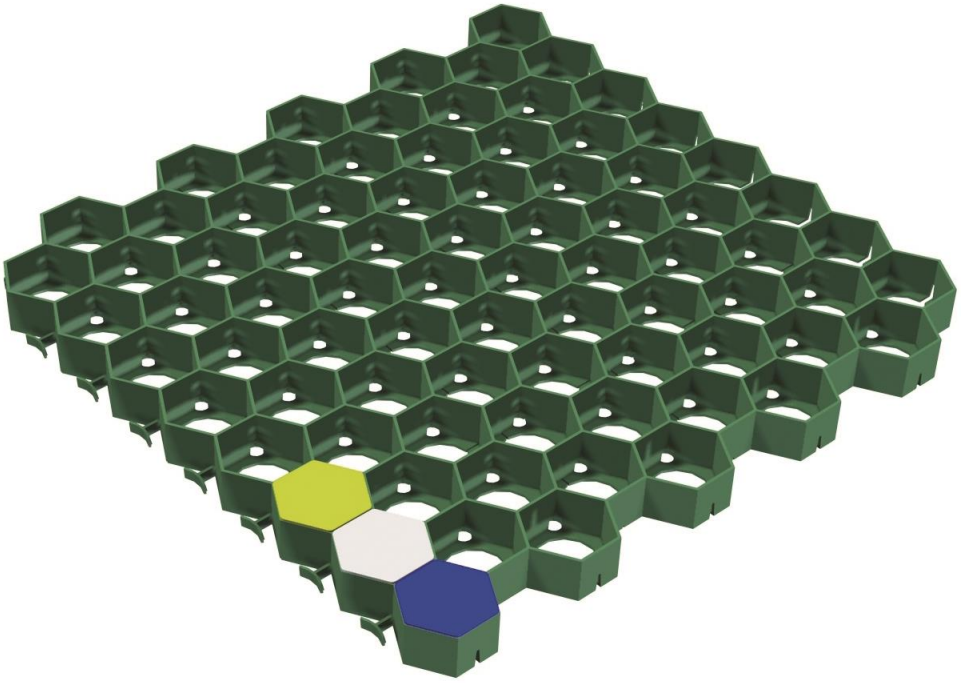
BEARING CAPACITY TEST ON PRATEX ELEMENT

PRATEX



PONTAROLO ENGINEERING
www.cupolex.ca

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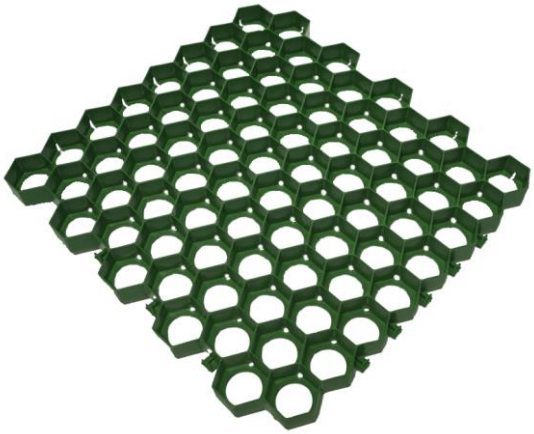
1 INTRODUCTION

On May 25th and 31st, 2005, at the Pontarolo Engineering SpA external laboratory, located at Via Clauzetto 20 Z.I. Red Bridge, San Vito al Tagliamento (PN), the Technician:

- Ing. A. Comisini Technician - Pontarolo Engineering SpA

conducted in partnership with the operators, the load tests on structural elements, called PRATEX®. The product is manufactured by Pontarolo Engineering SpA.
The purpose of the test is to analyze the static behavior of a draining grass pavment, constructed with the PRATEX® system designed by Pontarolo Engineering SpA.
It is a system of modular elements composed of plastic material (PE regenerated), with dimensions in plan of 56x60 cm and a height 4 cm, connected together and laid over a stony material substrate to form a support capable of receiving a subsequent filling of ground in order to create driveways gardens. For a more detailed description of the construction system, please refer to the website of the manufacturer www.pontarolo.com.
Below you will find a picture element PRATEX.



The choice of the structural elements to be verified and the methods of investigation have been identified by the Technical Department of the company in accordance with the possible uses of the property. The test scheme can be summarized as follows:

1) Selection of the specimen
2) Preparation of the test surface
3) Arrangement of the load and measuring instruments
4) Execution of the load tests
5) Study of the data obtained:
   - Evaluation of the load before deformation or failure;
   - Evaluation of tensile strength or break through;

The specimens were tested after filling with natural soil.

