

HOW RELIABLE IS ADHESIVE BONDING FOR VENTILATED FAÇADES

Discover what determines the long-term safety of bonded façades, from wind loads and temperature to surface preparation, ageing, fire performance and installation quality.

Gluing Façades – How Reliable Is It, Really?

When a façade panel falls from a building, the consequences can be serious. The concern of building owners, engineers and contractors is therefore entirely understandable. Façade safety should never be taken for granted.

However, a detached panel does not automatically prove that adhesive façade bonding is unreliable. It proves that one or more parts of the façade system did not perform as intended.

The decisive question is not simply: Was the panel glued or mechanically fixed?

The right question is: Was the complete façade system correctly assessed, engineered, installed and controlled?

A reliable bonded façade is not created by applying a bead of adhesive and hoping for the best. It is an engineered connection in which the panel, adhesive, supporting structure, surface preparation, joint geometry, environmental conditions and installation process must all work together.

A fallen panel is evidence—but not yet a diagnosis

When a panel detaches from a wind-exposed corner of a building, it may appear logical to conclude that wind caused the failure. Wind suction may certainly have been the load that triggered the incident, but it does not explain why the connection was unable to resist that load.

A proper investigation must examine the actual failure mechanism:

- Did the adhesive fail within its own mass?
- Did it detach from the panel or supporting profile?
- Did a coating, mesh or backing layer separate from the panel?
- Was the adhesive bead too narrow, too thin or interrupted?
- Was the surface contaminated or insufficiently prepared?
- Was the adhesive applied outside its permitted open-time?
- Was the panel positioned after skin formation had already started?
- Was the substructure correctly designed for the local wind load?
- Could the panel and supporting profiles move without creating unwanted stress?

The condition of the failure surfaces often provides more information than photographs of the fallen panel. Adhesive remaining on only one side usually indicates a surface-preparation

or compatibility issues. When a coating or backing layer has detached, the weakness may be within the façade panel rather than in the adhesive.

Without this analysis, blaming “the glue” is technically premature.

Bonded façades are recognized engineered systems

Adhesive fixing of external wall cladding is not an experimental installation method.

European Assessment Document **EAD 090097-00-0404** specifically addresses external wall cladding kits glued to a supporting frame.

The assessment framework covers much more than the initial strength of a freshly cured adhesive. It includes wind-suction resistance, tensile and shear performance, cyclic loading, creep, water exposure, high humidity, salt exposure, temperature conditioning, freeze-thaw resistance and other durability influences. Wind resistance must be calculated and validated by testing, including assessment of the mechanically weakest relevant configuration.

This is an important distinction.

A professionally engineered façade-bonding system is not based solely on the strength shown in a product datasheet. Its design values must account for ageing, environmental exposure, load duration, temperature and statistical variation.

Weather conditions must be controlled—not ignored

It is correct that adhesive application depends on environmental conditions. But that does not make the system unreliable. It means those conditions must be measured and managed. Bonding should not take place on wet, frozen, dirty or condensing surfaces. The substrate temperature must remain safely above the dew point, the prescribed application-temperature range must be respected, and the panel must be installed within the applicable open time.

Humidity itself is not automatically a problem. Many modern one-component façade adhesives cure through atmospheric moisture. What matters is the combination of:

- ambient temperature;
- relative humidity;
- substrate temperature;
- dew point;
- surface condition;
- curing time;
- protection from direct rain during application.

A rainy climate therefore does not automatically exclude adhesive bonding. An uncontrolled or wet bonding surface does.

The same principle applies to mechanical fixing. A rivet or screw is not automatically safe simply because it is mechanical. Its performance still depends on correct material selection, hole dimensions, edge distances, fixing pattern, corrosion resistance, substructure design and installation quality.

No façade system is independent of workmanship.

Bonding requires skilled and controlled installation

The idea that “anyone can glue a panel” is one of the greatest misconceptions surrounding bonded façades.

A reliable bonded connection requires trained installers who understand:

- material identification;
- surface preparation;
- cleaner and primer selection;
- adhesive compatibility;
- correct bead dimensions;
- the function of spacer tape;
- open time and working time;
- controlled panel positioning;
- temperature and dew-point measurement;
- inspection and documentation.

The adhesive bead must have the correct geometry and remain continuous over the calculated effective bonding length. With the TWEHA system, the spacer tape controls the final adhesive thickness while temporarily supporting the panel during curing. It is not a substitute for the adhesive and does not provide structural connection.

Application quality is therefore not a secondary consideration. It is part of the structural safety concept.

Factory quality control ensures that the adhesive leaving production has consistent properties. Site quality control ensures that those properties can be transferred into the finished façade.

Heavy panels are a design input—not an argument against bonding

Large-format ceramic, natural-stone or sintered-stone panels can weigh many tens of kilograms. That mass must be taken seriously, but it does not automatically make adhesive bonding unsuitable.

