PLYTEC formwork

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Pecaform Load Test Report

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Pecaform Load Test Report

1.0 Introduction

This report demonstrates the procedures and sequence of works involved in Pecaform Load Test. The objective of this test is to model the pressure exerted on Pecaform by backfilled earth before concreting of sub-structure elements. Subsequently to ensure that the said displacement is within acceptable limit and would not affect the integrity of the sub-structure elements.

2.0 Code of Practice and Assumptions

The load test has been carried out in accordance to the following Codes with assumptions:

a. BS 8110: Part 1: 1985. Structural Use of Concrete. Part 1.
b. The sub-structures are assumed to be exposed to moderate conditions. In accordance to Table 3.4, Nominal cover to all reinforcement (including links) to meet durability requirements is 35mm for concrete Grade 35.
c. The maximum backfill depth in this test is assumed to be 1.0m
d. Soil density = 18.0 kN/m^3
e. Coefficient of active earth pressure, $k_a = 0.33$

From the puncture resistance test results furnished by the manufacturer, the polyethylene used in Pecaform can resist a force of 435.833N for single layer and 948.792N for double layer where the diameter of the puncture probe is 5cm. In other words, the maximum pressure before failure for single layer and double layer polyethylene are 0.2219N/mm^2 (=221.9kN/m^2) and 0.4832N/mm^2(=483.2kN/m^2) respectively. Pecaform is made of 2 layers of polyethylene hence the reference pressure would be 483.2kN/m^2.

For 1.0m backfill of earth, active earth pressure exerted onto the Pecaform is,

$$\text{Active earth pressure} = k_a \gamma h$$

$$= 0.33 \times 18.0 \times 1.0$$

$$= 5.94\ kN/m^2 <<<<<<< 483.2kN/m^2$$

However, Pecaform is a composite material with combination of polyethylene sheet and wire mesh, the actual resistance shall be contributed by the composite action of the combined materials. Therefore, a load test simulating the backfill pressure on the Pecaform is carried out to demonstrate that this product is able to resist pressure due to 1.0m earth backfill.

3.0 Pecaform Load Test Set-up

The setting up of Pecaform load test is simple yet correlate to actual site condition, 50mm diameter steel pipes (simulating concrete spacers) were spaced at 300mm c/c secured with rectangular hollow sections bracers at 2 levels on 12mm thick plywood. (Refer Figure 1). A piece of 900mm x1200mm Pecaform specimen was used in the test. 9 bags of 25kg sand per layer equivalent to 225kg were loaded onto the specimen progressively. A total of 5 layers of sand bags were placed onto the specimen. Measurements were taken at 3 points, i.e. P1, P2, and P3 at the centre of the specimen (Refer Figure 1) before the loading procedures and after each layer of sand bags placement.

4.0 Load Test Procedures and Sequence of Works

- 3 points at the centre of the specimen P1, P2 and P3 are selected to be the displacement point before the sand bags are loaded onto the specimen. Measurements are taken before loading of sand bags
- 9 bags of 25kg sand are placed onto an area of 900mmx900mm of the specimen which is equivalent to a pressure of 2.78kN/m^2. Measurements are taken at 3 points namely P1, P2 and P3 at centre of the specimen as mentioned earlier
- Subsequently, another 9 bags of 25kg sand are placed and measurements are taken, equivalent pressure is 5.56 kN/m^2
- Repeat above steps for 3rd layer sand bags, 4th layer sand bags, and 5th layer sand bags, equivalent pressure: 8.33 kN/m^2, 11.11 kN/m^2 and 13.88 kN/m^2 respectively
- Measurements are taken at the selected 3 points P1, P2 and P3.

5.0 Acceptance Criteria

The load test shall be deemed to be satisfactory if the displacement is less than 10mm.

6.0 Conclusion

From the test results, measurements at the selected 3 points after 5th layer of sand bags placement which is equivalent to 13.88 kN/m^2 (>5.94kN/m^2) were P1:872mm, P2:872mm and P3:872mm respectively. The average displacement is 8mm which is less than 10mm. Therefore, the load test result is acceptable. The Pecaform is able to resist more than 2.0m of backfill earth with acceptable displacement.

