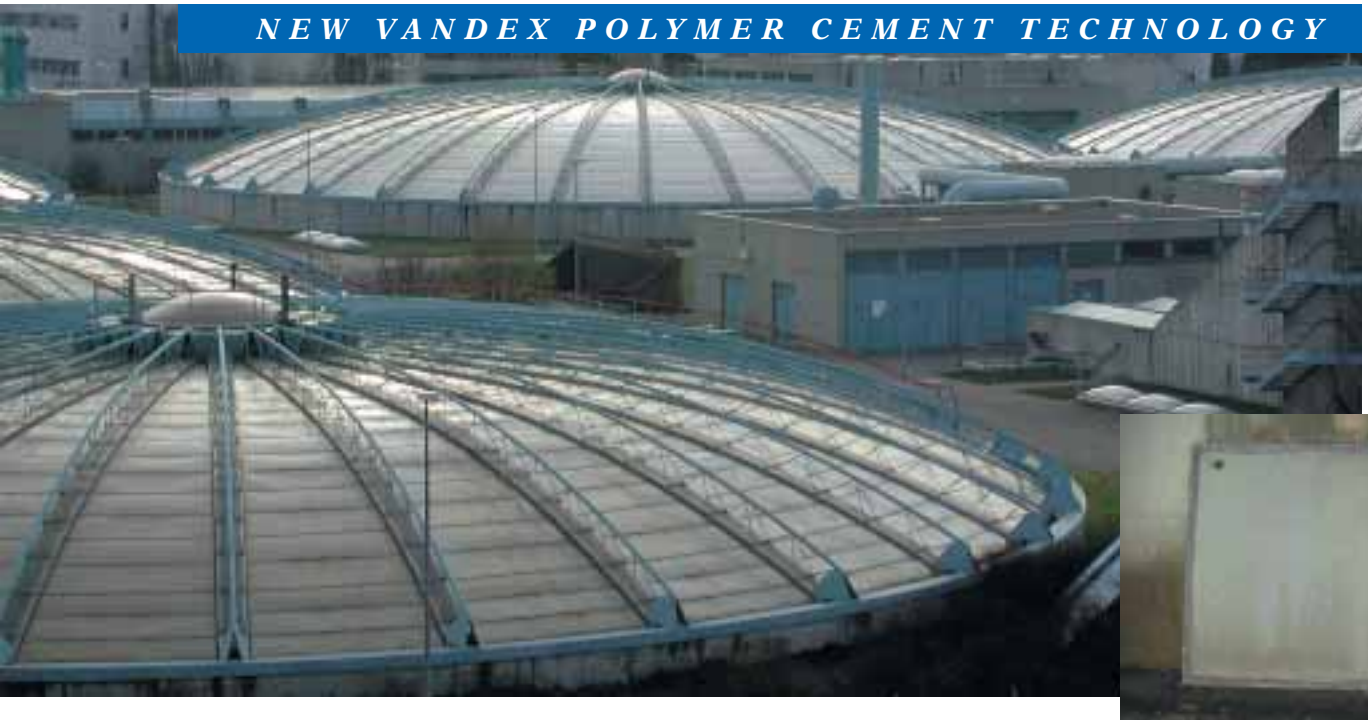

POLYMER CEMENT TECHNOLOGY AGAINST AGGRESSIVE SEWAGE

The treatment and processing of sewage is an undisputed necessity throughout the world. Due to the inconvenience caused by the smell of the sewage, the trend in design is towards closed facilities. This results in a new stress situation for the structures. In closed sewage tanks, an H_2S contaminated atmosphere develops. H_2S is generated by the bacteria "Thio Concretivorus", which feeds on the sewage sludge. The H_2S gas oxidises under the influence of oxygen to form sulphur trioxide (SO_3). This combines with condensed water on the concrete surface to form sulphuric acid (H_2SO_4) that attacks concrete. The bacteria that form the acid, survive in an environment with low pH-values.
The acid attack and the low pH-value of the condensed water, seriously damage concrete structures over the years. Protective coatings can effectively improve the situation.

Latest research in the field of polymer-modified, cementitious coatings has resulted in products that are able to withstand the attack and that can be applied easily to concrete in a damp environment. They can be considered for the refurbishment of old structures, as well as for preventive treatment for new structures.

TESTING

In addition to the internal testing with sulphuric acid and pH-values of 0 to 1, the resistance of the recently developed VANDEX POLYCEM Z coating has been evaluated through exposure to the ProRheno sewage treatment plant in Basle, Switzerland, which processes industrial and domestic sewage. Concrete specimens that have been coated with VANDEX POLYCEM Z have been exposed for 6 and 12 months to the tidal and gas zone of the final sedimentation tank. Measurements on the specimen are compared to reference specimens that have been stored in a climatic room at 25 °C/50% r. h.

HIGH RESISTANCE OF VANDEX POLYCEM Z

In the following the assessment of the accredited Swiss testing institute BBL: The tensile adhesive strength does not differ from the reference specimens. The water absorption is not higher than that of the reference specimens. There is a slight increase in the sulphate content on the surface. Inside the specimens, no increase in the sulphate content is however detectable.

A visual inspection of the specimens does not reveal any cracks, blisters or discolouration. Microorganisms cannot be detected. "The VANDEX POLYCEM Z coating shows a very high resistance against sulphur-containing compounds in water, and against sulphur containing gas compounds. Thus it is suitable for protective use in an environment with biogenic sulphuric acid attack."

SEWAGE		
Data	**Unit**	**Content**
Temperature	°C	22 – 35
pH-value	pH-value	4.0 – 5.5
NH_4^+	mg/l	25 – 65
Mg^{2+}	mg/l	220 – 450
SO_4^{2-}	mg/l	500 – 1250
Cl^-	mg/l	150 – 250

GAS ZONE		
Data	**Unit**	**Content**
Air humidity	Vol.%	78 – 92
Temperature	°C	22 – 35
H_2S concentration	mg/m³	5 – 25
SO_2 content	µg/m³	440 – 890
CO_2 content	µg/m³	0.1 – 0.2
NO_2 content	µg/m³	25 – 125
pH-value condensation water	pH-value	4.5 – 5.1