

CORRECT APPLICATION DETERMINES THE QUALITY OF A BONDED FAÇADE

Discover why substrate condition, climate, adhesive geometry, open time and on-site quality control determine the safety and durability of a bonded façade.

Correct Application Determines the Quality of a Bonded Façade

A high-quality, extensively tested adhesive system forms the technical foundation of a reliable façade connection. However, even the best product can only perform as intended when it is applied correctly.

At TWEHA®, adhesive systems are developed, manufactured and controlled under strictly managed conditions. Raw materials are carefully selected, production processes are monitored and finished products are thoroughly tested. In addition, system tests and project-specific adhesion tests determine whether the selected combination of façade panel, substructure and surface preparation is suitable.

However, the final quality of the façade is not determined solely in the laboratory or during production.

Performance is demonstrated through testing but achieved during application.

On site, product quality, material selection, weather conditions, façade design and installer workmanship all come together. Correct application is therefore not simply the final installation step. It is an essential part of the complete façade system.

Product Quality Forms the Technical Foundation

A consistently manufactured adhesive system with known mechanical properties is essential for a durable façade connection.

Production controls and approval tests provide information about properties such as:

- tensile and shear strength;
- elasticity;
- resistance to ageing;
- moisture resistance;
- performance at high and low temperatures;
- adhesion to specific substrates.

These results give architects, engineers, façade contractors and building owners confidence in the technical capabilities of the system.

However, test results always relate to defined materials and conditions. When the actual substrate, surface preparation or application differs from the tested configuration, the final performance may also change.

Product quality is therefore the starting point of a reliable façade, not the complete result.

Why Application Quality Is So Important

In a laboratory, almost all conditions can be controlled. The substrates are known, temperature and humidity are regulated, and the adhesive is applied according to a defined procedure.

Conditions on construction sites change continuously.

Typical influences include:

- changing temperatures;
- wind and direct sunlight;
- dust and contamination;
- condensation and rain;
- restricted access;
- time pressure;
- activities by other contractors;
- variations between production batches.

These factors can directly affect the quality of the adhesive connection.

An application error can limit the performance of even the best adhesive product.

Installation and on-site quality control must therefore be treated with the same level of attention as product development and laboratory testing.

A Durable Connection Starts with the Right Substrate

The substrate is the foundation of every adhesive connection. It must be sufficiently strong, stable, clean and dry.

Contaminants such as dust, grease, oil, condensation, release agents, production waxes and cleaning-product residues can reduce adhesion.

Surfaces that appear visually identical may still differ significantly from a technical perspective. These differences may result from:

- coatings and surface treatments;
- protective layers;
- mesh backings and resin layers;
- manufacturing processes;
- raw material and production batches;
- storage and transport;
- weather exposure and ageing.

The surface may look clean while still being unsuitable for durable bonding.

It is therefore essential to verify that the façade panels delivered to site correspond with the material used during the adhesion test.

For example, a test performed on an abraded laboratory specimen cannot automatically be considered representative of an untreated or differently coated production surface.

Surface Preparation Is Part of the System

Correct surface preparation ensures that the adhesive makes direct contact with a stable and suitable bonding surface.

Depending on the material, preparation may include:

- cleaning;
- mechanical preparation;
- removal of a weak surface layer;
- application of an approved surface enhancer.

Each step has a specific purpose.

Cleaning removes contamination. Mechanical preparation can remove an unstable surface layer and increase the effective bonding area. A surface enhancer can improve surface energy, adhesion or moisture resistance.

However, incorrect preparation can create a weak intermediate layer.

Common risks include:

- residual sanding dust;
- use of an unsuitable cleaning agent;
- contaminated cleaning cloths;
- insufficient evaporation or drying time;
- renewed contamination after cleaning;
- touching prepared surfaces with bare hands;
- application outside the permitted temperature range.

The adhesive application process therefore begins with the assessment and preparation of the bonding surfaces.

Controlling Temperature, Humidity and Dew Point

Environmental conditions directly influence the application, open time and curing of the façade adhesive.

