

Customer: FUMOSO INDUSTRIAL, S.A.
A08488371
Work: Caracterització d'EPS
Address: Parets del Vallès

Work number: C100349 C101893
File number: C11X7622- R2 Delivery note:
Reference:
Delivery date: 11/05/2011
Test/s date/s: 11/05/2011 - 11/05/2011

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THE OBTAINED RESULTS CORRESPOND ONLY TO THE
ANALYZED SAMPLE

Addressed to:

FUMOSO INDUSTRIAL, S.A.

C/ Llevant, 9. Pol Ind Llevant
08150 - PARETS DEL VALLES

CECAM Celrà, 18/05/2011

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REPORT OF RESULTS

SMPLE DESCRIPTION:
SAMPLING:

DRENOTUBE
customer

1. INTRODUCTION

At the request of FUMOSO INDUSTRIAL, S.A., a list of drainage tests were carried over his **drenotube®** product in CECAM (Celrà) on 2011-05-11 (FIGURE 1)



The tests have consisted of measurements of the different times that a certain water flow takes to be drained. This time is a function of the axial load applied to the sample

FIGURE 1: **drenotube®** appearance before being tested

Comments:

Technical Director



Lluís Rodríguez Alonso

Area Director



Domingo Losada Fernández

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The uncertainty of the quantitative values is available if requested.

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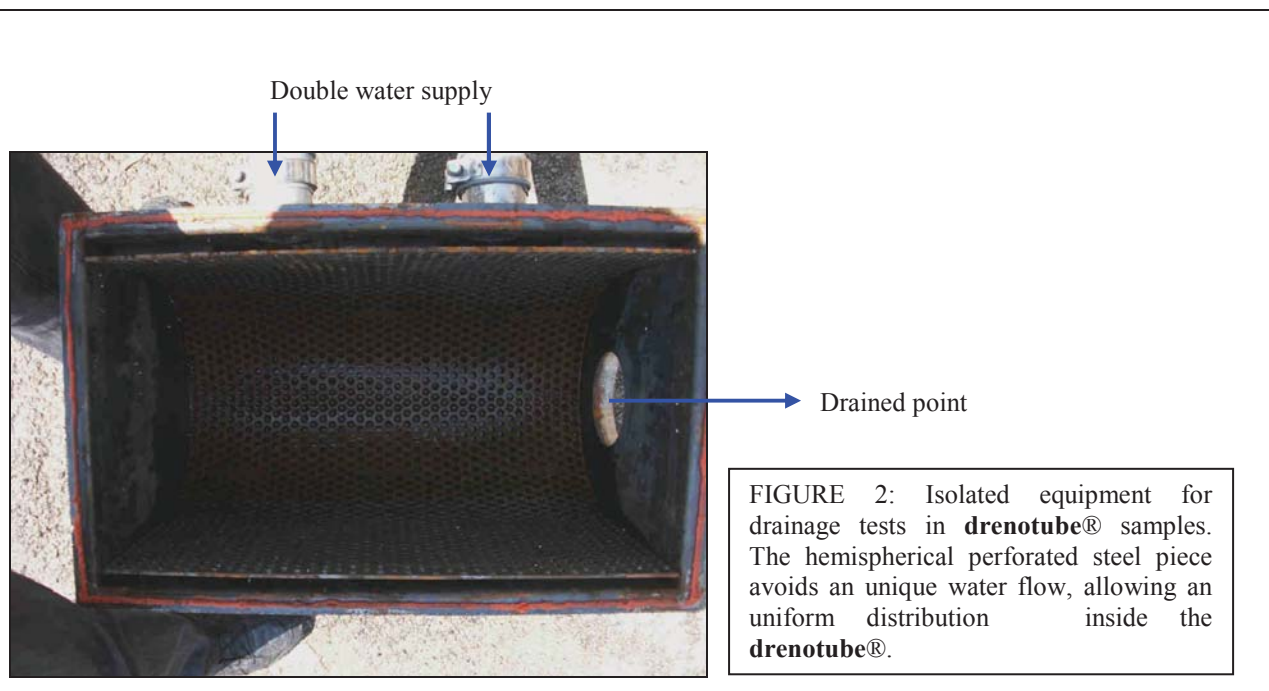
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2. DEVICE

The equipment manufactured by FUMOSO INDUSTRIAL S.A. consists on an isolated steel box, with a double water supply valves, which provide a transversal water flow trough the **drenotube®** tube. This tube is connected to a single water drained point (FIGURE 2).



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Water has been supplied from a 1000 liters deposit, where level was placed at 140 cm high. Water has been received on a second 1000 liters deposit, with water level at 40 cm high. The distance between both deposits was 100 cm. So, the gradient has been $\Delta = 1$.

The different axial loads have been provided using a 1000 kN capacity compression testing machine (accuracy 0.1 kN), trough a 530x280 mm (148400 mm²) iron platform. See FIGURES 3, 4 and 5.

