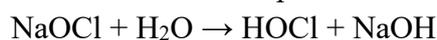


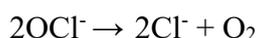
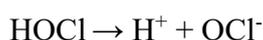
• *Corrosion of stainless steel elements in swimming pool building and method for improving construction durability*

Corrosion progress on railings made from the 316Ti (1.4571) and balcony cover plates made from 316L (1.4404) stainless steels in the swimming pool building appeared in the first month of usage. Corrosion was induced by hot air coming from the outlets of ventilation canal situated at the floor behind pool railings (Fig.1) and by salt aerosol deposition. Particles of aerosol carried by air stream into the ventilation inlets situated on the other pool side under the roof were deposited on stainless steel railings and plates (Fig. 2). Hot air coming from the ventilation increased rate of water evaporation from the railings and plates resulting corrosion agents concentration increase, up to the level at which stainless steel lost its resistance against pitting corrosion. High humidity at the pool surrounding was supporting corrosion process in spite of multiple air exchange.

Sodium hypochlorite having concentration of around 15% and 30-50% sulphuric acid (used for neutralisation of in situ formed NaOH) were automatic dosed into the swimming, whirl and other spa pools. Automatic control concentration of chlorine was equal to 0,3 – 0,5 mg/dm³. Sodium hypochlorite in water formed hypochlorous acid so that water was oxidized with simultaneous chlorine concentration increase as an effect of easy hypochlorous acid decomposition according to the chemical reactions presented below:



Hypochlorous acid HOCl presents higher activity compared to chlorine which concentration was controlled by electrochemical potential measurements. At pH above 7 hypochlorous acid dissociates into ions. The OCl⁻ ions are less active oxidizers and further decomposition to form chlorides and oxygen takes place:



Chlorine compounds that react with decomposition products of urea and creatinine introduced with human sweat and urine to water form volatile chloramines that have disinfection properties. Water aerosol with chlorides, hypochlorous acid, hypochlorous acid anions and chloramines creates very aggressive corrosion atmosphere that effects pitting corrosion of stainless steels. Intensity of stainless steel pitting corrosion is proportional to the concentration of chlorine compounds. To inhibit corrosion of metal constructions in natatoria stainless steels must be regularly flashed with water to prevent increase of solution concentration that effects corrosion. This necessary condition was completely impracticable within the pool building.

Other construction materials having high corrosion resistance against chlorides or alternative protection with paint coating having easily renewable outer layer were proposed to improve durability of the structures.

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Fig.1. Warm air coming into the building interior from the ventilation canal at the floor effected corrosion of 316Ti stainless steel barriers



Fig.2. Aerosol of chlorine compounds carried by air stream to the ventilation air exits effected corrosion of stainless steel plates and railings at the terrace



Fig.3. 316L stainless steel railings situated out of the air streams washed every day did not show any corrosion signs