

Hydrolysis, Aging Stability

Polyurethane is exposed to a natural aging process called hydrolysis.

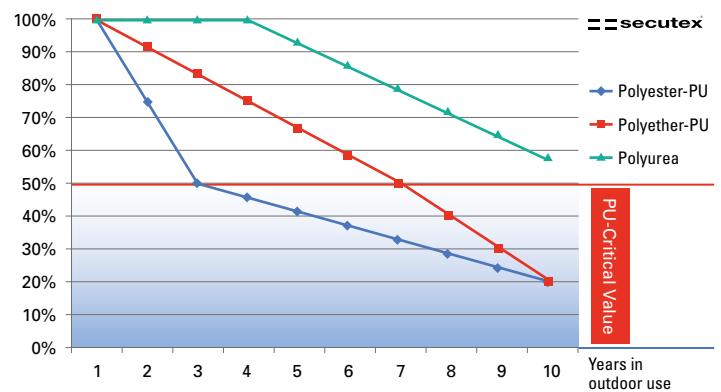
Hydrolysis in general is the decomposition of a chemical compound by reaction with water, by hydrolysis the molecules are broken down into their monomers. Hydrolysis is the chemical decomposition of the polyurethane polymer and the resulting material damage. In the final stage of hydrolysis, the polyurethane products lose their physical properties; the material partially cracks, appears oily and crumbles.

The coated lifting slings and other polyurethane products are often stored in closed storage rooms before use. These are usually places where there is greater humidity combined with higher temperatures, and there is no continuous exchange of air. And it is this „standing“ humidity that increases the hydrolysis process and makes these products age more rapidly, even if they are not used. This decomposition process is of course significantly faster in tropical and subtropical regions of the world, where it is usually warm and the regular humidity is high.

It is not possible to make any overall statements on the resistance to hydrolysis and aging. Weathering tests under real conditions would take far too long and would not be generally valid. The elastomers being tested therefore in a „Weather“ tester to a very high light load, combined with high humidity and higher temperature. The test samples will then be tested in a tensile test after a defined period of time. The results allow a general prognosis of the hydrolysis and ageing resistance.



Weather tester for testing polymers in combination with light, temperature and humidity



Polyester-based polyurethane

secutex offers three different elastomers for coating:

1. Polyester-based polyurethane

The two-component system is the result of the reaction between isocyanate and polyol. Polyester-based polyurethanes are not well resistant to hydrolysis, a polyether-based polyurethane is to be preferred. The resistance to oils, on the other hand, is quite good. By adding hydrolysis stabilizers and UV blockers, the aging process can be delayed but not completely stopped.

- Rather poor resistance to hydrolysis
- Relatively good resistance to oils

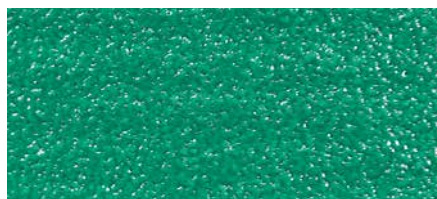


Polyether-based polyurethane

2. Polyether-based polyurethane

The two-component system is the result of the reaction between isocyanate and polyol. Polyether-based polyurethanes are relatively resistant to hydrolysis, but their resistance to oils is rather poor. By adding hydrolysis stabilizers and UV blockers, the aging process can be delayed but not completely stopped.

- Relatively good resistance to hydrolysis
- Rather poor resistance to oils



Polyurea

3. Polyurea

The two-component spray system is the result of the reaction between isocyanate compounds and aliphatic amines (and not between isocyanate and polyol as is the case with polyurethane). The components react very quickly to polyurea and have a good to very good chemical resistance as well as high elasticity and tear resistance. Polyurea has a high resistance to hydrolysis and aging and is therefore very good for outdoor use.

- Very good resistance to water, good hydrolysis resistance
- Very good resistance to a wide range of acids, alkalis and other chemicals
- Very good ageing resistance
- Very reactive, can therefore only be used as a spray system