2 DESCRIPTION OF THE TECHNICAL SPECIFICATIONS OF THE MATERIAL

Pratex is made of high density polyethylene (HDPE), which, thanks to its thermochemical stability, makes Pratex suitable for outdoor use under variable climatic conditions (extreme temperature changes) and in aggressive environments (presence of chemicals to the substrate such as fertilizers, salts, etc). The main technical characteristics of the material in question are as follows:

Physical Properties	**Metric**	**English**
Density	0.918 - 1.4 g/cc	0.0332 - 0.0506 lb/in³
Water Absorption	0.01 - 1.5 %	0.01 - 1.5 %
Moisture Absorption at Equilibrium	0.01 - 0.05 %	0.01 - 0.05 %
Environmental Stress Crack Resistance	3 - 3000 hour	3 - 3000 hour
Linear Mold Shrinkage	0.003 - 0.02 cm/cm	0.003 - 0.02 in/in
Hardness, Rockwell R	60 - 65	60 - 65
Hardness, Shore D	55 - 69	55 - 69
Tensile Strength, Ultimate	10 - 50 MPa	1450 - 7250 psi
Tensile Strength, Yield	2.4 - 31.7 MPa	348 - 4600 psi
Elongation at Break	10 - 1500 %	10 - 1500 %
Elongation at Yield	6.9 - 15 %	6.9 - 15 %
Tensile Modulus	0.18 - 1.6 GPa	26.1 - 232 ksi
Flexural Modulus	0.179 - 1.7 GPa	26 - 247 ksi
Flexural Yield Strength	14 - 25 MPa	2030 - 3630 psi
Compressive Yield Strength	4 - 25 MPa	580 - 3630 psi
Izod Impact, Notched	0.21 - 8.01 J/cm	0.393 - 15 ft-lb/in
Izod Impact, Unnotched	2.7 - NB	5.06 - NB
Charpy Impact, Unnotched	NB	NB
Charpy Impact, Notched Low Temp	0.28 - 0.44 J/cm²	1.33 - 2.09 ft-lb/in²
Charpy Impact, Unnotched Low Temp	NB	NB
Charpy Impact, Notched	0.38 - 11 J/cm²	1.81 - 52.4 ft-lb/in²
Tensile Impact Strength	34 - 330 kJ/m²	16.2 - 157 ft-lb/in²
Tensile Creep Modulus, 1 hour	400 - 570 MPa	58000 - 82700 psi
Tensile Creep Modulus, 1000 hours	270 - 400 MPa	39200 - 58000 psi
Electrical Resistivity	1e+006 - 1e+016 ohm-cm	1e+006 - 1e+016 ohm-cm
Surface Resistance	1e+006 - 1e+015 ohm	1e+006 - 1e+015 ohm
Dielectric Constant	1 - 3	1 - 3
Dielectric Constant, Low Frequency	2 - 5	2 - 5
Dielectric Strength	19 - 150 kV/mm	483 - 3810 kV/in
Dissipation Factor	0.0001 - 0.01	0.0001 - 0.01
Dissipation Factor, Low Frequency	0.0002 - 0.0005	0.0002 - 0.0005
Arc Resistance	100 - 180 sec	100 - 180 sec
Comparative Tracking Index	600 V	600 V
CTE, linear 20°C	22 - 200 µm/m-°C	12.2 - 111 µin/in-°F
Thermal Conductivity	0.29 - 0.5 W/m-K	2.01 - 3.47 BTU-in/hr-ft²-°F
Melting Point	110 - 135 °C	230 - 275 °F
Maximum Service Temperature, Air	41 - 120 °C	106 - 248 °F
Deflection Temperature at 0.46 MPa (66 psi)	60 - 104 °C	140 - 219 °F
Deflection Temperature at 1.8 MPa (264 psi)	41 - 93 °C	106 - 199 °F
Vicat Softening Point	67 - 131 °C	153 - 268 °F
Minimum Service Temperature, Air	-200 - -60 °C	-328 - -76 °F
Brittleness Temperature	-118 - -68 °C	-180 - -90.4 °F
Flammability, UL94	HB - V-0	HB - V-0
Oxygen Index	17 - 20 %	17 - 20 %

3 TEST WITH NATURAL SOIL

For load testing on a "dry" interface using the following equipment:

- A pressure gauge with a scale of 150 bar;
- A manual hydraulic pump 700 bar;
- A hydraulic piston 700 bar;
- A series of extensions to allow the contrast of the portal.

The load shall be evenly distributed on a 50x50 cm plate of 2500 cm^2.
The test was performed with an outside temperature of 29.4 ° C and a relative humidity of 45%.
The load test consists of a series of loading and unloading cycles, at each load increment the specimen is evaluated visually.
The measurements were performed by means of a pressure gauge located in the hydraulic circuit connecting the pump with the piston.
Outlined below are some photos taken during the tests.