Air temperature alone is not sufficient. The temperature of the façade panel and supporting structure must also be measured.

After a cold night, an aluminum profile may be significantly colder than the surrounding air. When the profile temperature is close to the dew point, an almost invisible layer of condensation can form.

Bonding to a damp surface can seriously affect adhesion.

During application, the substrate temperature must therefore remain sufficiently above the calculated dew point. Within the TWEHA® system, the substrate must be at least 3 °C above the dew point.

Temperature and humidity also influence processing:

- high temperatures can shorten the open-time;
- wind and direct sunlight can accelerate skin formation;
- curing is slower at low temperatures;
- low relative humidity can delay moisture curing.

The actual site conditions therefore determine the installation sequence, working speed and amount of adhesive that can safely be applied in advance.

The Adhesive Bead Is a Structural Component

Façade bonding is not simply about applying adhesive. The shape, position, continuity and final dimensions of the adhesive bead are all critical.

Within the TWEHA® system, a triangular adhesive bead of approximately 8 × 8 mm is applied. During panel installation, it is compressed in a controlled manner to a final cross-section of approximately 12 × 3 mm.

TWEHA® Tape controls the nominal adhesive thickness of 3 mm.

This geometry is required to:

- transfer wind pressure and wind suction;
- support the dead weight of the façade panel;
- accommodate movement between the panel and substructure;
- distribute stress evenly;
- prevent direct contact between the panel and profile;
- create a durable and elastic connection.

A bead that is too narrow, too thin or interrupted can significantly reduce the available load-bearing capacity.

The adhesive geometry must therefore correspond with the façade design and structural calculations.

Why a 3 mm Adhesive Thickness Is Essential

Façade panels and substructures respond differently to temperature and moisture.

Aluminium, ceramics, natural stone, composites and fiber cement each have their own thermal expansion characteristics. This creates relative movement between the panel and supporting structure.

The elastic adhesive layer must be able to accommodate these movements.

An adhesive layer that is too thin has less deformation capacity and creates higher stress within the connection. A bead that is too thick or insufficiently compressed may affect panel alignment and load transfer.

The spacer tape:

- prevents excessive compression of the adhesive;
- creates a consistent final thickness;
- supports the panel during initial curing;
- helps create a reproducible connection.

However, the tape is not a structural fixing. Once the adhesive is fully cured, the loads are transferred through the adhesive connection.

The Open Time Must Not Be Exceeded

After the adhesive has been applied, the façade panel must be installed within the permitted open-time.

The available open time is influenced by:

- air and material temperatures;
- relative humidity;
- wind;
- direct sunlight;
- the length of the applied adhesive beads;
- working speed and accessibility.

At high temperatures or under strong air movement, skin may form more quickly on the adhesive surface. When the panel is installed after skin formation has started, the adhesive may no longer wet the surface sufficiently.

The adhesive may appear to have made contact, while the actual bond is inadequate.

Applying large quantities of adhesive in advance may appear efficient, but it increases the risk of exceeding the open-time.

Realistic work planning is therefore a technical part of the application process.

Controlled Compression of the Façade Panel

After the adhesive has been applied, the façade panel must be pressed evenly against the spacer tape.

This controlled movement compresses the triangular adhesive bead to its designed final dimensions. The panel must not be slid uncontrollably across the adhesive.

Sliding the panel can:

- displace the adhesive bead;
- locally reduce the bead width;
- create air pockets;
- decontaminated prepared surfaces;
- produce an inconsistent adhesive thickness.

Correct panel positioning ensures complete contact between the adhesive and façade panel without disturbing the designed geometry.

Curing Requires Time and Protection

TWEHA® façade adhesives cure through moisture. The curing process progresses from the outside towards the center of the adhesive bead.

The curing rate depends on:

- temperature;
- relative humidity;
- adhesive thickness;
- the connected materials;
- ventilation around the connection.

The connection therefore does not reach its full mechanical strength immediately after installation.