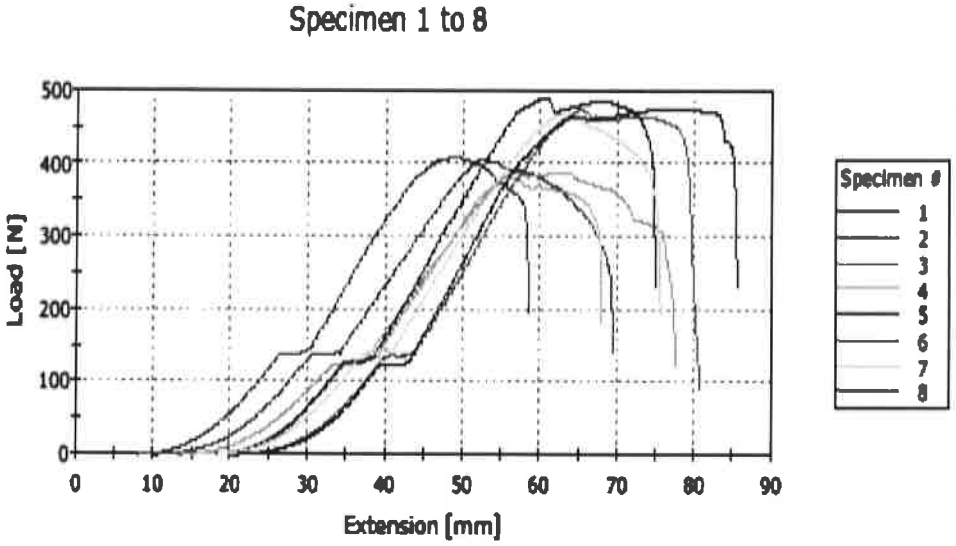
Appendix A

KLANG HOCK PLASTIC INDUSTRIES SDN. BHD (28053-D)

COMPARISON BETWEEN DS1 (SINGLE LAYER) AND DS2 (DOUBLE LAYER)

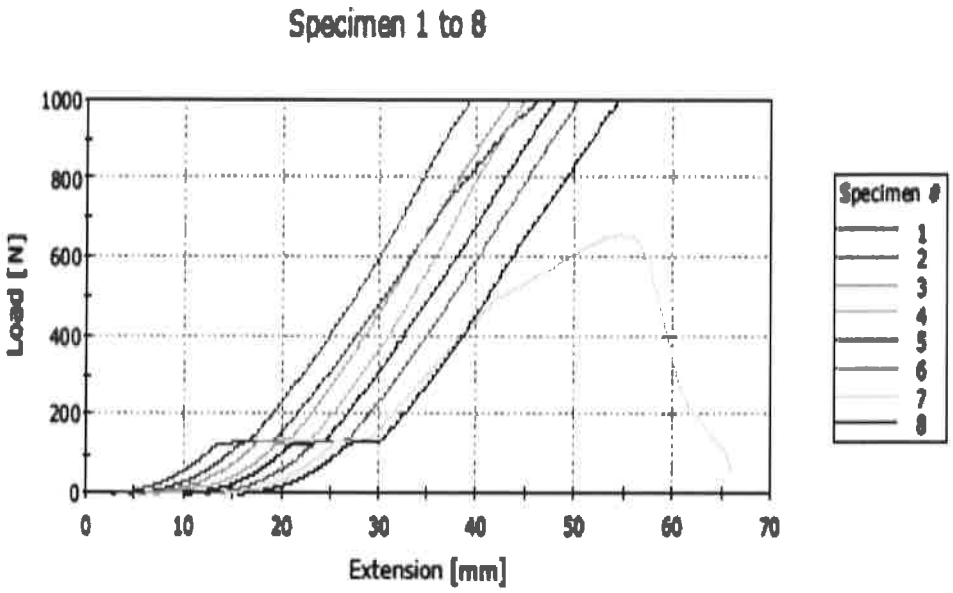
CUSTOMER : DANSEA CONSTRUCTION

RESULT FOR SINGLE LAYER



	Force at Peak [N]	Force at Break [N]	Energy to Break [N-m]	Energy to Peak [N-m]	Inner Diameter [mm]
1	408.008	251.135	10.659	6.858	152.00
2	406.015	233.878	12.616	6.445	152.00
3	388.540	208.595	13.822	8.968	152.00
4	382.043	287.794	10.172	5.676	152.00
5	489.743	242.850	15.283	8.650	152.00
6	472.699	115.615	15.035	8.276	152.00
7	466.200	291.497	13.900	8.363	152.00
8	473.416	252.824	17.794	13.012	152.00
Maximum	489.743	291.497	17.794	13.012	152.00
Minimum	382.043	115.615	10.172	5.676	152.00
Mean	435.833	235.524	13.660	8.281	152.00

