SKAPS INDUSTRIES

TECHNICAL NOTE:
SPECIFYING TRNSMISSIVITY

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INTRODUCTION:

Transmissivity is defined as the quantity of water that passes through a test specimen in a specific time interval under a specific normal pressure and a specific hydraulic gradient. The hydraulic gradient, boundary conditions & normal load are selected by the engineer/designer as closely as possible as actual field conditions.

ASTM D 4716, "Standard Test Method for Determining the In Plane Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head" is the standard testing method to test hydraulic transmissivity for geosynthetics materials.

ASTM recognizes two types testing under ASTM D 4716, the index testing and design testing. Manufacturers use index testing for quality control processes. They measures hydraulic transmissivity by placing geonet or geocomposite between steel plates with a 15 minute seat time. Boundary conditions of an index test are between steel plates, therefore, would not be specified.

Design transmissivity test are performed as per Engineer/Designer's specifications to simulate field conditions in the laboratory test setup. Four essential factors must be known or specified to perform transmissivity tests:

- Normal Load (Pressure)
- Hydraulic Gradient
- Boundary Conditions
- Seat Time

1.1 Normal Load (Pressure)

A normal load is the pressure that is to be applied on the drainage geonet or geocomposite in project specific conditions. Specified normal load should be maximum estimated field load with appropriate safety factors for the intended application.

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1.2 Hydraulic Gradient

Hydraulic gradient is a simulated slope of the geonet or geocomposite in a laboratory test setup for transmissivity test. The slope specified for the test should be equivalent to the slope of the actual field condition. Most landfill projects have a slope between 0.02 and 0.33. The gradient for transmissivity test should be considered during design phase of the project.

1.3 Boundary Conditions

Boundary conditions are surrounding materials (textile, geomembrane, sand, clay, soil etc.) of the drainage layer in the intended project/application. Boundary conditions can significantly impact the performance of the geonet and geocomposite. If a geocomposite is to be used with sand or soil, the intrusion factor of sand, soil and textile should be considered in the design phase of the project. In order to simulate the field conditions, site specific soil should be utilized for the transmissivity test.

1.4 Seat Time

Seat time should be sufficient to allow the geonet or geocomposite to reach as close as to the field conditions under specified load. The longer the seat time, it allows more time for material to compress/deform under the specified load to give a more realistic transmissivity value. Design transmissivity tests should have 100 hours seat time. A seat time of 100 hours shows an increasing rate of decreasing transmissivity. After 100 hours, the transmissivity decreases at a much slower rate.

Effects on the results of transmissivity test of the above factors are as shown below:

Normal Load Increases	Transmissivity Decreases
Gradient Increases	Transmissivity Decreases
Boundary Conditions Softness increases	Transmissivity Decreases
Seat Time Increases	Transmissivity Decreases

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