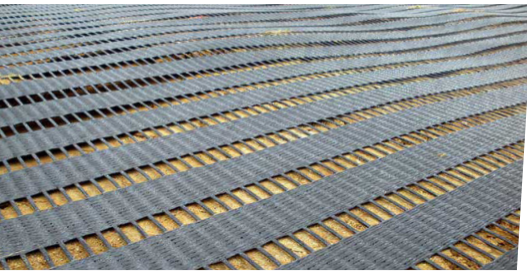




International Geosynthetic Society

Geosynthetic Functions



Geosynthetic Functions

Geosynthetics include a variety of synthetic polymeric materials that are specially fabricated to be used in geotechnical, environmental, hydraulic and transportation engineering applications.

The main functions of geosynthetics are defined by ISO 10318-1 standard, while the pictograms associated to each function are standardized by ISO 10318-2 standard.

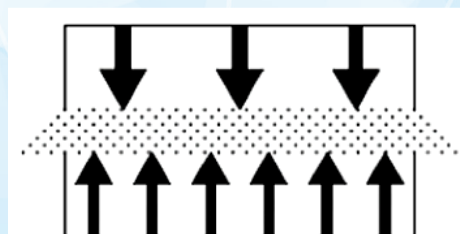
It is convenient to identify the primary function of a geosynthetic according to these ISO documents, also considering that few geosynthetics perform only one function.

The main functions of geosynthetics are now described in the following sections. All the pictograms are reported from ISO 10318-2.

Separation

The ISO 10318-1 definition is:
Prevention from intermixing of adjacent dissimilar soils and/or fill materials by the use of a geosynthetic material.

The geosynthetic acts to separate two layers of soil that have different particle size distributions, thus preventing the contamination of the coarser soil or material with small particles of the finer soil or material. For example, geotextiles are used to prevent road base materials from intermixing with soft subgrade soils, thus maintaining design thickness and roadway integrity. Separators also help to prevent fine-grained subgrade soils from being pumped into permeable granular road bases or railway ballast.



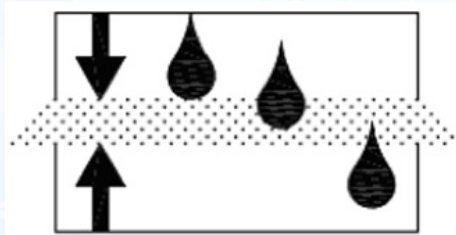
Pictogram of Separation function.

The Separation function used to prevent road base materials from intermixing with soft underlying soil.

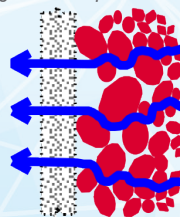
Filtration

The ISO 10318-1 definition is:
restraining of uncontrolled passage of soil or other particles subjected to hydrodynamic forces, while allowing the passage of fluids into or across a geosynthetic material.

The geosynthetic acts as a filter by allowing water to move through the soil while retaining all upstream soil particles. For example, geotextiles are used to prevent soils from migrating into drainage aggregate or pipes while maintaining flow through the system. Filtration geotextiles are a fundamental component of drainage geocomposites for preventing the clogging of the draining core.



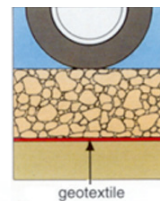
Pictogram of Filtration function.



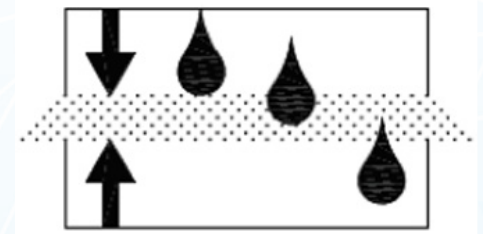
The Geosynthetic filter retains soil particles while allowing the passage of water.

Drainage

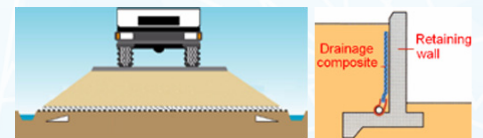
The ISO 10318-1 definition is:
collecting and transporting of precipitation, ground water, and/or other fluids in the plane of a geosynthetic material.



