

MODULO GEOBENT XP Clay Geosynthetic Barriers for Environmental Applications

Bentonite

Bentonite is a clay mineral of the smectite group and is composed mainly of montmorillonite. The smectites are a group of minerals that swell as they absorb water or organic molecules within the structural layers; they also have considerable cationic exchange properties. The clay mineral they are composed of in the crystalline state is derived from the devitrification, and consequent chemical change, of glass of magmatic origin, usually tufa or volcanic ash (definition by Ross and Shannon, 1926).

The nature and volcanic origins of bentonite deposits give rise to varieties of the mineral that are often extremely heterogeneous. The bentonites that are thus formed that can be described as sodium, calcium, and acid bentonites.

The crystallographic basis of the montmorillonite (bentonite) is typical of phyllosilicates: sheets of AlX octahedrons (X=oxygen or oxydril) between two sheets of SiO₄ tetrahedrons.

In the octahedron layer the Aluminum may be replaced by magnesium, thus giving rise to an excess negative charge: the negative charge in excess is



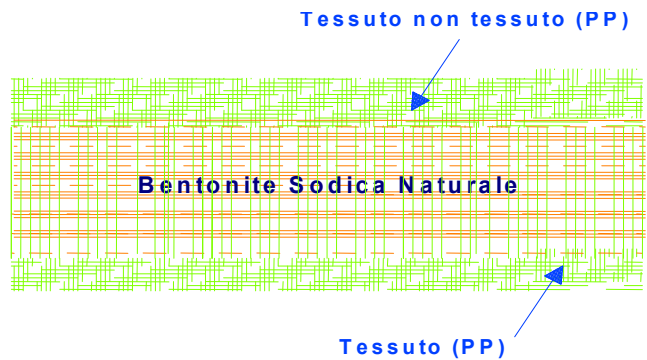
compensated for by various mono and bivalent cations (Ca⁺⁺, Mg⁺⁺, Na⁺...).

This elementary particle is a lamella: the various lamellas are held together in "packets" by Van der Waals force, but they can be "delamellised" and dispersed in water in submicronic particles until a specific superficial area of 800 m²/g is developed.

A reliable barrier system is realized with the use of sodium bentonite, which has a high grade for swelling (higher than 24 ml/2g) and water absorption (higher than 600%) and gives rise to a gelling with excellent waterproofing properties.

Product Description

Modulo Geobent XP is a needle punched Geosynthetic Clay Barrier made of one non-woven polypropylene geotextile as cover layer, and a one woven polypropylene geotextile as carrier layer, which encapsulate a uniform layer of sodium bentonite.



The connection between the cover and carrier geotextile is achieved by a specific reinforcement system which enable the two geotextiles to be joined by thousands of fibers through the bentonite layer. This kind of reinforcement is especially made in order to cut down internal shear forces acting on the barrier, making Modulo Geobent XP a perfect solution for application on steep slopes, and giving the barrier a pre-confinement, which increase the barrier capability to remain exposed before the finale confinement is reached.

The dimension of the particles of the bentonite together with the open size of the non-woven geotextile are carefully calibrated to achieve a full saturation of the geotextiles, once the barrier is fully hydrated, increasing the self-seaming of the rolls on the overlapping area.

Product Advantages

Equivalent thickness - Modulo Geobent XP replaces a layer of compacted mineral clay with a thickness of 1 m.

Low hydraulic conductivity provided by the Modulo Geobent XP ensures protection of the environment and a high level of safety.

Easy installation - does not involve high costs in terms of machinery and labor.

Easy to repair - slight accidental damage of the Modulo Geobent is self-repairing and does not require any intervention; if wide areas are damaged it is possible to intervene simply by "patching" the damaged surface with pieces taken from rolls of GCL still available on the site.

Cost effective – compared to high costs for the construction of compacted clay layers and on-site QC.



High internal shear resistance – the particular reinforcement system enables the Modulo Geobent XP to reach a strong resistance to internal friction and to be used on steep slopes providing the system with excellent stability.

High puncturing resistance - Modulo Geobent XP also has strong resistance to penetration (static puncturing).

Low gas permeability – making the barrier a perfect solution for capping barrier of solid waste disposals.

Less CQ on site - because thickness, hydraulic properties and mechanical are quality controlled during production, there are also considerable financial saving costs by reducing the need of on-site tests.

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