Panel weight is known and can be calculated. It produces a long-term shear load that must be transferred through the adhesive beads to the supporting profiles. The bead dimensions, effective bonding length, number of supporting profiles and project design values must be selected accordingly.

Modern assessment procedures specifically include shear-creep testing under the combined influence of heat, humidity and constant dead load. This addresses the concern that a heavy panel could gradually move over time.

The correct conclusion is therefore not: Heavy panels should never be bonded.
It is: Heavy panels should only be bonded using a system that has been tested, calculated and approved for the specific panel, substrate, dimensions and exposure conditions.

The same requirement applies to mechanical systems. Heavy panels also place significant loads on anchors, rails, clips, undercut fasteners and panel fixing points.

Temperature performance cannot be reduced to one Tg value

The mechanical properties of polymer-based adhesives change with temperature. That is neither unexpected nor ignored in professional façade engineering.

However, referring to a generic glass-transition temperature of “façade adhesives” is too simplistic. Different adhesive technologies have different chemical structures and temperature-dependent behavior. A generic Tg range cannot be used to predict the performance of every silicone, polyurethane, hybrid-polymer or SMP adhesive system.

The relevant question is not whether material properties change with temperature. The relevant question is whether the **tested performance at the applicable temperature remains sufficient for the calculated load.**

EAD 090097 includes testing at elevated and reduced temperatures. It identifies +60 °C as a reference high temperature for ventilated façades, with +80 °C considered for dark, sun-exposed materials and higher temperatures for non-ventilated applications. Low-temperature assessment may extend to –20 °C or –40 °C, depending on the intended geographical use.

TWEHA façade adhesives are elastically curing structural bonding products—not thermoplastic hot-melt adhesives. They do not simply liquefy because a dark façade becomes warm in the sun.

Temperature effects must be included in testing and design, but they should not be used as a generic argument that all bonded façades become unsafe during warm weather.

Fire performance belongs to the complete façade system

Fire safety must always be taken seriously, but photographs from a fire test rarely tell the complete technical story.

Reaction to fire, flame spread, cavity behavior and panel retention are different performance characteristics. Results depend on the panel material, insulation, cavity dimensions, fire barriers, supporting structure, fixing arrangement and exact test configuration.

The European assessment framework requires the reaction-to-fire performance of the components and, where necessary, the assembled kit in its end-use configuration to be assessed. The type and quantity of adhesive, cladding, substructure and supplementary fixings are all part of that evaluation.

A panel that moves or falls during a severe full-scale fire test does not, by itself, establish that the adhesive was the first or governing failure. The applicable test method, exposure time, acceptance criteria and post-test investigation must all be considered. Fire performance is a property of the façade assembly—not of one isolated cartridge of adhesive.

Additional rivets do not explain the original failure

Installing supplementary rivets after a panel has fallen may be an understandable temporary safety measure. However, it does not establish why the original connection failed.

Adding mechanical fixings without engineering review can also change:

- the load distribution;
- the panel's thermal movement;
- the stress around drilled holes;
- the interaction between fixed and sliding points;
- the way wind loads are transferred to the substructure.

Remediation should therefore begin with investigation, not assumption. Only after the failure mechanism has been identified can an effective and technically justified repair strategy be developed.

What makes a bonded façade reliable?

Long-term safety depends on a controlled chain of decisions:

1. The actual façade panel and supporting profile must be identified and assessed.
2. Adhesion tests must represent the real production surface—not a specially prepared laboratory sample.
3. Wind pressure, wind suction, panel weight and profile spacing must be calculated.
4. The supporting structure must accommodate panel and building movements.
5. The specified cleaner, surface treatment and adhesive must be used.
6. The adhesive bead must have the correct width, thickness and effective length.
7. Temperature, humidity, dew point and open time must be controlled.
8. Installation must be performed by trained personnel.
9. Critical application data must be inspected and documented.

When one of these links is missing, the risk increases—regardless of whether the panel is bonded, riveted, screwed, clipped or anchored.

Do not trust the adhesive—verify the system

European assessment methods for bonded façade kits are based on an intended working life of 25 years when the kit is correctly designed and installed. The actual service life can be longer, but it always remains dependent on design, execution, exposure and maintenance. At TWEHA, we do not ask architects, contractors or building owners simply to “trust the glue”.

We support façade bonding with:

- verified substrate compatibility;
- representative adhesion testing;
- defined design values;

- controlled adhesive geometry;
- detailed application instructions;
- technical project support;
- training and documentation.

Because an adhesive product alone does not create a safe façade.

A complete, tested and correctly applied bonding system does.

So, how reliable is façade bonding?

A properly engineered and applied bond façade system can provide a safe, durable and highly reliable connection—even for large panels and demanding exposure conditions.

An incorrectly designed or poorly applied system can fail.

The same is true for mechanical fixing.

The real choice is therefore not between “safe mechanical fixing” and “uncertain adhesive bonding”. It is between a **controlled engineered façade system** and an uncontrolled one.

Reliable façade bonding is not a matter of belief. It is a matter of testing, calculation, application quality and verifiable process control.

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