Alan Bamforth: Be mindful of misleading performance data when specifying geocomposites

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One of the key challenges regarding specification of geocomposite drainage products is misleading data. Specifiers can get lost in the manufacturer's data, forgetting that the most important function of a geocomposite drain is that it drains!

The term geocomposite drainage is used to describe products commonly featuring one or two geotextile layers bonded to an HDPE core with either a cuspated or geonet based void structure. The key performance metric used to determine a geocomposite's drainage capability is the in-plane flow rate, as tested in accordance with the EN ISO 12958 standard.

Product flow rates are stated in l/ms at differing confining compressive pressures and hydraulic gradients – the difference in head between two points, for example 10m head over a slope distance of 100 m is 10/100 = 0.1. It is important that flow is measured in the machine and cross machine direction of the geocomposite.

The most important aspect is that the in-plane flow is tested with the appropriate boundary. In the great majority of applications, the geocomposite is installed within a layer of soil, and to replicate this, EN ISO 12958 details the use of a soft rubber boundary for the test. The problem is that EN ISO 12958 also has a hard platen option for the rare instance that the geocomposite is installed against concrete or rock. It must also be recognised that EN ISO 12958 is a short term test, which means that it is possible to obtain a flow value at say 500 kPa confining pressure without knowing that the geocomposite might collapse under a long term pressure of just 200 kPa. So the in-plane flow test must be used in conjunction with a long term creep test to ASTM D7361.

Engineers and buyers rarely have the time or inclination to read and understand test standards such as EN ISO 12958 or ASTM D7361 and this ignorance is exploited by many unscrupulous manufacturers which provide misleading information on datasheets.

A geocomposite comprises an HDPE core, which is mainly void space with discrete points supporting the geotextile. Soil pressure pushes the geotextile into the void of the geocomposite core and this can severely reduce the in-plane flow, which is easily simulated by finger pressure on a sample.

A soil or soft boundary will reduce the in-plane flow of a good geocomposite by 10 to 15% but the in-plane flow of a poor geocomposite might reduce by 90%. Tested with a hard boundary, however, there is no geotextile intrusion and the same poor product will appear to give excellent in-plane flow that simply will not be achieved on site. Specifiers and buyers must insist on datasheets giving in-plane flow tests with soft boundary in conjunction with a long term creep test at the design confining pressure.

Other important parameters of a geocomposite are pore size, through-plane flow, CBR and interface shear strength.

Completely irrelevant are product thickness and weight. These must never be specified and the values only appear on the datasheet to enable a CQA check that the product supplied to site is the one that was intended. Also irrelevant is the geocomposite compressive strength to EN 25619-2. This is a short term test that gives the confining pressure that results in complete collapse of the product in 10 minutes. There is absolutely no reason for such a value to be on the datasheet as it is solely relevant to the manufacturer’s production control.

Tensile strength of a geocomposite is also generally a meaningless value. Typically, the tensile strength at break is associated with a 50% elongation of the product.

Considering that at just 10% elongation, the core deforms to the point where, if tested, the in-plane flow could be non-existent. Those familiar with geogrids will realise that design of tensile reinforcement requires strain limited strength and partial factors for creep, installation damage, etc.

In summary, to avoid project specifications becoming a box ticking exercise involving characteristics that are misleading or unimportant to the essential drainage function, geocomposites should be assessed based on the relevant boundary conditions for in-plane flow in conjunction with long term creep strength.

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