Hydrolysis and its effects on Polyamide materials

Hydrolysis is a chemical decomposition process in which water splits the chemical bonds within a substance. Well known in biochemical processes (reduction of cellulose to component sugars) this chemical reaction can also break down several thermoplastic materials into their basic molecules.

The reason for this is a reversed synthesis process: Plastics formed through Polycondensation evolve from linking of many single elements (=monomers) to a large – polymeric – chain structure by a repeated condensation process (under separation of water and heat).

This formation process can be reversed when the materials are exposed to water and energy at the same time, e.g. in steam environment. The energy contained in the steam can split the chemical bonds of the polymer matrix while the available water in the air will allow the degradation of the material into its original substances.

The material degradation will result in brittleness of the products. Degradation can occur in a time span of between two months and more than a year, depending on the strength of specific influences in a certain application.

Polyamides are formed through Polycondensation. Therefore the use of Polyamide conduits in applications where high temperatures (80 – 100°C) and high humidity occur at the same time should be assessed critically.

Recommended materials for installations where such conditions prevail:

- Polypropylene (type LLPO, LL; attention to max. application temperature 90°C)
- PVDF (type PVDT) or PFA/TFA (type TEC)

In case of doubt please contact PMA Headquarters for further assessment and recommendation.