The geosynthetic acts as a drain to collect and carry fluid flows through less permeable soils. Drainage can occur in horizontal, sloping, or vertical conditions. For example, drainage geosynthetics are used horizontally to dissipate pore water pressures at the base of roadway embankments and as pavement edge drains, sloping in landfill capping and slope interceptor drains, vertically behind retaining walls and to accelerate consolidation of soft cohesive foundation soils below embankments.



Pictogram of Drainage function.



Examples of the drainage function used horizontally and vertically.

Barrier

The ISO 10318-1 definition is:
Use of a geosynthetic to prevent or limit the migration of fluids.

The geosynthetic acts as a practically impermeable barrier to fluids or gases. For example, geomembranes and geosynthetic clay liners (GCLs) are used as fluid barriers to impede flow of liquid or gas into the ground in landfills, reservoirs, and lagoons. This function is also used for waterproofing dams, foundations, and vertical walls.

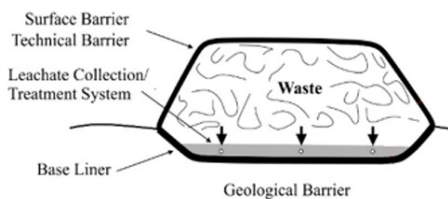
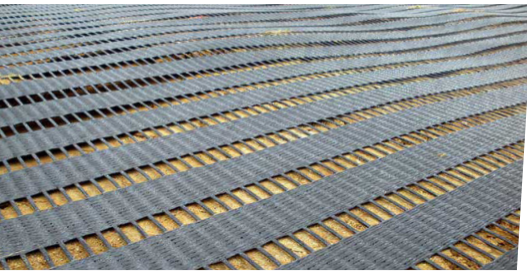


Pictogram of Barrier function.



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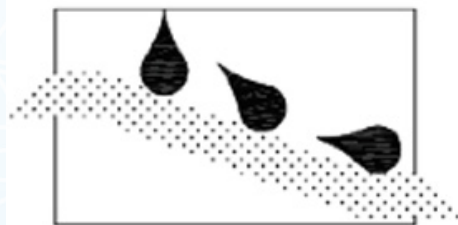
The barrier function used in a landfill.

Surface Erosion Control

The ISO 10318-1 definition is:

Use of geosynthetic materials to prevent or limit soil or other particle movements at the surface of, for example, a slope.

Geosynthetics acts to prevent or to reduce soil erosion caused by rainfall impact and surface water runoff on slopes, to protect river and channel banks against erosion and scouring by flowing waters, to protect beaches against marine erosion. For example, temporary geoblankets and permanent geomats are placed over the otherwise exposed soil surface on slopes and discharge channels.



Pictogram of Separation function.



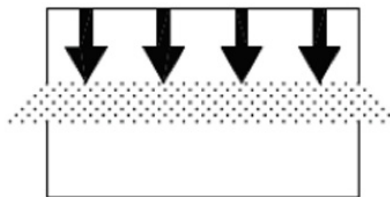
The erosion control function used to protect a slope and a discharge channel.

Protection

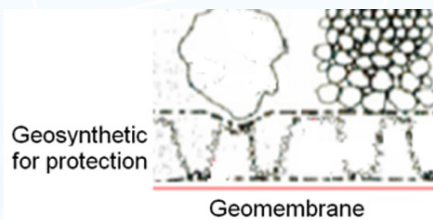
The ISO 10318-1 definition is:

Preventing or limiting of local damage to a given element or material by the use of a geosynthetic material.

The geosynthetic prevents mechanical damage to structures and materials, by acting as cushion layers, as example to prevent puncture of waterproofing layers, like geomembranes, by reducing point contact stresses from stones in the adjacent soil, waste or drainage aggregate during installation and while in service.



Pictogram of Protection function.



The protection function used to avoid damage to a geomembrane by stones and coarse soil particles.

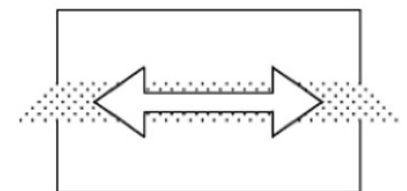
Reinforcement

The ISO 10318-1 definition is:

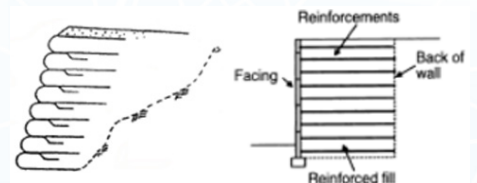
Use of the stress-strain behaviour of a geosynthetic material to improve the mechanical properties of soil or other construction materials.

