The decontamination and neutralization of acid and alkaline industrial effluents that are discharged into a general sewage system and outdoor water basins are carried out in special waste-treatment facilities. The inadequate efficiency of the operation of waste-treatment facilities leads to the contamination of rivers and lakes and causes intense corrosion and the premature failure of the equipment and building structures of both decontaminating systems and objects of production work. The main methods for treating sewage water are its physicochemical and biological treatment in the presence of organic substances. Sewage water is often delivered for biological treatment together with domestic sewage or industrial effluents that are easily oxidized biochemically. The majority of equipment used in these cases (industrial tanks, mixers, balancing reservoirs, settling ponds, neutralizing tanks, and pump basins) are made of reinforced concrete. The main causes of the early fracture and premature failure of this equipment are leakages of both the internal anticorrosive coating of a facility and its building. The operating practice of waste-treatment facilities showed that the causes of these defects may be errors introduced in their design and manufacture. In the design, as a rule, the specific features of equipment whose inner surface is subject to corrosion protection are not taken into account. Basic designs often provide for the use of conventional concrete without selecting the water-to-cement ratio, grade of concrete, or an analysis of its crack resistance. These factors are of particular significance for protecting equipment with film coatings and linings without a compensatory elastic underlayer. The studies carried out at the Research Institute of Reinforced Concrete and Concrete (NIIZhB) showed that anticorrosive coatings, including those formed by glass-reinforced plastics (based on perchlorovinyl, epoxy, and other resins) are susceptible to severe cracking with an opening width of cracks in concrete of more than 0.02–0.05 mm. This inevitably leads to the penetration of an aggressive environment into concrete, its corrosion failure, and the loss of the leak integrity in buildings. The examination of a number of failed reinforced-concrete waste-treatment facilities showed that the concrete of their bodies has cracks with a length of 3–15 cm and a depth of 1–2 cm. In some places of the bodies, through-the-thickness leaks were found. The crack formation is attributed to the effect of temperature differences and mechanical stresses on the concrete.

The most efficient method for protecting equipment and building structures from the impact of corrosive wastewater is the covering of their surface with anticorrosive compositions the choice of which depends on the chemical composition of industrial effluents, their temperature, the presence of abrasive inclusions, the design of waste-treatment facilities, and other factors specific to each individual case.

In the 1960s, the Giprokauchuk Institute developed a new method for the biological purification of sewage water with pH 2–3.5 from sulfur compounds. In connection with this, a demand arose for the anticorrosive protection of two aerotanks intended for treatment of the thiocol-production sewage water containing sodium sulfate, sulfuric acid, magnesium sulfate, and polythionates. In the capacity of a 2-mm-thick protective coating, an epoxy-resin based composition was used. After five months of operation, cracking of the coating was found in some places. The defects were eliminated by clearing the damaged areas and applying a composition similar to the basic coating. The aerotanks remained in use for 7 months (until a scheduled repair).

One of the causes of the failure of Dorr settling ponds (diameter up to 30 m) in some enterprises was crack formation under the acid-proof brick lining in

Sealing Properties Study of Sewage Facilities

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Abstract — Results of a study of the leak integrity of industrial reinforced-concrete waste-treatment facilities are presented. The main causes of their permeability are discussed and recommendations for increasing their service life are given.

Key words: liquid rubber mixtures, sealing of reinforced-concrete bodies of waste-treatment facilities, biological treatment of sewage water.

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One of the conditions for the reliable operation of waste-treatment facilities is the correct choice of protective coating. Taking into account these data, as well as domestic and foreign operating experience of protective coatings of waste-treatment facilities, we can recommend the use of an armored lining with an insulating underlayer based on polymer materials. For an armored lining, along with conventional acid-resistant and diabase tile, it is appropriate to use shaped objects...