TECHNICAL REPORT

WATERPROOFING MATERIALS EVALUATION

BOND STRENGTH OF XYPEX CONCENTRATE AND MODIFIED TO A CONCRETE SUBSTRATE

Prepared for:

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Company Profile:

James Neill and Associates Limited provides consulting engineering and testing services to the building construction industry. Mr. Jim Neill, P.Eng , the company owner and principal, has 25 years of building materials experience, specializing in the evaluation and design of waterproofing systems for all types of structures. Dr. Patrick F. McGrath, P.Eng., completed a doctorate in the field of chloride diffusion and water permeability of concrete based products. Dr. McGrath has 13 years of experience in the field of materials evaluation and testing.

1. The test results contained in this Test Report refer exclusively to the described material(s) as submitted to James Neill and Associates Ltd.
2. The test results contained in this Test Report refer exclusively to methods of sample preparation and curing as described in this Test Report.
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1.0 INTRODUCTION

The objective of the test program was to measure the direct tensile bond strength of Xypex Concentrate and Modified when applied to a properly prepared concrete substrate. Preparation of the test samples was conducted by JNA. Bond pull off testing was conducted by Metro Testing Ltd.

2.0 PROCEDURE

Pre-cast concrete paving slabs (400 x 400 x 40 mm) were chosen for the bond test. The surface of the slabs was clean and contained open texturing which would facilitate good bond. The surface was free of laitence or other materials deleterious to bond. The slabs were saturated with water and brought to a saturated surface dry condition prior to applying the Xypex products.

Three combinations of Xypex product were mixed in accordance with the manufacturers' written instructions and applied to the concrete surface. The combinations were:

- Concentrate with Modified top-coat
- Modified only
- Concentrate only

Two replicate slabs were coated for each type of product application. Coating thickness was approximately 1.25 mm. Samples were moist cured by fog spray for 3 days after application and then allowed to cure in laboratory air (approximately 20 °C and 50% rh) for an additional 34 days at which time bond testing was completed (total coating age of 37 days).

Bond testing was completed using the test apparatus shown in Figure 1 and in Photograph 1. The center pull jack was calibrated against a testing machine in a Canadian Standards Association certified laboratory. Next, 100 x 100 x 10 mm steel plates were mounted to the test surface using epoxy adhesive. Once the epoxy gained sufficient strength, the test frame was mounted to the slab surface and the plate was pulled in tension to failure. The failure surface was examined and an estimate of the percent area of failure in each plane or bonding surface was made.

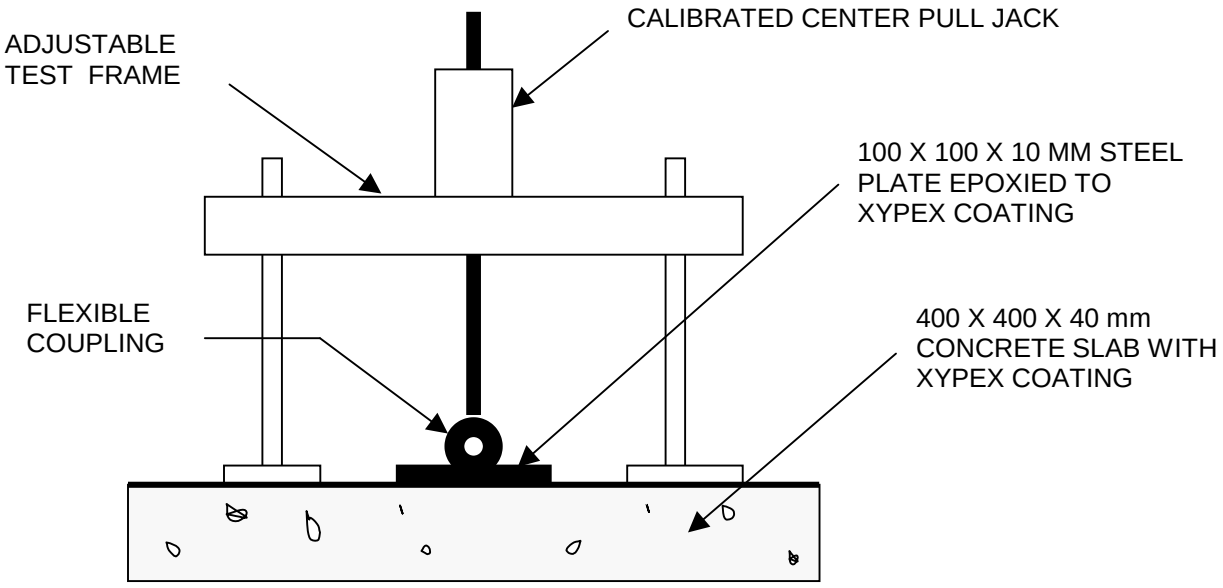

Figure 1: Bond Pull-off Test Apparatus.

Photograph 1: Bond Pull-off test apparatus and example of prepared concrete slabs.

3.0 TEST RESULTS

Bond pull-off testing was completed by Metro Testing Ltd (see attached Technical report). The location of the failure plane varied between the following locations:

- within the Xypex coating,
- at the interface between the coating and the concrete substrate,
- within the concrete substrate.

One sample (#206) failed prematurely due to breaking of the concrete slab in shear. Tensile bond strengths between replicates and between coating combinations were also variable. The variability suggests no clear difference between the three coating combinations. This variability is not unexpected for this type of test method and application.

4.0 CONCLUSIONS

1. The bond strength of the Xypex coatings is considered normal for a product of this nature. For comparison, the Canadian Standard CSA A233.1-94 "Concrete Materials and Methods of Concrete Construction" requires a minimum bond strength of 0.9 MPa for a concrete topping to concrete substrate.

2. Waterproofing materials such as Xypex Concentrate/Modified do not require high bond strength levels in order to function as designed and to waterproof the concrete substrate. The coating is merely a vehicle for the transference of the waterproofing chemicals into the concrete substrate. The measured bond strengths of Xypex Concentrate and Modified are sufficient to allow for this chemical diffusion to occur.

3. No clear difference between the bond strength of the three combinations of coatings was observed in the test data. The variability of the test results is considered normal for this type of test configuration and the type of materials tested.

4. It should be emphasized that the bond test was completed using laboratory quality control and a specific type of concrete surface. Concrete surface condition, preparation techniques and curing and environmental techniques are critical to bond strength and actual field strengths may vary from the results obtained in this study.

END OF REPORT