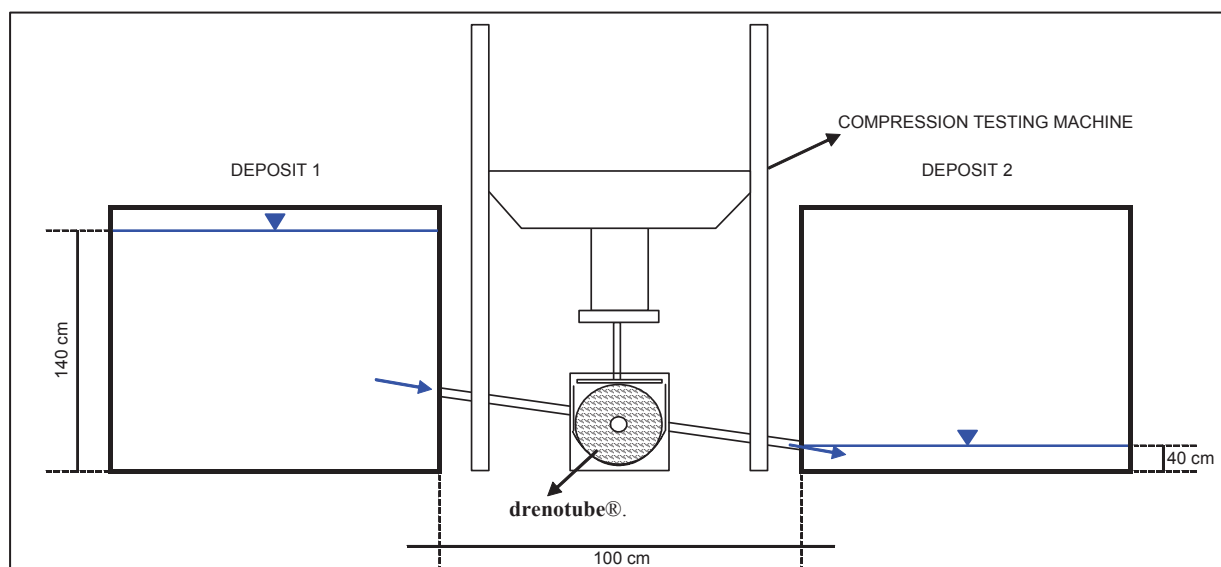


FIGURE 3: Permeability and load system scheme

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FIGURE 4: drenotube® placed on its isolated box before being tested.

FIGURE 5: Assembled equipment detail, ready to start de test



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3. RESULTS

10 drainage tests have been carried out over two **drenotube®** samples:

- Sample 1: drainage under 0, 3, 6, 9, 12 and 15 kN axial load (0, 20, 40, 60, 80 and 100 kPa)
- Sample 2: drainage under 15, 18, 21 and 24 kN axial load (100, 120, 140 and 160 kPa)

FIGURES 6 and 7 show both **drenotube®** samples after the tests.



FIGURE 6: **drenotube®** sample 1, after 6 tests under 0, 3, 6, 9, 12 and 15 kN axial load.



FIGURE 7: **drenotube®** sample 2 after drainage test under 15, 18, 21 and 24 kN axial load. Notice the strong deformation suffered by the tube, which has not been recovered once the axial load has released.

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Results are shown in TABLE 1.

	STRESS (kPa)				WATER VOLUME (l)	DRAINAGE TIME (s)	WATER FLOW (l/s)
	Theoretical	At the start	At the end	Average			
SAMPLE 1	0	0	0	0	198	68	2.91
	20	18	15	17	198	68	2.91
	40	38	30	34	198	69	2.87
	60	50	42	46	198	69	2.87
	80	71	55	63	198	70	2.83
	100	88	68	78	198	77	2.57
SAMPLE 2	100	90	67	79	198	75	2.64
	120	104	75	90	198	79	2.51
	140	124	84	104	198	98	2.02
	160	144	89	117	198	121	1.64

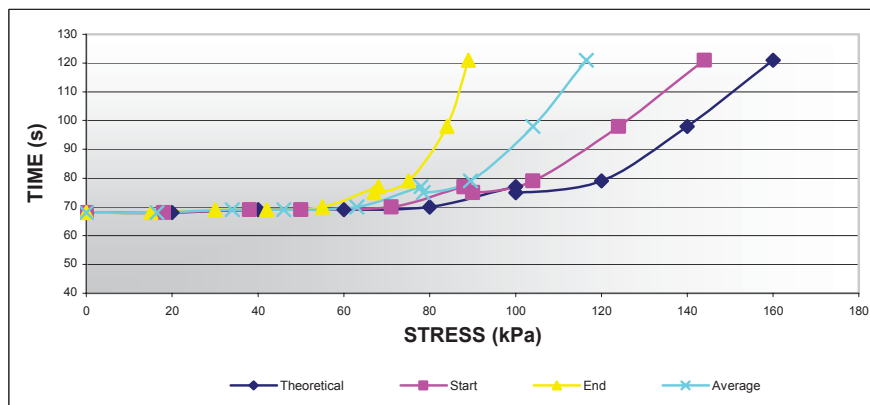


TABLE 1: Results obtained

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Technical Director

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It has been noticed that the applied stress decreases whilst the tests have been in progress, because of the relaxation that the **drenotube®** sample suffers when the axial load is applied. This fact involves a decrease in the resistance that the sample opposes, and so it is translated in a decrease of the load measurement by the compression test machine.

4. CONCLUSIONS

Drainage capacity is nearly constant until an 80 kPa stress. From this point, it decreases gradually, and after a 120 kPa stress it follows a linear trend, with "stress"/"drainage times" ratios between 1/0.7 (for theoretical stress) and 1/1.2 (for the final stress)

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