

PTL

CLIENT:

XYPEX CHEMICAL CORPORATION  
12520 VICKERS WAY  
RICHMOND, B.C., CANADA V6V 1H9

SUBJECT:

PERMEABILITY TEST  
OF XYPEX TREATED AND UNTREATED  
CONCRETE SAMPLES

PREPARED BY:

PACIFIC TESTING LABORATORIES  
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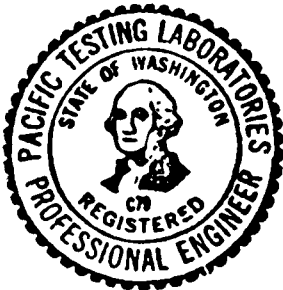
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PERMEABILITY TEST  
 OF TREATED AND UNTREATED  
 CONCRETE SAMPLES

SYNOPSIS

As requested, Pacific Testing Laboratories has completed permeability tests of Xypex treated and untreated concrete samples. Pacific Testing Laboratories meets the requirements of ASTM E-329 and is inspected periodically by the National Bureau of Standards. Test apparatus, provided by the Xypex Corporation, was modeled after the test apparatus described in the Corps. of Engineer's Test No. CRD-C 48-73, with several variations as described in the paragraphs below. Data obtained during the two month period from 6/28/82 to 9/3/82 has led to the conclusion that the XYPEX chemical treatment sealed the concrete and eliminated all measurable leakage of water at each phase of increased pressure, up to 175 psig (= 405 ft. of head), which was the maximum working capacity of the apparatus.

SAMPLE IDENTIFICATION

The four samples used for the permeability test were cast by Pacific Testing Laboratories at the Salmon Bay mixing plant, Seattle, on 6/8/82. Specimens were sampled according to ASTM standards and left on site to dry for twenty-four hours, then returned to the laboratory on 6/9/82. Upon agreement with the client, it was decided to use 2000 psi concrete due to its expected higher permeability and therefore expedited test results.

	<u>PER CUBIC YARD</u>
7/8 Inch Max, Aggregate	2,035 lbs.
Sand	1,355 lbs.
Type I Cement	470 pounds
Ad. Mix	—
Slump	3 inches
Sampling Conditions	70°, sunny
28 Day Breaking Strength (Average of three samples air dried for 28 days)	3,410 psi

SAMPLE PREPARATION

The four samples were soaked in water for one day after being returned to the lab. The samples were then towel dried and acid etched with muriatic acid diluted with water in an approximate one to four ratio (acid to water). One coat of XYPEX chemical coating was applied to the top halves of two of the samples. The XYPEX coating material had been previously obtained by Pacific Testing Laboratories from a local dealer (Sound Concrete Waterproofing of Tacoma) on 6/5/82. After waiting approximately one and one-half hours, a second coat of Xypex chemical coating was applied to the two samples. The samples were then given a fog spray (light, damp coating of water - no ponding) four times a day for the next four days (6/11/82 thru 6/14/82). Samples were then air dried at room temperature for four more days before starting test procedures.

## TEST METHODS AND PROCEDURES:

### A. Description of Test Apparatus

The apparatus used for the permeability test was supplied by Xypex Chemical Company. It consisted of a panel to control air pressure and flow, four steel pressure vessels to hold the four samples to be used and the necessary hoses, gauges, valves, and fittings to carry out the test (see Photograph on Page 5). The gauges used for this test were calibrated by Pacific Testing Laboratories and are traceable to the National Bureau of Standards. Pressurized air was directed through the control panel to each of the four pressure vessels. Each vessel contained a gauge to monitor the pressure, and outlet hoses and flasks for collecting and measuring water output (as will be described in Procedure section). The major differences in the test apparatus and procedures are as listed below:

#### XYPEX TEST

1. Steel cylinders were 6½ in. dia. × 6 in. high with samples approximately 6 in. dia. × 2 in. thick.
2. Apparatus was set up to measure water flow emitted from bottom side of concrete sample.
3. Pressure was increased as described in data sheets, from 10 psig to 175 psig over duration of test.
4. Polysulfide Sealant used to seal sample to cylinder.
5. Cork ring used on bottom plate to set sample on.

