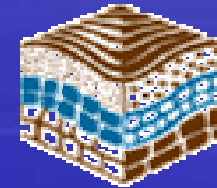


# PERMITTIVITY & HYDRULIC CONDUCTIVITY TESTING ON M10+50™



*All Testing done in conformance  
of ASTM D-4491 and D-5048*



Testing performed by

**GeoTesting  
Express**

*Alpharetta, GA*



Analysis Charts & Presentation:  
Thomas Stevens  
Andy Stevens  
Tarcisio Noguera

B.S.C.E.-PE, Col.-EIT-FL

# SOIL PERMITTIVITY TEST RESULTS USING M10+50™

## PERMITTIVITY

- Is the measure of the flow rate that passes in the normal direction through a geotextile or a geotextile + stabilizer.

## ASTM D 4491

Water Permeability of Geotextiles by  
Permittivity

## EQUIPMENT



# CONSTANT HEAD PERMITTIVITY TEST RESULTS

**CONSTANT HEAD PERMITTIVITY**  
ASTM D4491 <sup>(1)</sup>

Project Name: Enviroseal  
 Project Number: GTX-G0420  
 Client Project Number: \_\_\_\_\_  
 Client Site ID: \_\_\_\_\_  
 Sample Number: 7568 (geotextile)  
 Material Type: Amoco 0188 Non-woven Geotextile  
 Expected/Specified Value: \_\_\_\_\_  
 Date Received: \_\_\_\_\_

Spec. #	Flow Rate (gal/min/ft)	Permittivity (s <sup>-1</sup> )
A	115.2	1.54
B	102.3	1.37
C	130.4	1.74
D	106.4	1.42
Ave.	113.6	1.52
S.D.	12.5	0.17

Notes:  
Test results are corrected to 20°C

(1) Deviations:  
Laboratory Temperature at 22±1 °C, Laboratory Humidity at 50±15 %  
The Oxygen content of the test water is 0-2 ppm.

Tested By: SS Test Date: 3-5-03  
 Reviewed By: JW Review Date: 3/6/03

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**CONSTANT HEAD PERMITTIVITY**  
ASTM D4491 <sup>(1)</sup>

Project Name: Enviroseal  
 Project Number: GTX-G0420  
 Client Project Number: \_\_\_\_\_  
 Client Site ID: Enviroseal - M 10+50 Military Soil Stabilizer  
 Sample Number: 7568 (geotextile) w/ 7961 (Enviroseal)  
 Material Type: Amoco 0188 Non-woven Geotextile  
 Expected/Specified Value: \_\_\_\_\_  
 Date Received: \_\_\_\_\_

Spec. #	Flow Rate (gal/min/ft)	Permittivity (s <sup>-1</sup> )
A	17.39	0.2324
B	21.24	0.2839
C	26.86	0.3590
D	17.59	0.2351
Ave.	20.77	0.2776
S.D.	4.43	0.0592

Notes:  
Test results are corrected to 20°C

(1) Deviations:  
Laboratory Temperature at 22±1 °C, Laboratory Humidity at 50±15 %  
The Oxygen content of the test water is 0-2 ppm.

Tested By: SS Test Date: 3-5-03  
 Reviewed By: JW Review Date: 3/6/03

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# CONSTANT HEAD PERMITTIVITY TEST RESULTS

## CONSTANT HEAD PERMITTIVITY ASTM D4491 (1)

Project Name: Enviroseal  
 Project Number: GTX-G0420  
 Client Project Number: \_\_\_\_\_  
 Client Site ID: \_\_\_\_\_  
 Sample Number: 7774 (geotextile)  
 Material Type: Amoco 2006 Woven Geotextile  
 Expected/Specified Value: \_\_\_\_\_  
 Date Received: \_\_\_\_\_

Spec. #	Flow Rate (gal/min/ft <sup>2</sup> )	Permittivity (s <sup>-1</sup> )
A	4.3	0.06
B	3.9	0.05
C	4.3	0.06
D	4.5	0.06
Ave.	4.3	0.06
S.D.	0.3	0.00

Notes:  
 Test results are corrected to 20°C

(1) Deviations:  
 Laboratory Temperature at 22±3 °C; Laboratory Humidity at 80±5 %  
 The Oxygen content of the test water is 6±2 ppm.