RESULT FOR DOUBLE LAYER



	Force at Peak [N]	Force at Break [N]	Energy to Break [N-m]	Energy to Peak [N-m]	Inner Diameter [mm]
1	990.241	990.241	12.809	12.809	152.00
2	990.112	990.112	16.259	16.259	152.00
3	990.233	990.233	13.260	13.260	152.00
4	990.129	990.129	12.639	12.639	152.00
5	990.222	990.222	13.603	13.603	152.00
6	990.247	990.247	13.687	13.687	152.00
7	658.974	99.398	16.536	12.273	152.00
8	990.177	990.177	14.144	14.144	152.00
Maximum	990.247	990.247	16.536	16.259	152.00
Minimum	658.974	99.398	12.639	12.273	152.00
Mean	948.792	878.845	14.117	13.584	152.00

From the table and graph above, we compare the puncture resistance result from the Force at Peak (N) only on a single and double layer. The test speed shall be set to 250mm/min. The diameter of puncture probe is 5cm. So, overall result for single layer got 435.833N compare to double layer show 948.792N.

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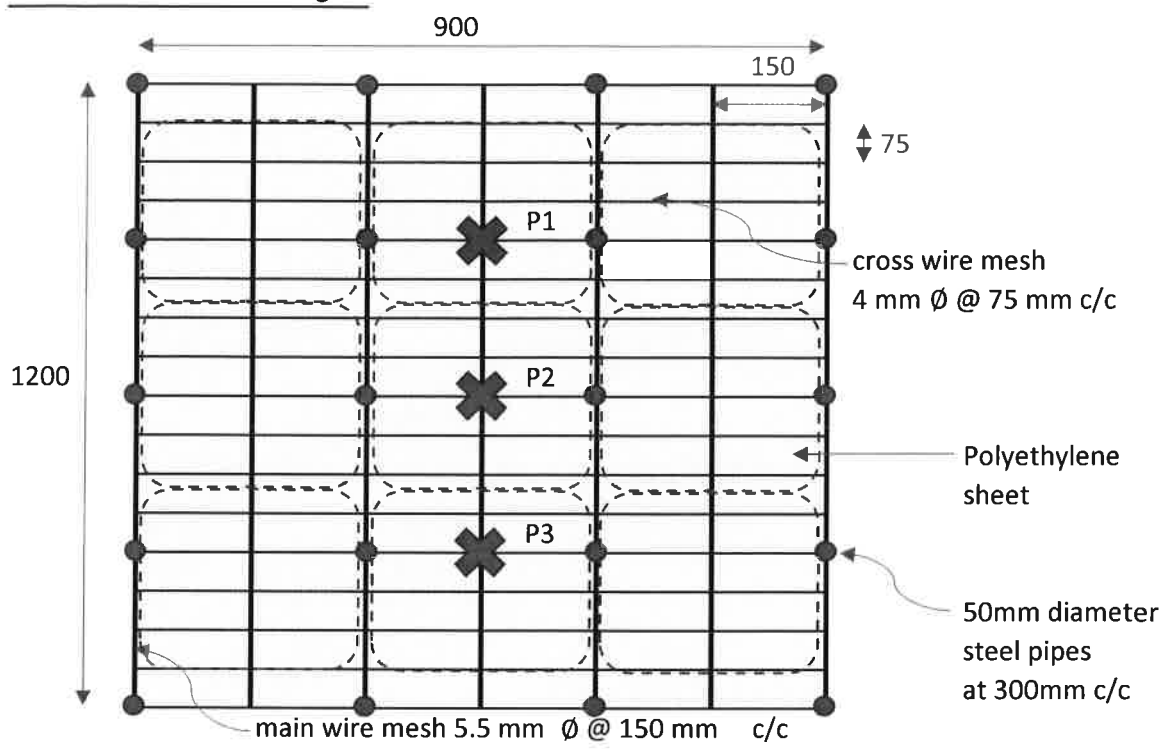
Approved by,

