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Study of waterproofing membranes used in civil construction to prevent corrosion induced by carbonation

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Reinforced concrete can suffer a significant reduction in durability when used under unfavorable exposure conditions. One of the main degradation mechanisms is corrosion induced by carbonation. This phenomenon occurs when atmospheric carbon dioxide penetrates the porous structure of concrete. Due to the alkaline nature of concrete, the steel covered by this material is protected from corrosion, since in this environment a film develops on the surface of the reinforced concrete, which consists of a layer of oxides with a protective function –a process referred to as passivation. When CO2 penetrates the porous structure of the concrete, it reacts with the calcium hydroxide leading to a decrease in pH, and as a result, the corrosion of steel commences. The need to develop efficient protection systems against carbonation by creating surface films that try to prevent the penetration of CO2 is in high demand.

The present work addresses the characterization of dense acrylic-based liquid membranes produced at COLALIZ, Lda. in terms of CO2 permeability.

Three different flat sheet dense membranes consisting of three layers were prepared using dope solutions provided by COLALIZ, Lda using a 250 µm casting knife and were characterized in terms of surface morphology by scanning electron microscopy (SEM), chemical composition by attenuated total reflection - fourier transform infrared (ATR-FTIR) spectroscopy as well as CO2 permeability by the time-lag method. For comparison purposes, a certified waterproofing membrane used in civil construction that is already on the market was also studied.

Results show that the permeabilities of the COLALIZ membranes vary between 33 and 77 Barrer, where the membrane already on the market has a value of 33 Barrer.ATR-FTIR confirmed that these membranes are produced from styrene acrylic resins with main peaks appearing at 1560 cm-1 ,1780 cm-1, and 3020 cm-1, specific for styrene and acrylic groups respectively.

Author: VIEIRA, Catarina (IST)

Co-author: FARIA, Monica

Presenter: FARIA, Monica

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