Tested By: SS Test Date: 12-4-02  
 Reviewed By: JW Review Date: 3/6/03

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## CONSTANT HEAD PERMITTIVITY ASTM D4491 (1)

Project Name: Enviroseal  
 Project Number: GTX-G0420  
 Client Project Number: \_\_\_\_\_  
 Client Site ID: Enviroseal - M 10+50 Military Soil Stabilizer  
 Sample Number: 7774 (geotextile) w/ 7961 (Enviroseal)  
 Material Type: Amoco 2006 Woven Geotextile  
 Expected/Specified Value: \_\_\_\_\_  
 Date Received: \_\_\_\_\_

Spec. #	Flow Rate (gal/min/ft <sup>2</sup> )	Permittivity (s <sup>-1</sup> )
A	0.30	0.0040
B	0.31	0.0042
C	0.06	0.0008
D	0.26	0.0035
Ave.	0.23	0.0031
S.D.	0.12	0.0016

Notes:  
 Test results are corrected to 20°C

(1) Deviations:  
 Laboratory Temperature at 22±3 °C; Laboratory Humidity at 80±5 %  
 The Oxygen content of the test water is 6±2 ppm.

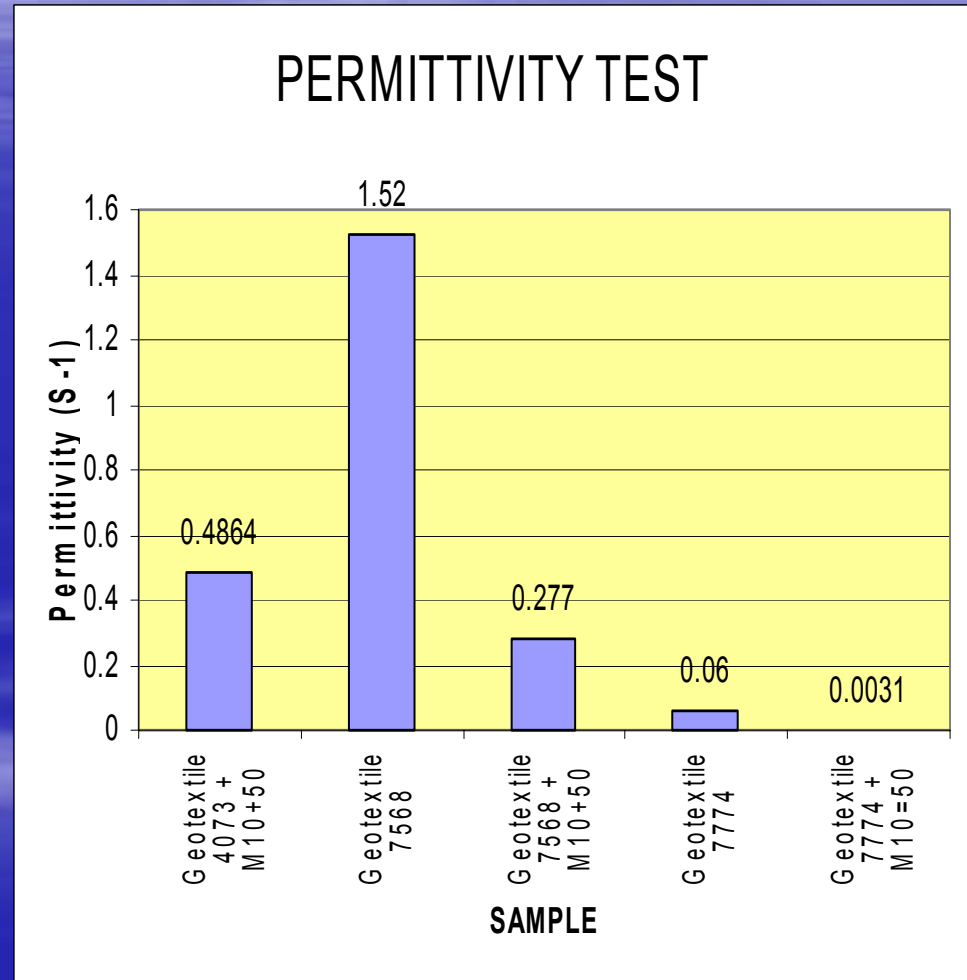
Tested By: SS Test Date: 3-4-03  
 Reviewed By: JW Review Date: 3/6/03