During the initial curing period, panels must be protected against:

- movement;
- pull-off forces;
- shocks and vibrations;
- temporary displacement;
- premature loading.

Wind, scaffolding activities, protective sheeting and work by other contractors can also affect a connection that has not yet fully cured.

Good site organization therefore protects both the construction schedule and the technical quality of the façade.

The Substructure Also Determines Façade Performance

A high-quality adhesive connection cannot compensate for an inadequately designed or installed substructure.

The supporting profiles must:

- have sufficient stiffness;
- be correctly aligned;
- be installed in the correct positions;
- provide sufficient width for both tape and adhesive;
- be properly connected to the load-bearing structure.

Profile spacing, panel layout, joints and movement gaps must also be coordinated with:

- panel dimensions;
- wind loading;
- dead weight;
- material movement;
- building deformation;
- installation tolerances.

A reliable bonded façade system can only be achieved when the design, substructure and adhesive connection are treated as one integrated system.

Adhesion Tests Must Be Representative

An adhesion test is only valuable when the test configuration represents the actual façade application.

It is not sufficient for the general material name to be the same. The following properties must also be considered:

- the exact rear surface of the façade panel;
- coating and surface treatment;
- production batch;
- cleaning procedure;
- mechanical preparation;
- selected surface enhancer;
- adhesive type;
- adhesive geometry;
- curing conditions;
- moisture and temperature exposure.

A positive result obtained on an ideal or specially prepared laboratory specimen cannot be applied to a different production surface without technical justification.

The purpose of testing is not simply to achieve a positive result. It is to predict the actual application reliably.

Quality Control During Installation

Production controls ensure the quality of the supplied adhesive. Adhesion and system tests demonstrate that the selected material combination is technically suitable.

The quality of the completed façade must then be inspected and documented during installation.

A practical quality control plan may include:

- verification of product names and batch numbers;
- inspection of expiry dates;
- recording of storage conditions;
- inspection of panel and profile surfaces;
- recording of air and material temperatures;
- monitoring of humidity and dew point;
- documentation of surface preparation;
- inspection of the nozzle and adhesive bead;
- verification of tape positioning;
- recording of application and installation times;
- visual inspection of critical connections;
- photographs of important installation stages;
- periodic adhesion tests;
- documentation of deviations and corrective actions.

This documentation makes the installation demonstrable, verifiable and traceable.

It protects the installer, façade contractor, client and building users.

The Installer Is Part of the Façade System

A professional façade bonding system consists of more than adhesive, cleaner and tape.

It is a combination of:

- engineering;
- material selection;
- representative testing;
- surface preparation;
- environmental conditions;
- adhesive application;
- panel installation;
- curing;
- inspection;
- documentation.

The installer therefore does more than apply adhesive.

The installer creates the structural connection on which the façade design, calculations and test results are based.

Training, clear work instructions, discipline and on-site guidance are therefore essential.

TWEHA® Supports the Complete Application Process

TWEHA® supplies high-quality, controlled adhesive systems for ventilated façade cladding. Our support extends far beyond product supply. TWEHA® assists architects, engineers, distributors, façade contractors and installers with:

- technical advice;
- project-specific adhesion testing;
- substrate and material assessment;
- application instructions;
- training;
- façade-design support;
- calculations;
- on-site installation guidance.

This creates a reliable link between a proven product and a professionally installed façade.

From a Tested System to a Durable Façade

Product quality, manufacturing controls and system testing form the technical basis of reliable façade bonding.

However, the final performance is created on the construction site.

The correct substrate, appropriate surface preparation, suitable environmental conditions, specified adhesive geometry, control of the open time and sufficient curing time all determine the result.

A high-quality product can only perform properly when it is applied correctly.

TWEHA® combines premium products with technical knowledge, project support and a controlled application process.

This is how a technically sound façade design becomes a durable, safe and reliable façade system.

TWEHA® – The Bonding People

The quality of a bonded façade is ultimately determined during application.

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