Stick with it

Dr Detlef Heindl, Panacol, provides expertise on UV curing adhesives compatible with common sterilisation processes

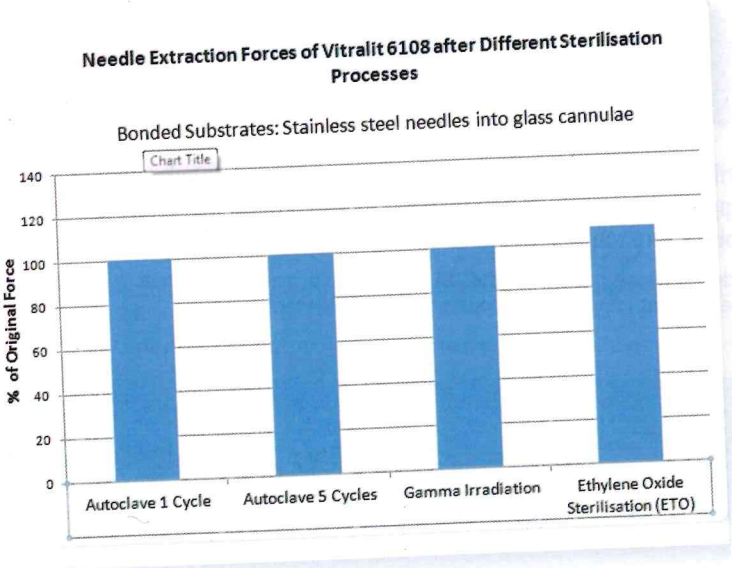
Adhesive technology can be a cost-effective solution to connect components for single use medical products. When bonding transparent or translucent substrates, using a UV curing acrylate adhesive has several advantages: They are easy to handle, can be quickly dispensed and if necessary, can also cure in seconds. In addition cured acrylates are compatible with common sterilisation processes such as autoclaving, gamma and ETO. They maintain high adhesion after sterilisation. Interestingly, in several tests electron beam sterilisation (not in the diagram below) has even improved the adhesion.

By sterilising and good preparation, acrylates can achieve significantly better bond strength

After curing, uv curing acrylate adhesives are very resistant to autoclave sterilisation, gamma irradiation and ETO treatment. Usually there is no reduction in bond strength at all. E-beam Sterilisation has proved to be especially effective, and with some acrylates improvements can be achieved, because of an increase in the degree of polymerisation of the chemistry. This means that invisible bonding, transparent acrylates have high strength, long lasting adhesion and good sealing properties, even after several cycles of sterilisation.

Especially non-polar substrates, mostly plastics such as polyethylene or polypropylene, and also steel, after a surface pre-treatment such as Corona or Plasma will often achieve a better and lasting bond. With a few acrylate adhesives you can achieve improvements in bond strength through pre treating the substrates by up to 50% increase.

Typical examples for the use of UV curing acrylate adhesive are bonding catheters, and lancets; also suction tubes, blood sugar metering or medicine holders, bonding to larynx heads or blood pumps and breathing masks.



Fast curing increases productivity

Acrylates are solvent-free, environmentally friendly and very well suited for manual and automatic production processes for high volume component manufacturing. As a single component system they are easy to handle. In many cases they are cured with LED light devices and wavelengths within visible light range - all within 10 seconds. The cold LED technology is especially important for bonding temperature-sensitive parts.

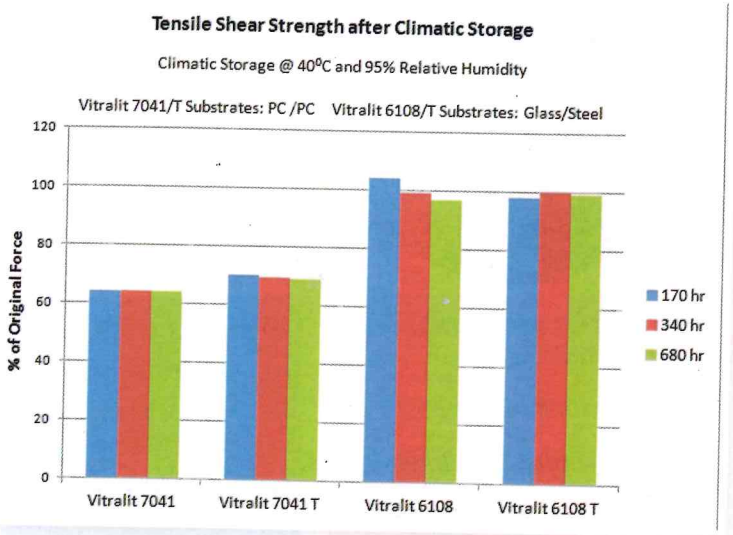
In principle, the curing time of an acrylate is between 0.5 and 60 seconds. For example, during the bonding of needles in syringes, then curing is significantly less than a second.

Despite a short cure time, a very high/ high mechanical strength is achievable ; it's worth noting the E-module. The E-module is a benchmark for the inner strength (cohesion) of a material, however it is dependent on the elasticity of the adhesive: the more elastic the adhesive and the higher the elasticity, the lower the module. That is why low modules do not necessarily mean poor mechanical properties.

Measuring the tensile bond strength under different climatic conditions

The bond strength of the substrates was investigated by measuring the tensile strength. Two flat samples were bonded to each other under different climatic storage conditions and pulled apart to the point of failure. The value of the required force is a measure of the adhesion of the adhesive. After 24-hour storage of the specimen in isopropyl alcohol or water, as well as under the influence of elevated temperature for a long time and humidity, the results are compared with values of unpolluted samples. In all cases there was no fall in bond strength or a only very small decrease.

Acrylates are ideal for transparent or translucent substrates such as glass and plastic, and are also ideal when bonding these substrates to metals.



Techsil offers a range of Vitralit acrylate adhesives from manufacturer Panacol, for many different applications. They are all USP VI and/or ISO 10993 certified.