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Laboratory Test Report

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Hydrostatic Pressure Test on Cast-in Place Concrete Construction Joints with "Bond Swelling" Waterstop

1 Introduction

The objective of this test is to determine the hydrostatic pressure capacity of **Bond Swelling** waterstop in preventing leakages along the construction joints of cast-in-place concrete. The test was designed to simulate jobsite conditions wherein the waterstop material was installed along the construction joints of a specially made concrete test chamber and subjected to controlled hydrostatic pressures in the laboratory.

2 Test Set-up Preparation

A cylindrical concrete test chamber Ø0.60 m in diameter and 1.00 m high was prepared using conventional construction techniques. The concrete test chamber had a wall thickness of 200 mm (8") and reinforced by two rows of Ø12 mm vertical steel bars with Ø9 mm stirrups spaced at 0.15 m. In preparing the concrete test chamber, the following design mix was implemented:

Mix proportion of concrete per cubic meter:

Cement Type 1 (Elephant Brand)	*350 kg*
Fine aggregate, sand	*720 kg*
Coarse aggregate, 3/8"	*1,100 kg*
Water, W/C (0.46)	*160 kg*

The above design mix had an average compressive strength of 292 kgf/cm^2 (4,153 psi) at curing age of 7 days.

The construction was carried out in three stages, i.e., base, lower wall and upper wall. Along each construction joint, a sample of **Bond Swelling** waterstop was installed using primer adhesive. The waterstop was installed following the general instructions set by the manufacturer.

After completion of the test set-up preparation, the concrete test chamber was filled with water and allowed to cure for 14 days prior to the hydrostatic pressure tests. The sketch of the completed hydrostatic pressure test set-up is shown on Figure 1.

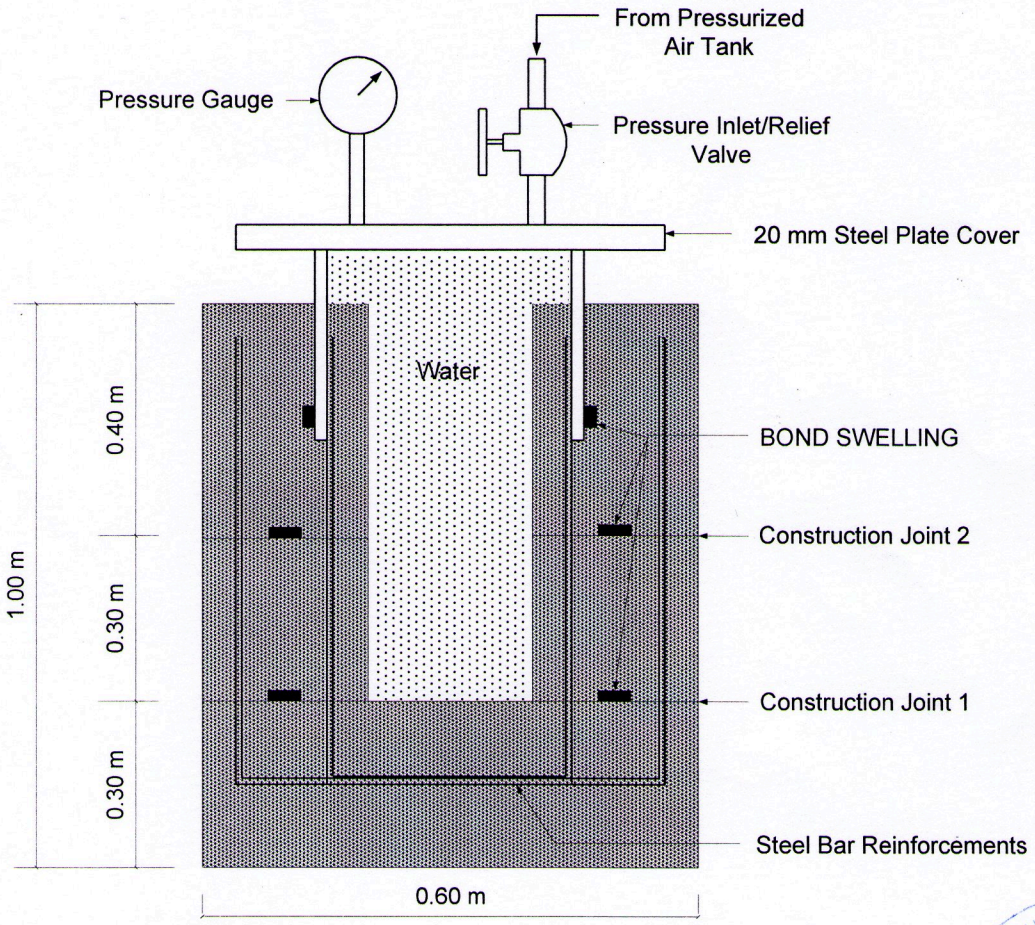

Figure 1. Sketch of the complete hydrostatic pressure test set-up

3 Hydrostatic Pressure Test

The hydrostatic pressure test was carried out by gradually supplying pressure inside the concrete test chamber at 10-psi increments every hour while monitoring the construction joints for any leakage. The pressure increments were continued until the waterstop material failed and leakages were detected along the construction joints.

4 Test Results

Time (hour)	Concrete Chamber Pressure (psi)	(m of water)	Remarks
8:10 hrs	30	21.12	no leakage at joints
9:10 hrs	40	28.17	no leakage at joints
10:10 hrs	50	35.21	no leakage at joints
11:10 hrs	60	42.25	no leakage at joints
12:10 hrs	70	49.30	no leakage at joints
13:10 hrs	80	56.34	no leakage at joints
14:10 hrs	90	63.38	no leakage at joints
15:10 hrs	100	70.43	no leakage at joints
16:10 hrs	110	77.47	no leakage at joints
16:55 hrs	120	84.51	Initial leakage at construction joint

5 Conclusion

Based from the sample tested and following the hydrostatic pressure test procedure described in this report, the **Bond Swelling** waterstop was found to be effective in preventing water intrusion along the construction joints of the concrete test chamber up to a maximum hydrostatic pressure of 110 psi (77.47 m of water).

Tests performed by:

3/9/09

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Note:
Results obtained from this test are based on the material submitted as sample and testing conditions and procedure described in this report. No statement can be made on the precision or bias of this test method in relation with the actual performance in the field.

Reference:

Robert L. Nelson and Associates Inc. Construction Materials Laboratory, "A Study to Determine the Effectiveness of Swellable Waterstop Barriers in Concrete Joints".

Photograph 1 - **Bond Swelling** installed along the construction joint of the concrete test chamber

Photograph 2 – Concrete test chamber at 60 psi pressure; no leakages along the construction joints were noted.

Photograph 3 – Concrete test chamber at 100 psi pressure; no leakages along the construction joints were noted.

Photograph 4 – Initial leakage along the construction joint at 120 psi pressure