



Division of Building, Construction and Engineering

A Division of the Institute of Minerals, Energy & Construction

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AS:mlc
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Mr Rob Godson
General Manager
Xypex Marketing Services
PO Box 255
LAVINGTON NSW 2641

Dear Mr Godson,

I have now completed the investigation that was agreed on earlier by Mr R. Dolman of your company, regarding the effects of surface application of Xypex on concretes prone to alkali-aggregate reaction (AAR). This letter is written to inform you of the agreed procedure and the results obtained in the investigation.

A. Procedures

Because there has been concern that surface application of Xypex may allow alkali from Xypex to penetrate into concrete and exacerbate AAR, it was decided to make concrete prisms containing reactive aggregate but with insufficient amounts of alkali, and monitor their expansion behaviour after coating with Xypex according to the manufacturer's instructions.

Another use of Xypex appears to be for restricting or stopping water leakage in cracked concrete, by making it more impermeable. It was of interest to Mr Dolman to see the effects of Xypex application on concrete prisms which have AAR expansion potential (i.e., reactive aggregate plus sufficient alkali), and whether or not the application will stop or retard AAR expansion. For this purpose concrete prisms were made that contained a reactive aggregate and a boosted cement alkali level of 1.38% and were then coated with Xypex according to the manufacturer's instructions. It had been shown earlier that this mix causes considerable expansion of concrete prisms. Concrete prisms without Xypex coating were used as reference for similar prisms that received the coating.

B. Results

The attached figure shows the expansion curves for the various concrete prisms. Curve A shows that Xypex-coated concrete prisms that contained a reactive aggregate, but insufficient alkali did not expand as a result of the coating with Xypex. This shows that Xypex application could be regarded as safe under similar conditions.

Curve B shows that concrete prisms made with the reactive aggregate at the 1.38% alkali level expanded rapidly and cracked, and the expansion continued to increase up to the 1 year of monitoring (for this set of prisms, from a previous study, expansion measurements were made only for 1 year).

Curve C shows the expansion of the Xypex-coated concrete prisms which were otherwise similar to those for curve B. The coated prisms also expanded rapidly and cracked. This is because the prisms initially contained sufficient moisture for the reaction and expansion to take place. No other coating material would have stopped this initial phase of the reaction and expansion. After about 6 months these prisms were recoated with Xypex to seal the cracks. This would be similar to applying Xypex to a cracked structure. After this application the expansion appears to have slowed down considerably and curve C falls below curve B, showing approximately a 20% reduction in total expansion. This may mean that Xypex could have restricted the moisture supply to the interior of the prisms compared with the uncoated prisms.

It would have been informative to run other experiments, e.g., recoating the cracked prisms soon after the appearance of cracks and monitor their expansion behaviour, or coating a series of prisms with other materials and comparing them with Xypex-coated prisms. However, the restricted funds available for this work did not allow extra work to be undertaken.

C. Conclusions

From the limited work reported here it can be concluded that

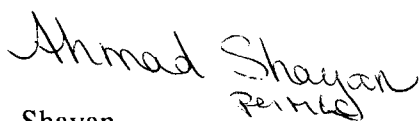
- 1) Coating a concrete surface with Xypex would not aggravate the AAR.
- 2) Coating a concrete surface which has cracked due to AAR and sealing the cracks does not aggravate AAR, and may reduce the extent of expansion.

D. Further Work

It is suggested to complement the available data by extending the scope of the investigation as mentioned earlier under "Results". It is also suggested that similar work be done on Xypex concentrate which is added to the concrete rather than being used as surface coating.

I would be pleased to discuss this matter with you if it is of interest to your company.

Yours sincerely,



A. Shayan
Principal Research Scientist

CONCRETE PRISMS MADE WITH
REACTIVE AGGREGATE (40°C, 100% R.H.)

