

WETTING / SURFACE TENSION – THE KEY TO RELIABLE ADHESION

Surface tension of the substrate plays a critical role in achieving durable and high-performance bonding.

At a microscopic level, surface tension is created by the attraction between molecules at the surface of a material. These molecules naturally pull toward each other, forming a “tight” surface layer. This physical behavior determines whether an adhesive can properly spread across the surface—an essential condition known as wetting.

Why Wetting Matters

Effective adhesion starts with proper wetting:

- When an adhesive spreads evenly across a surface, it creates maximum contact and optimal bonding.
- If it cannot spread, adhesion will be limited or may even fail.

A simple example illustrates this clearly:

- On clean glass (high surface tension), a drop of water spreads out completely.
- On plastic (low surface tension), the same drop beads up and remains in place.

This difference directly reflects how well an adhesive can bond to the surface.

Hidden Risks: Surface Contamination

In practice, façade materials are often affected by surface treatments or contaminants, such as:

- Mold release agents used during manufacturing
- Processing aids
- Protective foils applied during transport

These substances are intentionally designed to reduce surface tension, making materials easier to process or handle. However, they also reduce the chemical activity of the surface and must be removed prior to bonding.

Failure to do so can significantly compromise adhesion performance.

Material Compatibility

Good adhesion is achieved when:

The surface tension of the adhesive is lower than that of the substrate

TWEHA® adhesives, based on silane-modified polymers (SMP), are polar in nature and therefore exhibit relatively high surface energy. This ensures excellent adhesion to polar substrates, such as:

- Glass
- Metals
- Mineral-based panels

Challenges with Low-Energy Surfaces

Bonding becomes more critical when dealing with low surface tension (apolar) materials, including many plastics such as:

- Polyethylene (PE)
- Polypropylene (PP)
- Silicone-based materials
- Polytetrafluoroethylene (PTFE, e.g. Teflon™)

These materials inherently resist wetting, making reliable adhesion difficult without proper surface preparation or modification.

Simple On-Site Verification

Surface tension can be quickly assessed with a practical test:

- Apply a drop of demineralized water to the surface
- If the drop spreads: high surface tension → good adhesion potential
- If the drop beads up: low surface tension → critical bonding condition

TWEHA® Assurance

TWEHA® has extensively tested and validated substrate compatibility across a wide range of façade materials. Unless otherwise specified, bonding can be carried out directly using TWEHA® adhesive systems—without additional primers or surface modifications.

This ensures:

- Reliable adhesion performance
- Simplified application
- Proven durability in real-world conditions

In short: surface tension is not just a physical property—it is a decisive factor in achieving safe, durable, and predictable bonding performance.