“STACKING” FIRE CLASSIFICATIONS IS NOT VALID

Why façade fire safety must always be assessed as a complete system
In façade engineering, fire safety is often oversimplified. Materials are individually tested, assigned to a fire classification, and then assumed to perform equally well when combined into a façade assembly.

That assumption is incorrect.
Fire classification is **not a material property** — it is a **system property**.

At TWEHA®, we believe façade fire safety should be approached realistically, based on actual construction behavior rather than isolated laboratory assumptions.
The SBI classification of adhesive systems
The TWEHA® adhesive systems are classified according to the SBI test (Single Burning Item Test – EN 13501-1) as: **B-s1, d0**
This classification demonstrates that the adhesive system has a very limited contribution to fire growth, low smoke production, and no flaming droplets under the specific conditions of the SBI test.
However, the SBI test only evaluates how a material behaves when exposed to radiant heat from the front side. It does **not** assess:

- fire spread within ventilated cavities,
- behavior around window frames or façade penetrations,
- edge exposure conditions,
- interaction between multiple façade components,
- or structural behavior during prolonged fire exposure.

Façade fires are far more complex.

A façade is never just one material
Modern ventilated façade systems consist of multiple interacting components:

- cladding panels,
- adhesives,
- insulation,
- subframes,
- membranes,
- fixings,
- and ventilated cavities.

Each component influences the fire behavior of the entire façade construction.
This means that combining materials with good individual fire classifications does **not** automatically result in a façade system with the same classification.

“Stacking” classifications is therefore not valid.

For example:

- a cladding panel with Class A performance,
- installed on combustible insulation,
- combined with a timber subframe,
- may ultimately result in an assembly performing only at Class C or D level.

This is particularly relevant for:

- timber frame constructions,
- HSB elements,
- combustible insulation systems,
- and lightweight façade structures.

Real façade performance requires full-scale testing

To properly evaluate façade fire behavior, the complete assembly must be tested as a system.

One of the most recognized large-scale façade fire tests is: BS 8414

This test evaluates:

- vertical fire spread,
- cavity fire propagation,
- thermal behavior,
- and system integrity under realistic fire exposure.

Proven performance: TWEHA® StoneMate tested successfully

In 2024, a ceramic façade system incorporating the TWEHA® StoneMate adhesive technology was tested according to BS 8414 by the Fire Protection Association.

The results demonstrated that the façade construction satisfied the performance criteria of the standard.

This confirms an important principle: **façade fire safety depends on the behavior of the complete construction — not on isolated product classifications.**

The hidden risk: fire inside the ventilated cavity

In practice, façade fire scenarios are often more severe than standardized tests predict.

One of the most critical factors is fire propagation inside the ventilated cavity.

Surface fire spread can often be detected and extinguished relatively quickly.

Fire developing behind the cladding is far more dangerous because it remains hidden while continuing to spread vertically.

Open joints, cavity geometry, airflow, membranes, insulation type, and subframe materials all influence this behavior.

This is why relying solely on SBI classifications creates a false sense of security.

Real fires behave differently than laboratory tests

Even when a façade system successfully passes BS 8414, actual fire scenarios may still differ significantly.

Real-world fires can generate:

- higher thermal loads,
- longer exposure durations,
- faster cavity temperatures,
- and unexpected structural deformation.

For example:

- aluminum framing may lose strength or melt earlier,
- mechanical fixings may deform,
- and unsupported façade sections may behave differently than during testing.

Testing does not eliminate risk — but it dramatically improves understanding and reduces uncertainty.

What about the adhesive?

A common question concerns the contribution of adhesives to façade fire development.

In practice, the influence of the adhesive bead is extremely limited.

Why?

Because:

- the adhesive quantity is relatively small,
- it is confined between panel and substrate,
- and it is not directly exposed to oxygen-rich combustion conditions.

In many real fire scenarios, the cladding material or supporting structure fails before the adhesive system itself becomes relevant.

Photographic evidence from a bonded façade fire in 2006 clearly demonstrated this phenomenon:

the façade panels failed, while the adhesive bond near the timber substructure largely remained intact.

Stable cladding systems improve fire safety

Ventilated façade systems finished with relatively non-combustible cladding panels can significantly improve façade fire performance.

Certain ceramic and mineral-based cladding panels remain mechanically stable for extended periods during fire exposure. In many cases, panels only detach once the supporting structure becomes severely compromised.

This behavior is fundamentally different from more combustible façade materials, which may accelerate flame spread and system failure.

The conclusion

Fire safety in façades cannot be reduced to individual product classifications.

A façade is a completely engineered system in which:

- cladding,
- adhesive,
- insulation,
- substructure,
- membranes,
- and cavity detailing

all interact under fire conditions.

Therefore:

“STACKING” FIRE CLASSIFICATIONS IS NOT VALID.

Only full-system assessment and realistic testing can provide meaningful insight into façade fire behavior.

At TWEHA®, we continue to invest in realistic testing, technical validation, and engineered façade solutions that contribute to safer and more reliable building envelopes.

TWEHA®, 2026