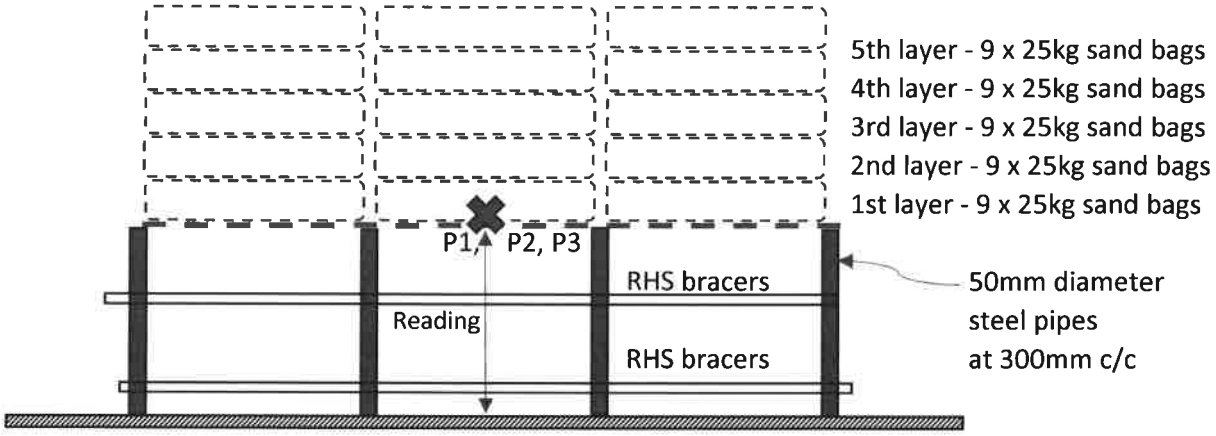
SURESH

(Head of Department)

Pecaform - Load Test Diagramme



PLAN - Pecaform Load Test Arrangement



SECTION - Pecaform Load Test Arrangement

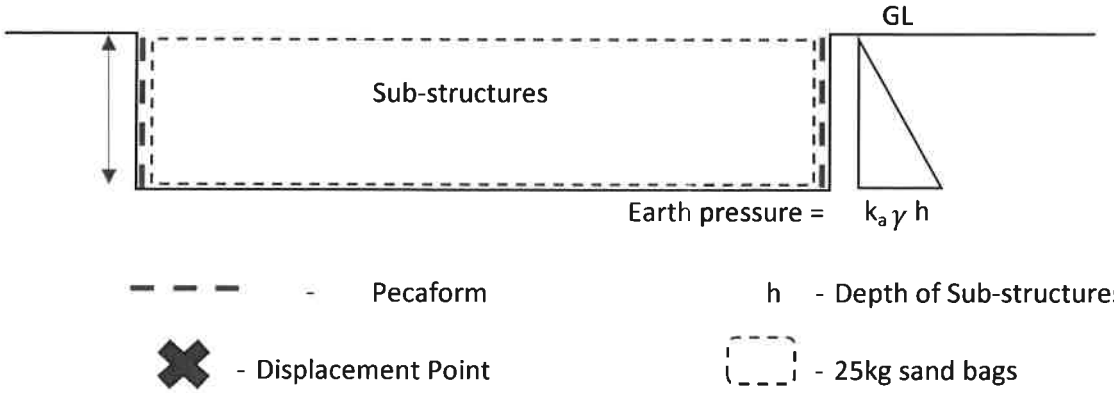


Figure 1. Pecaform Load Test Diagramme

PecaformLoad Test Results

Date: 14th April 2017

Pecaform Load Test Table

Date	Loading (kg)	Vertical Distance btwn P1, P2,P3 and 12mm Plywood (mm)		
		P1	P2	P3
4/14/17	a) No sand bags	880	880	880
	b) 1st layer of 9 x 25kg = 225 kg	880	880	880
	c) 2nd layer of 9 x 25kg = 450 kg	880	880	880
	d) 3rd layer of 9 x 25kg = 675 kg	878	878	878
	e) 4th layer of 9 x 25kg = 900 kg	875	875	875
	f) 5th layer of 9 x 25kg = 1125 kg	872	872	872
Final Displacement (mm) [= a) - f)]		8	8	8

Remarks:

Weather - Sunny

Pecaform Load Test Set-Up

Measurements at P1, P2 and P3 are taken before loading

1st layer 9 x 25kg sand bags = 225 kg

Vertical distance between P1 and 12mm Plywood = 880 mm

Vertical distance between P2 and 12mm Plywood = 880 mm

Vertical distance between P3 and 12mm Plywood = 880 mm

2nd layer 9 x 25kg sand bags = 450 kg

Vertical distance between P1 and 12mm Plywood = 880 mm

Vertical distance between P2 and 12mm Plywood = 880 mm

Vertical distance between P3 and 12mm Plywood = 880 mm

3rd layer 9 x 25kg sand bags = 675 kg

Vertical distance between P1 and 12mm Plywood = 878 mm

Vertical distance between P2 and 12mm Plywood = 878 mm

Vertical distance between P3 and 12mm Plywood = 878 mm

4th layer 9 x 25kg sand bags = 900 kg

Vertical distance between P1 and 12mm Plywood = 875 mm

Vertical distance between P2 and 12mm Plywood = 875mm

Vertical distance between P3 and 12mm Plywood = 875 mm

5th layer 9 x 25kg sand bags = 1125 kg

Vertical distance between P1 and 12mm Plywood = 872 mm

Vertical distance between P2 and 12mm Plywood = 872 mm

Vertical distance between P3 and 12mm Plywood = 872 mm