#### CORPS. OF ENGINEER'S TEST

1. Steel cylinders were made to accommodate samples 14½ in. dia. × 15 in. high.
2. Apparatus set up with standpipe to measure flow of water into concrete samples.
3. Pressure started at 100 psig for five minutes, then increased to 200 psig and left for duration of test.
4. Paraffin-rosin and asphalt mixtures used to seal sample to cylinder.
5. Plaster ring used on bottom plate to set sample on.

(See Photograph and Diagram page)

### B. Procedure

Per instructions supplied by Xypex, the four samples (two treated, two untreated) were placed in the four steel cylinders on 6/18/82. Each cylinder was equipped with several holes in the bottom plate.

These holes were surrounded by a cork ring, upon which the samples were placed. The treated samples were placed with the treated sides up. Sternson-Duoflex Self Leveling Two-Part Polysulfide Sealant (supplied by Xypex) was then poured in around the specimens until sealant ran up onto the top of the samples and up to the edge of a five inch diameter rubber "O" ring that had been placed on top of the cylinders, thus sealing off all voids around the samples. Specimens and sealant were then left to cure for seven days.

On 6/25/82 each cylinder was filled with water (at room temperature approx. 70°F) and each lid bolted down tightly. A cork gasket was placed between each lid and cylinder to assure that it was airtight. Pressurized air was then allowed into the cylinders and allowed to bear on the water contained in the cylinders. Pressure was set at 10 psig and the test begun. Water which was forced through the samples was trapped in flasks below, and measured as shown on the data sheets in the Data section of this report. Per instructions supplied by Mr. Mainwaring, the pressure was increased in all cylinders when the leakage approached zero for a twenty-four hour period for the treated samples. Pressures and water emitted for each cylinder sample is shown on the Data sheets. (Water measured after weekends, etc., was averaged over the days missed for the included graph.)

## TEST RESULTS

The data gathered during the permeability test showed three concrete samples (two untreated and one treated) exhibiting leakage starting at ten psig, and the fourth sample exhibiting leakage starting at 30 psig. The untreated samples showed some decrease in leakage during each phase of increased pressure, but did not, at any time, approach zero. The Xypex treated samples also exhibited leakage at each state of increased pressure, but consistently followed decreasing leakage patterns approaching zero.

It can therefore be stated that the Xypex chemical treatment sealing effect eliminates all measurable leakage.

END OF REPORT TEXT

U.S. ARMY CORPS OF ENGINEERS PERMEABILITY TEST CRD C-48-73

**XYPEX** has now been tested by a major United States testing laboratory with excellent results. Some of the more important points are:

- 1) The test was performed strictly according to Army Corps of Engineers Specification CRD C-48-73.
- 2) The testing laboratory, Pacific Testing Laboratory is a major testing lab inspected regularly by U.S. Bureau of Standards. As an example of the scope of Pacific Testing Laboratories' work, they were responsible for concrete and steel quality control testing for Washington Public Power System's nuclear stations at Hanford, Washington.
- 3) **The results of the tests showed that the XYPEX-treated samples totally sealed themselves by the process of catalytic crystallization up to a pressure of 405 feet of water head (175 PSI).** This was the maximum working pressure of the testing apparatus not the failure point of the **XYPEX**, therefore it is logical to assume that the **XYPEX** treatment will waterproof concrete to a pressure even higher than the 175 PSIG limit of the testing apparatus.
- 4) The concrete specimens were only 2 inches thick, and had a design strength of only 2000 PSI. Obviously, in terms of quality and thickness, this is far below the porosity and density of concrete that **XYPEX** would normally be applied to.
- 5) Only 2 coats of **XYPEX** were applied to the concrete for a total thickness of 2 millimeters (1 mm per coat). This is significantly thinner than our competitors' materials.
- 6) "The **XYPEX** treated samples also exhibited leakage at each stage of increased pressure but consistently followed decreasing leakage patterns approaching zero." This is an indicator of the permanent catalytic action of the **XYPEX** materials.

Proof positive of the unique **Concrete Waterproofing by Crystallization™** effect of **XYPEX®**. We are not aware of any other product on the market today that can match these impressive results.

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