

ANALYSIS OF CONCRETE CORROSION OF MANHOLE LOCATED NEAR SOURCE OF ODOROUS EMISSION

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Abstract

The problem of corrosion of sanitary sewer concrete concerns the elements located just behind the expansion well. Evolving odorigenic substances and bioaerosols spread in the sewage system, cause in adverse conditions both chemical and biological corrosion of concrete. The paper presents the results of tests of samples taken from the top concrete circle and from a corroded cast iron hatch of 7 years old manhole located below the expansion well. Well elements were subjected to a strong interaction of hydrogen sulphide, which average concentration in the sewage air, during an exemplary 84 hours was 29 ppm. Concrete was gelatinous fine with noticeable outer pellicular layer of 1 mm thick and the inner layer containing aggregates (grain < 1 cm). Sulfur oxidizing, sulfates reducing, Fe²⁺ oxidizing bacteria, aerobic heterotrophs, anaerobic heterotrophs, nitrifiers and denitrifiers were determined. In the concrete sample, no sulfate-reducing bacteria were detected under the film-like layer and in the cast-iron manhole material, while the hatch also did not contain anaerobic heterotrophs, nitrifying and denitrifying bacteria. The sulphate content in the concrete samples tested was very high, about 20% in the mass of concrete and 50% in the weight of the binder soluble in HCl. Microscopic investigations showed that the outer layer of the concrete was very rich in gypsum, and the pH of the aqueous extract was in the range of 7–8.

Keywords: Concrete; Cast iron; Sewage wells; Biodeterioration; Corrosion; Gypsum.