understanding of fire performance assessment of façade systems: Current situation and a proposed new assessment framework.
4. EN 13501-2: Fire classification of construction products — Fire resistance; test methods EN 1364, EN 1365, ISO 834.
5. Lepoänen, P. and Malaska, M. (2019) Experimental Study on the Smouldering Combustion of Mineral Wool Insulation in Chimney Penetrations.
6. Grenfell Tower Inquiry, Phase 1 and Phase 2 Reports.
7. UK Government: Aluminium composite material cladding — ACM fire test reports. gov.uk/guidance/aluminium-composite-material-cladding
8. Guillaume, E. et al. (2019) Reconstruction of the Grenfell Tower fire. Part 3 — Numerical simulation: contribution to understanding fire propagation and behaviour during vertical fire spread. Fire and Materials 44(1):35–57. DOI:10.1002/fam.2763.
9. Guillaume, E. (2020) Reconstruction of the Grenfell Tower fire — Part 4: contribution to understanding fire propagation and behaviour during horizontal fire spread. Fire and Materials 44(8):1072–1099. DOI:10.1002/fam.2911.
10. OFR (2025) Research and analysis: Fire safety — smoke and toxicity.
11. Stockholm Convention on Persistent Organic Pollutants — HBCDD listing.

12. Jomaas, G. and Kristensen, J. (2018) Experimental Study of the Fire Behaviour of Flat Roof Constructions with multiple Photovoltaic (PV) panels. *Fire Technology*. DOI:10.1007/s10694-018-0772-5.

SFPE Handbook of Fire Protection Engineering.

International Building Code (IBC).

ISO 9705: Full-Scale Room Fire Tests.

FM Global Property Loss Prevention Data Sheets.

EU Fire Safety Guide, Modern Building Alliance.

PU Europe, "PU Europe Factsheet #24: Fire performance of thermal insulation products in end-use conditions," Jun. 2022.

Kingspan Insulation B.V., "The Performance of Two Dutch Flat Roof Constructions in the Event of a Fire in a PV System — A White Paper," Jan. 2025.

KIWA BDA, "Test reports 25L0053/1 and 25L0198/2 — large-scale fire tests on flat roof systems with EPS and MWR insulation.

DBI, "Large-Scale Tests of Flame Spread on Roof Build-Ups with PV Systems" — White Paper SIEC2'006.

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