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# RESULTS & INTERPRETATION

## GENERAL INFORMATION

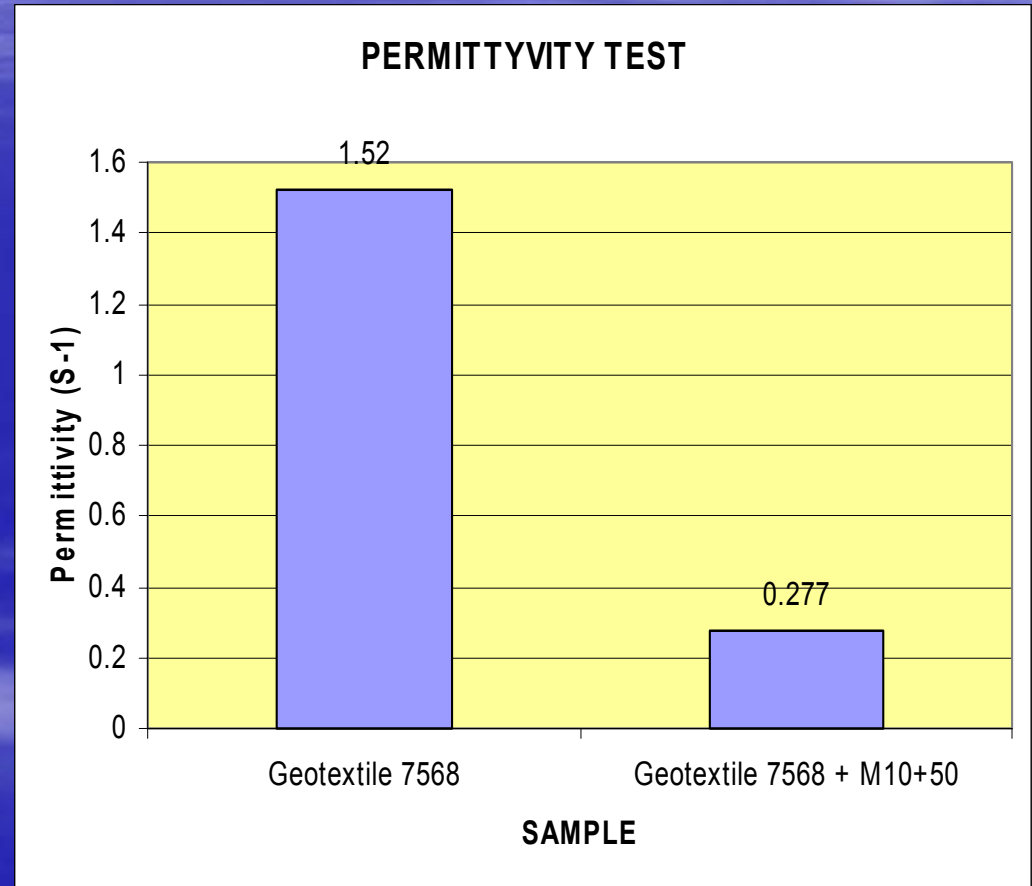
- Using M10+50™
- Provides Higher Impermeability in woven Geotextiles (Amoco 2006)
- Provides Significant Increase of Impermeability just by spraying M10+50 on the surface.



