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# DISCUSSION OF PAPER TITLED "CHLORIDE THRESHOLDS IN MARINE CONCRETE" BY MICHAEL THOMAS

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The paper *Chloride Thresholds in Marine Concrete* by Michael Thomas presents data indicating that the chloride content corrosion threshold for reinforcing steel in concrete containing fly-ash is significantly lower than the corrosion threshold for reinforcing steel in normal portland cement concretes. This type of work is of extreme importance for life-time durability predictions, particularly for concretes with pozzolans. It is common to find specifications requiring permeability testing; however, as Thomas has determined, this is only a portion of the complex corrosion performance story.

The author used one cement with a $SO_3$ content of 2.53 percent and an alkali equivalent of 0.60. In the US it is common to find cements with significantly higher $SO_3$ and alkali contents. Further work should be conducted on different cements with high and low sulfate and alkali concentrations to determine if these have a significant affect on the chloride content corrosion threshold. One suspects that the alkali content of the concrete will control the pore-water pH. Thus, if the chloride/hydroxide ratio is meaningful it may be expected that high alkali cements would have a higher chloride corrosion threshold.

Using the data from Thomas for 30 percent replacement of fly-ash, and if one assumes that chloride ingress follows Fick's Law, it would be concluded that if the chloride threshold is reduced by half, the time-to-corrosion would be reduced by about 25 percent. Similarly, for concretes with the same time-to-corrosion, the diffusion coefficient of the fly-ash mixture would have to be 25 percent lower than the diffusion coefficient of the normal portland cement mixture.

Many researchers have been studying permeability; however, time-to-corrosion and time-to-cracking is the information that designers of concrete structures are seeking.

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