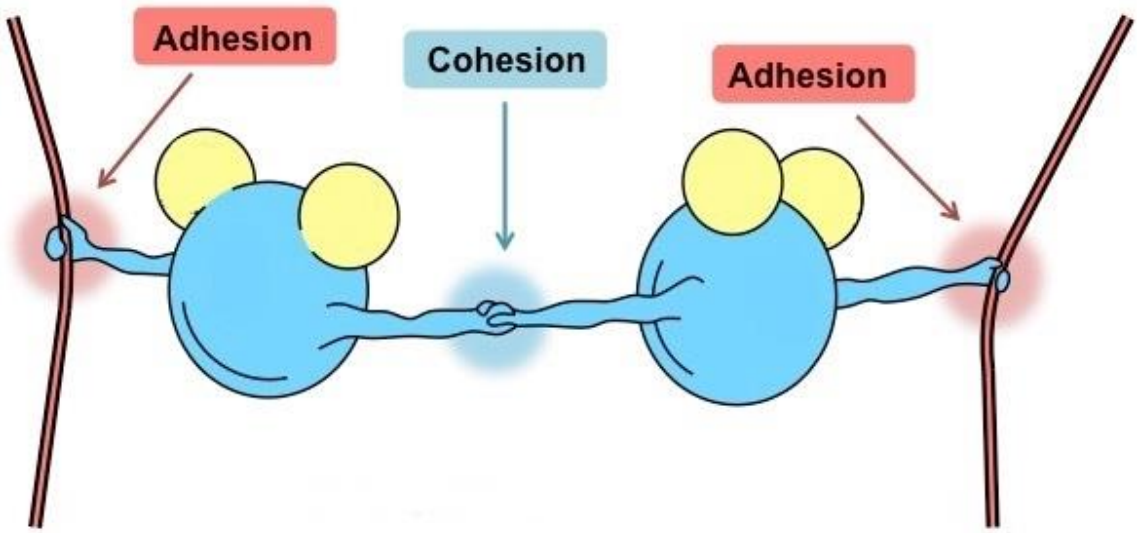
ADHESION AND COHESION EXPLAINED

Adhesion and cohesion are both based on the root word ‘hesion’, which is an equivalent to ‘stick’. They are nouns that describe a state of molecules sticking together.
The difference between them is that adhesion refers to the clinging of unlike molecules and cohesion refers to the clinging of like molecules.

Cohesion is the attraction of particles within the adhesive that holds the adhesive mass together. In other words the strength of the adhesive itself. A fixed fact.

Adhesion on the other hand, is variable as a result of the mutual attraction between unequal molecules that cause them to stick together. The defining feature is that adhesion occurs between two different substances. For example the adhesion of TWEHA’s Bonding Systems to the several types of façade panels.



TYPE OF FAILURE: COHESIVE
In case of a cohesive failure in the adhesive, there will still be an adhesive layer on the surface at both material sides. In that case there is an excessive tensile or shear stress, in which the breaking stress in the adhesive joint has proved to be the critical factor.

Because this material property does not depend on the features of the substrate, the characteristic strength can be determined on the basis of the manufacturer's declaration which is determined according EN 54505.

The calculation rule of the model must be such that the result corresponds to a probability of inferential statistic is < 5%, so that the required reliability is achieved (the minimum strength is determined from tests and then reduced by a material factor).

TYPE OF FAILURE: ADHESIVE

In the case of an adhesive break, the adherence of the adhesive to the substrate will prove to be the limiting factor and thus the weakest link in the connection.
The bond breaks are due to the fact that the physicochemical connections are not created between the adhesive and the substrate.

Even for the failure of the adhesive joint at the interface between the adhesive and the substrate, hardly any theoretical models are available. As long as there are no good models for adhesive collapse, the design philosophy is used, the starting point is that this collapsed shape may never occur.

Determination that an adhesive break does not occur can only be done with the help of tests. For this reason, the characteristic adherence strength must be determined for each type of substrate on the basis of a test series.

CONSEQUENTLY
A bond fails if either the adhesive separates from the substrate or the adhesive breaks apart. In cladding industry the adhesive strength of the adhesive must be firm enough so the cohesive strength of the bond fails before the adhesive one.

So, the effectiveness of a bonded connection is determined by the adhesion force on the substrate. In other words, the bonded connection must always collapse cohesively, a fixed value which can be used in static calculations.

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