# RESULTS & INTERPRETATION

**Non Woven Geotextile  
Treated with  
M10+50™**

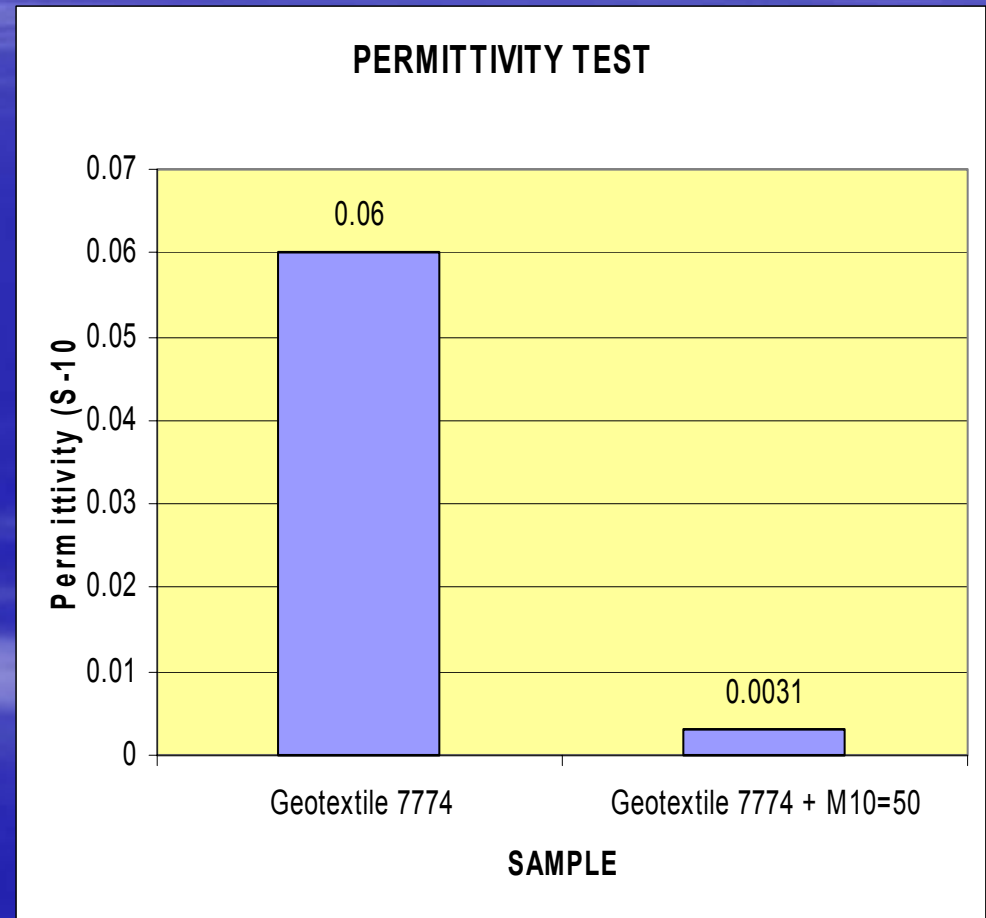
■ **Increases  
Impermeability  
by 548%.**



