

Corrosion-proof bonding of glass and metal

It is possible to attain long-term bonds of glass and metal using a polyurethane adhesive that has been optimized regarding hydrolysis and UV stability. These bonds can be substantially improved by atmospheric plasma pretreatment.

Adhesive bonds of glass and metal are used in many application fields: architecture, machinery, and facilities in the food industry, but also modern furniture designs, just to name a few examples.

Glass and stainless steel alike are materials of choice when clean surfaces, perfect hygiene or classy looks are critical. They maintain these qualities even over the course of multiple cleaning cycles.

Polyurethanes have excellent adhesive properties and are highly resistant against solvents, chemicals and atmospheric exposure. Their elasticity can be adjusted widely, enabling the mechanical properties of the bond to be perfectly adapted to the required strain and seam dimensions.

When an application-oriented test item (glass/stainless steel and borosilicate glass/stainless steel) is exposed to a tempered bath mixed of different cleaning agents over 24 hours, an accelerated aging process can be observed. Under low pH values, a bond seam with high water absorption can even lead to progressive glass corrosion.

Typical cleaning agents used in different combinations are alkaline agents (lyes), phosphoric agents, acetic agents, diluted acids, hydrogen peroxide (disinfection), sodium hypochlorite (mold), isopropanol, ethanol, acetone (against grease and fingerprints) and many more. According to the objective target, ionic or anionic tensides are added for heightened wettability and dirt dissolution.

In machinery and facilities, the adhesive bond may also be exposed to oil, grease or lubricants.

For testing, one basic and one acidic preparation were chosen respectively. Then, acetone was left to work as a solvent.

Although these test conditions may seem relatively extreme, in practice it is not uncommon for equally aggressive forces to be at work during cleaning procedures or in wet steam areas.

The tested adhesives were chosen from class 2K epoxy resin adhesives, cyanoacrylate adhesives, methyl methacrylate (MMA) adhesives, and polyurethane adhesives. Silicones were not tested.

Regarding accelerated atmospheric degradation, best test results were obtained with a 2K PUR system with low hydrolysis. Atmospheric plasma pretreatment of the glass surface proved to be the decisive factor.



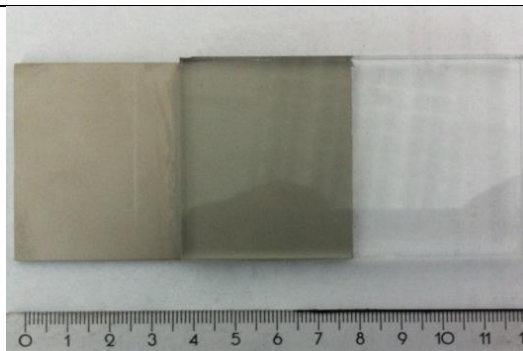
Surface treatment of a glass test item using piezo brush[®] PZ2. Treatment duration is ca. 5s/cm².



piezo brush[®] PZ2: Complete kit with handheld tool, nozzle caps and wall power supply



Picture of a typical metal-glass-bond



Test item for trial and shear tests

Teamwork with



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