

SUSPENDED SOLIDS REMOVAL TEST  
OF A 22 X 44 INCH STORMBASIN MODULAR  
STORMWATER FILTRATION SYSTEM

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# SUSPENDED SOLIDS REMOVAL EFFICIENCY TEST OF A 22 X 44 INCH STORMBASIN MODULAR STORMWATER FILTRATION SYSTEM

## 1.0 INTRODUCTION

Under a contract from Fabco Industries, Inc. (Fabco), a sediment removal efficiency test of a StormBasin Modular Stormwater Filtration System, using OK110 silica sand, was conducted at Alden Research Laboratory, Inc. (Alden), Holden, Massachusetts. The filtration system consisted of a 22 x 44 inch molded StormBasin unit which housed two (2) filter cartridges.

## 2.0 TEST FACILITY DESCRIPTION

A closed test loop, located in Alden's laboratory testing facility was used to facilitate the testing of the StormBasin unit. The test loop consisted of a 15 HP pump drawing water from a laboratory sump, 2-inch calibrated flow meter, influent piping, test unit, collection tank and effluent piping to return the water to the sump. The influent piping contained a sampling port approximately 3 ft upstream of the test unit for collecting the influent concentration samples and consisted of a 3-inch tee, pipe and quick-turn butterfly valve. A 3-inch tee was used for injecting the OK110 silica sand and was positioned 10 pipe diameters upstream of the sampling port to assure thorough mixing. The effluent concentration samples were collected at the free-discharge of the effluent piping.

## 3.0 INSTRUMENTATION AND MEASURING TECHNIQUES

### 3.1 Flow

The inflow to the test unit was set with a 2-inch butterfly valve and measured using an orifice plate fabricated and installed per ASME guidelines. The fabricated flow meter was calibrated in Alden's Calibration Department and is NIST traceable. The accuracy of the flow measurement is estimated at  $\pm 1\%$ . The differential head from the orifice meter was measured using a

Rosemount 0 to 250-inch Differential Pressure Cell, calibrated at the laboratory prior to testing. The test flow was averaged and recorded every 10 seconds throughout the duration of the test, using a computerized data acquisition program.

### 3.2 Temperature

Temperature measurements were achieved using an Omega DP41 temperature probe and readout device, which was calibrated at the laboratory prior to testing.

### 3.3 Pressure Head

The pressure head within the StormBasin unit was measured using a Druck, 2-psi single-ended pressure cell, which was calibrated at the laboratory prior to testing. Pressure readings were averaged and recorded every 10 seconds throughout the duration of the test, using a computerized data acquisition program.

### 3.4 Sediment Injection

OK110 silica sand was used to test the StormBasin unit. The test sand was introduced into the system using an Auger volumetric screw feeder, model VF-1. A ½ inch feed auger was driven with a variable speed drive, which was calibrated with the OK110 sand prior to testing. The feed unit contains a 1.5 cubic foot hopper at the upper end of the auger to provide a constant supply of dry test sand.

### 3.5 Sample Analysis

Samples of approximately 1 Liter were collected at each location in graduated 2-Liter beakers. The samples were weighed to the nearest 0.1gram, using an Ohaus 4000g x 0.1g digital scale, model SCD-010. Each sample was filtered through a Whatman 934-AH, 42 mm, 1.5-micron, glass microfiber filter paper. Each sediment sample was dried and then weighed to the nearest 0.0001gram, using an AND analytical balance, model ER-182A.

#### 4.0 TEST PROCEDURE

The Fabco StormBasin modular stormwater filtration system was tested at a flow of 60 gpm, with a sediment injection concentration of approximately 200 mg/L. The test was conducted under 100% filtration, with no flow going into bypass.

The system flow was set and allowed to stabilize. The OK110 test sand was introduced into the inflow line and three system volumes were allowed to pass through the system prior to the collection of samples. Four pairs of influent/effluent samples were collected, with the effluent samples taken 1 unit residence time after the influent sample. At the completion of the sample collections, the sediment injection was stopped and three system volumes were again passed through the unit.

The collected samples were filtered and analyzed in accordance with Method B, as described in ASTM Designation: D 3977-97 (Re-approved 2002), "Standard Test Methods for Determining Sediment Concentration in Water Samples."

## 5.0 RESULTS

The test was conducted at a nominal flow of 60 gpm. The average flow was 60.1 gpm, with a minimum and maximum-recorded flow of 58.2 gpm and 61.6 gpm, respectively. The recorded temperature was 60.0 degrees Fahrenheit.

The measured influent sediment concentrations ranged from 95.6 mg/L to 139.2 mg/L, with a mean concentration of 114.6 mg/L. The effluent concentrations ranged from 1.4 mg/L to 3.3 mg/L, with a mean concentration of 2.5 mg/L. The resulting sediment concentration removal efficiencies ranged from 96.6% to 99.0%, with a mean of 97.8%.

FABCO INDUSTRIES, INC.			
60 GPM SEDIMENT REMOVAL TEST			
OK110 SILICA SAND			
Red Tag Filters		0580026	0580031
Sample	Influent mg/L	Effluent mg/L	Efficiency (%)
1	108.6	2.1	<b>98.1</b>
2	115.2	3.3	<b>97.2</b>
3	139.2	1.4	<b>99.0</b>
4	95.6	3.3	<b>96.6</b>
<b>MEAN</b>	114.6	2.5	<b>97.8</b>