# RESULTS AND INTERPRETATION

**Woven  
Geotextile  
Treated with  
M10+50™**

Increases  
Impermeability  
by **1935%**

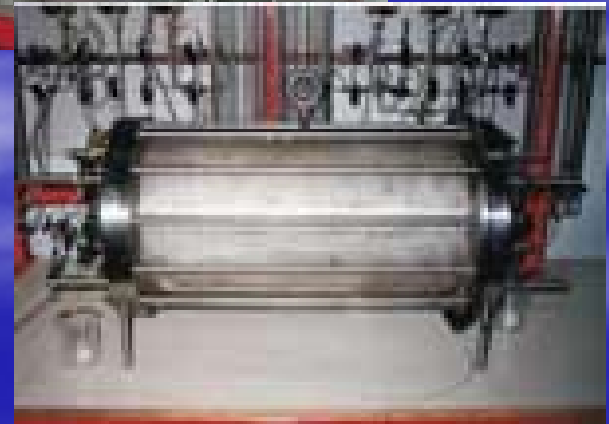


# HYDRAULIC CONDUCTIVITY TESTING ON M10+50 Equipment

**HYDRAULIC  
CONDUCTIVITY**

**ASTM D 5084**

**Hydraulic Conductivity of  
saturated porous material  
using a flexible wall  
permeameter**





# HYDRAULIC CONDUCTIVITY TEST RESULTS



GeoTesting Express

## HYDRAULIC CONDUCTIVITY

Project No. *GTX G0420*                      Tested By *HJ*  
 Project Name *Enviroseal*                      Test Date *2/28/2003*  
 Boring No. *JO2 & JO3*                      Reviewed By *JW*  
 Sample No. *Bag*                      Review Date *2/28/03*  
 Sample Depth                      Lab No. *7961*  
 Sample Description *Red Brown Silty Sand (coated soil sample)*

### ASTM D5084 - Falling Head (Method C RisingTail)

Sample Type:	<i>Ud</i>
Sample Orientation:	<i>Vertical</i>
Initial Water Content, %:	<i>9.8</i>
Wet Unit Weight, pcf:	<i>123.0</i>
Dry Unit Weight, pcf:	<i>112.0</i>
Compaction, %:	<i>N/A</i>
Hydraulic Conductivity, cm/sec. @20 °C	<i>1.0E-05</i>

Remarks: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



GeoTesting Express

## HYDRAULIC CONDUCTIVITY

Project No. *GTX G0420*                      Tested By *HJ*  
 Project Name *Enviroseal*                      Test Date *2/28/2003*  
 Boring No. *JO2 & JO3*                      Reviewed By *JW*  
 Sample No. *7765/7961*                      Review Date *2/28/03*  
 Sample Depth                      Lab No. *7961A*  
 Sample Description *Red Brown Silty Sand (uncoated sample)*

