Landfill Basal Protection – HPS50

British Bespoke Manufacturing Landfill Cell

A fantastic example of British manufacturing, Geofabrics Ltd demonstrated exactly why it is the leading UK manufacturer in nonwoven geosynthetics by producing a bespoke non-woven geotextile in a commendable turnaround time. The landfill site required a nonwoven geotextile to construct part of a cell following completing of the cylinder testing process it came apparent a standard geotextile would not be suitable in the application so further consideration and expertise were required. Geofabrics Ltd were able to manufacture a nonwoven geotextile with a CBR rating of 50KN made from 100% virgin fibre achieving over 100 years durability. Geofabrics is the only manufacturer in the world with the capabilities to produce a product achieving such a high CBR rating. From confirming the order to the final load being delivered on site, over 23,000m^2 (112 rolls) of product was manufactured and delivered within 10 working days - a real achievement from whole team at Geofabrics and a reassuring sign of the highest quality manufacturing and service.

Just as with this example of the HPS50, the cylinder test plays a key role in determining what grade of textile is required for landfill cells.

Project Information	
Location	Rugby
Product	HPS50 Geotextile (5.9 x 35m)
Installer	Sean Carr Lining Technology Ltd
Installation Date	December 2019/January 2020

Cylinder Test
(Environment Agency LFE:2/ BS EN 13719)

The selection of an appropriate geosynthetic protection layer is made using the Cylinder Test. The Cylinder Test is recognised as the only method for determining the effectiveness of a material in protecting a geomembrane against the long-term effects of static point loads; it is designed to simulate the conditions expected in the base of a landfill.
The load applied includes the dead load of the waste mass and any overburden pressure due to the depth of the waste and restoration materials, calculated as:

(depth of waste x waste density x acceleration due to gravity)
+
(depth of restoration materials x density of restoration materials x acceleration due to gravity)

It is known that the HDPE continues to deform under constant load and at higher temperatures (plastic deformation), therefore a safety factor of 2.5 is incorporated into the test.
Geofabrics laboratories have conducted thousands of Cylinder Tests and built up a vast library of knowledge over many years. Using this expertise, we can assist designers in finding the most effective value engineered solution to leachate management and membrane protection.

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The Cylinder Test Method

The cylinder used during the test must be of steel construction and with a minimum internal diameter of 300mm. The construction inside the cylinder from the bottom up is:

1. Three-point support: three load cells or pressure gauges support the lower steel plate of the test apparatus. These measure the direct load received by the geomembrane.

2. Lower Steel plate: lower steel plate with a minimum thickness of 20mm, and a diameter 4mm smaller than the cylinder.

3. Dense Rubber Pad: rubber pad with a minimum thickness of 25mm and a defined shore hardness (50A). This is representative of the lower mineral layer.

4. Lead impression sheet: a lead sheet of 1.3mm thick (grade 3) to record deformation

5. A disk of proposed geomembrane: typically 2mm HDPE - GM13 compliant

6. Protective Material

7. Drainage Aggregate: minimum 50KG

8. Separator Disk: Geotextile Filter

9. Levelling Sand: 50mm thick

10. Upper Steel Plate: as lower

11. Loading Device

The samples of stone, fabric and membrane are selected as typical and checked for obvious flaws. The cylinder built up to cross section is often segmental in design so that the liner components can be placed and easily removed. Usually an additional layer of geotextile is placed around the wall of the cylinder to reduce the very high friction loads that occur.

The aggregate is mixed and placed uncompacted in 3 layers to the final depth. Once the sand is in place, it is tamped lightly to ensure a direct load throughout the cylinder. The load is gradually applied over one hour up to the final load and then maintained for the duration of the test.

For more information on our Landfill Products please contact our Sector Manager Gavin O'Brien at gobrien@geofabrics.com