Fig. 1 Preparation of structure test

Fig. 2 Preparation of structure test

Fig. 3 Performance test

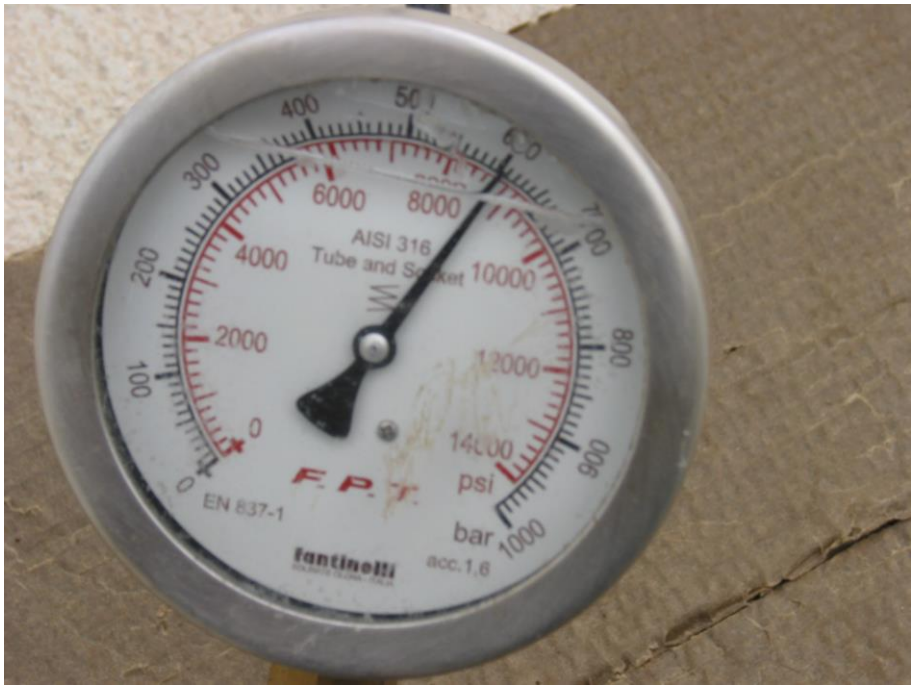


Fig. 4 Reading pressure gauge

Fig. 5 Surface test

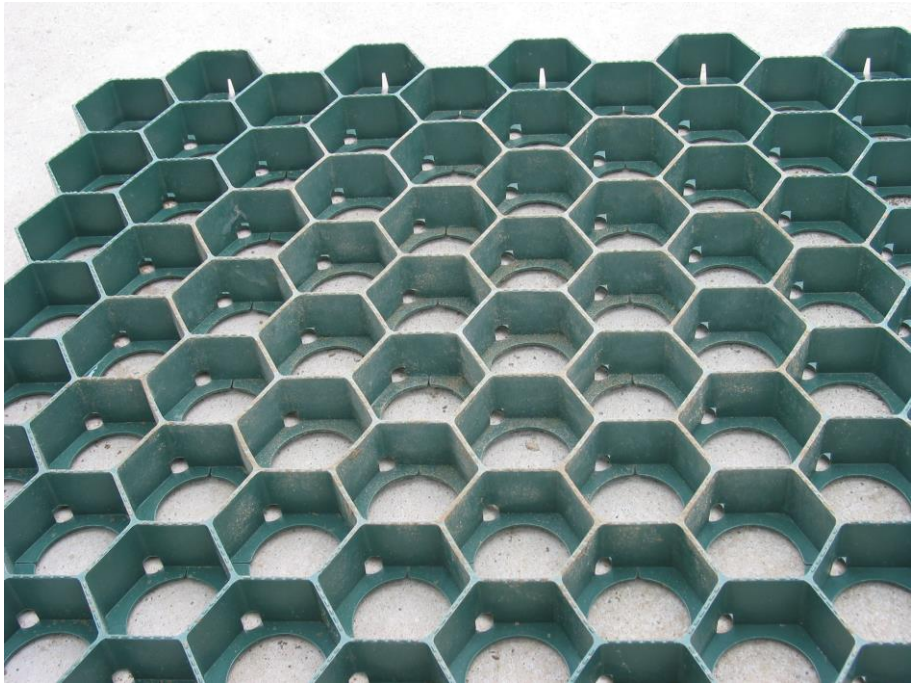


Fig. 6 Structure after test

4 CONCLUSION

It can be noted that the deformations related to the loads which the structures were subjected are limited to a few millimeters.
For the test loads the element has proven substantially intact and able to withstand more loads.

Data and test results

Test	[um]			
Day		25/05/2005	31/05/2005	31/05/2005
Start Time		10.15	11.37	15.00
End Time		11.00	12.10	15.40
Temperature	[°C]	25	26	26
Pressure	[mb]	1002	1008	1007
Condition		operation	operation	operation
Humidity	%	50	46	43
Force	**[bar]**	**700***	**700***	**700***
LOAD	**[t/m²]**	**300**	**300**	**300**

Note: The application of stress was stopped at 700 bar as it is the maximum stress that can be applied by the hydraulic jack.

San Vito al Tagliamento, 07/06/2005

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