The geosynthetic acts as a reinforcement element within a soil mass to produce a composite that has improved strength and deformation properties over the unreinforced soil. For example, geotextiles and geogrids are used to add tensile strength to a soil mass in order to build reinforced soil steep slopes and vertical or near-vertical walls.

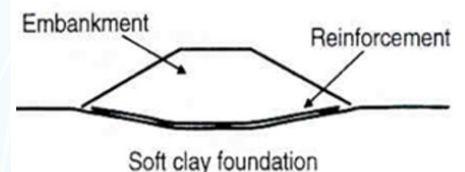
The reinforcement function is used at the base of embankments to be constructed over very soft foundation soil, to span over piles, and to bridge over voids that may develop below load bearing granular layers.



Pictogram of Reinforcement function.



The reinforcement function used for reinforced soil steep slopes and retaining walls.



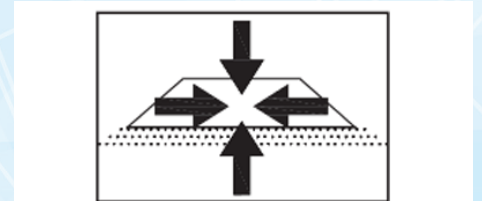
The reinforcement function used at the base of embankments over soft foundation soil.

Stabilisation

The ISO 10318-1 definition is:

improvement of the mechanical behaviour of an unbound granular material by including one or more geosynthetic layers such that deformation under applied loads is reduced by minimizing movements of the unbound granular material.

The stabilization function facilitates the reduction in differential vertical settlements and lateral deformations and thereby extending the design life of roads and railways

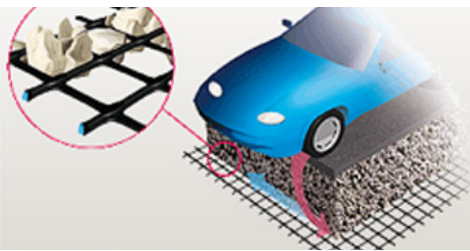
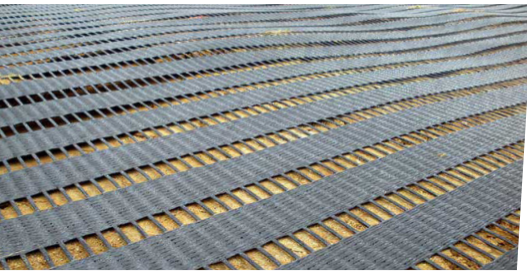


Pictogram of Stabilisation function.



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The stabilisation function used in a road base.

Stress Relief (For Asphalt Overlay)

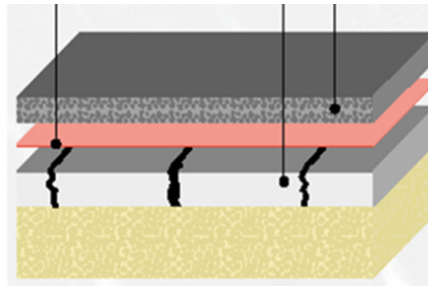
The ISO 10318-1 definition is:

Use of a geosynthetic to retard the development of cracks by absorbing the stresses that arise from the damaged pavement.

The service life of a cracked pavement is often extended by providing an overlay placed on top of a geosynthetic material. Geosynthetics used in pavement overlays provide the stress relief function, which affords to retard the development of cracks in the overlay by absorbing stresses and strains which originate from the distressed pavement, and by providing additional strength to the overlay which helps to resist fatigue and pavement movements.



Pictogram of stress relief function.



The stress relief function used to delay reflective cracking in asphalt overlays.

References

ISO 10318-1. Geosynthetics - Part 1: Terms and definitions. International Standard Organization, Genève, Switzerland.

ISO 10318-2. Geosynthetics - Part 2: Symbols and Pictograms. International Standard Organization, Genève, Switzerland.

About the IGS

The International Geosynthetics Society (IGS) is a non-profit organization dedicated to the scientific and engineering development of geotextiles, geomembranes, related products and associated technologies. The IGS promotes the dissemination of technical information on geosynthetics and their appropriate uses through a newsletter (IGS News), two official journals (Geosynthetics International and Geotextiles and geomembranes), conferences and technical seminars, dedicated task forces, over 40 National Chapters, special publications, and multiple other communications and outreach methods.

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