### ASTM D5084 - Falling Head (Method C RisingTail)

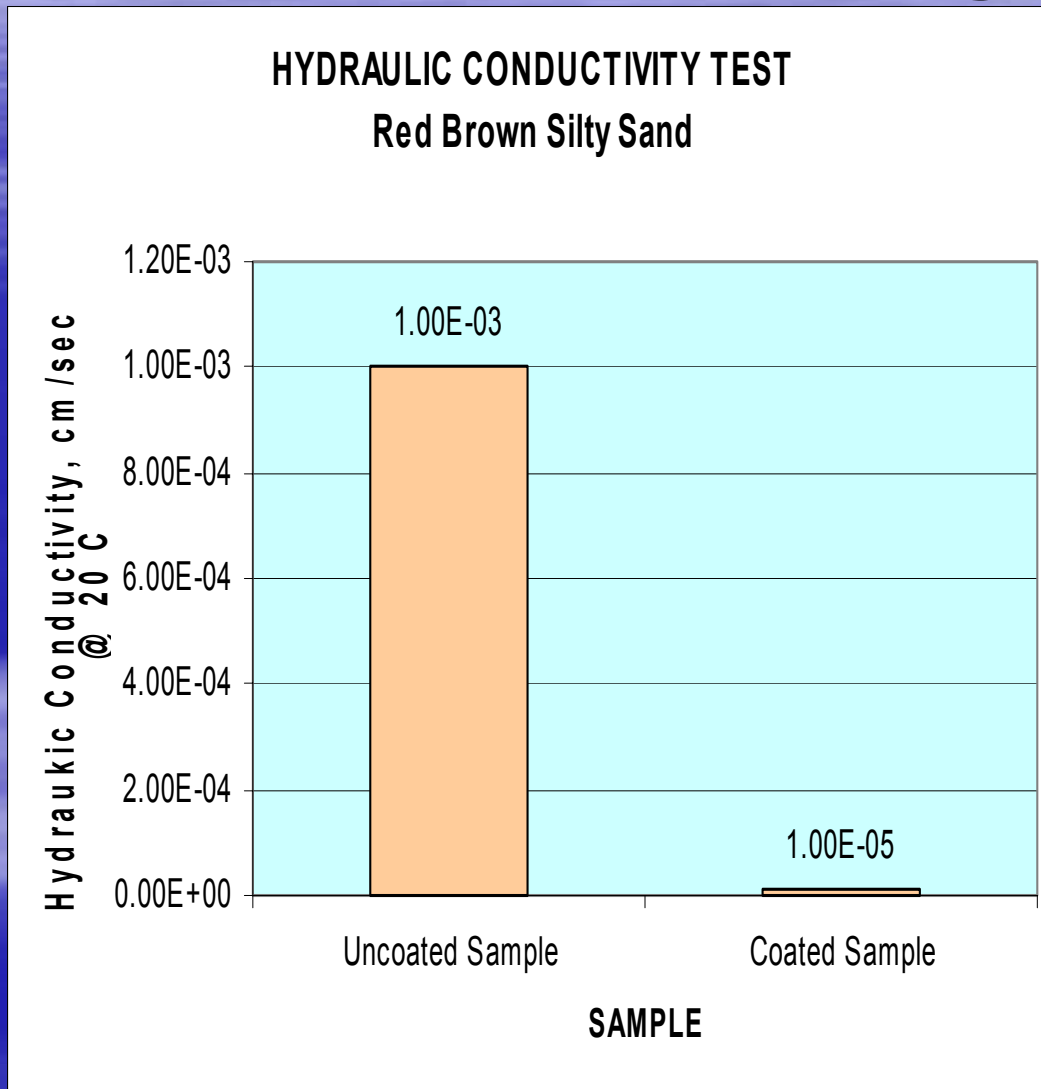
Sample Type:	<i>Ud</i>
Sample Orientation:	<i>Vertical</i>
Initial Water Content, %:	<i>9.5</i>
Wet Unit Weight, pcf:	<i>122.4</i>
Dry Unit Weight, pcf:	<i>111.8</i>
Compaction, %:	<i>N/A</i>
Hydraulic Conductivity, cm/sec. @20 °C	<i>1.0E-03</i>

Remarks: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

# Normal range of Hydraulic Conductivity of various materials

<b>MATERIAL</b>	<b>Intrinsic Permeability (Darcy)</b>	<b>Hydraulic Conductivity (cm/sec)</b>
<b>Clay</b>	10E-6 to 10E-3	10E-9 to 10E-6
<b>Silt, sandy silts, Clayed sands</b>	10E-3 to 10E-1	10E-6 to 10E-4
<b>Silty sands, fine sands</b>	10E-2 to 1	10E-5 to 10E-3
<b>Well-sorted sands, glacial outwash</b>	1 to 10E+2	10E-3 to 10E-1
<b>Well-sorted gravel</b>	10 to 10E+3	10E-2 to 1

# INTERPRETATION OF THE RESULTS



**10,000%**  
Increase of  
Hydraulic  
Conductivity  
(100 times more)

By simply  
spraying  
M10+50™/Water  
solution on the  
surface of Silty  
Sand

# SUMMARY OF M10+50™

## PERMITTIVITY TEST

Increases the Impermeability performance of Geotextiles with a simple topical spray application

\*Most normal applications use 500 ml +/- of **M10+50™** concentrate per square yard

\*Significantly Increased performance can be expected from Woven Geotextiles.

## HYDRAULIC CONDUCTIVITY TESTING

- High increase of impermeability by simple topical application. Your results will experience a significant increase after using **M10+50™**
- To determine how your soil reacts with **M10+50™**, testing should be preformed to obtain Specific Results based on site conditions

### Questions or comments ?

Contact Enviroseal Corp. Phone (772) 335 8225

E-mail [sales@enviroseal.com](mailto:sales@enviroseal.com)