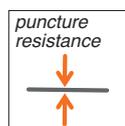
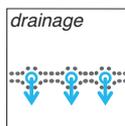
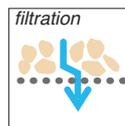
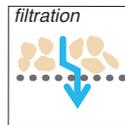
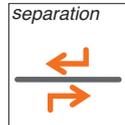




Depot coverings, rehabilitation of storage units



Separation and filtration of material layers

▲ to separate, filter, and improve bearing capacity, the layers of granular material shall be separated by a thermally bonded, needle-punched nonwoven geotextile of the **Bontec NW optim** type, with an optimal 40% to 50% elongation at break, and a modulus of resistance 20 kN/m for 100 grams at failure, as per NFE-NISO 10319.

▲ thanks to the thermally bonded structure, the pore size in the soil shall be stable for controlled filtration.

▲ the surface of the product shall be slightly rough to increase the “grip” with the soil and improve the bearing capacity.

▲ the manufacturer, with ISO 9001 certification, shall have an engineering department capable of advising the designer and installer.

Draining gases

▲ in order to drain the accumulation of gases rising from the storage unit and blocked by the geomembrane, a geocomposite such as **teradrain**, consisting of a combination of needle-punched, nonwoven geotextiles and a network of regularly spaced 20 mm perforated mini-drains, shall be placed on the foundation level.

▲ the product shall have a filtration opening of 78 µm on the external filtering surfaces, supported at all points by the nonwoven draining core; the whole system shall be self-healing in the event of localized tearing. The vertical drainage capacity of a mini-drain shall be 720 litres/hour. The circular shape of the mini-drains shall enable them to resist very high pressures of 900 kPa in the soil, and not collapse in the long term. The ultimate tensile strength of the product shall be 14 kN/m with a 45% elongation at break. The gas drainage strips shall be connected to the shafts by specific T-shaped polyethylene parts.

▲ the mass per unit area shall be 350 g/m².

▲ the product must be sized by computation.

Waterproofing the cover by geomembrane

▲ waterproofing shall be executed with a heat-sealable geomembrane barrier such as **teraline**, in HDPE, 15/10th to 20/10th mm thick, of black colour, UV stabilized, and with an ultimate tensile strength of 18 MPa and 11.5% elongation at the plastic yield point.

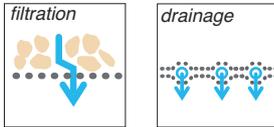
▲ joining shall be performed by a company having ISO certification for the installation of geomembranes, and Asqual-certified welding and site management personnel.

▲ the site report shall demonstrate the conformity of the work with the Asqual references for calibration of welding machines and resistance of test samples.

▲ all welds shall be inspected by compressed air and identified on an as-built drawing.



Depot coverings, rehabilitation of storage units



Protecting the waterproofing and draining rainwater on flat ground

▲ geomembrane protection and drainage of the teradrain type shall be executed using a geocomposite consisting of a combination of needle-punched, nonwoven geotextiles and a network of regularly spaced 20 mm perforated mini-drains.

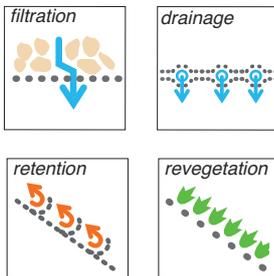
▲ the product shall have a filtration opening of 78 μm on the filtering surface in contact with the soil cover, supported at all points by the nonwoven draining core; the whole system shall be self-healing in the event of localized tearing. The vertical drainage capacity of a mini-drain shall be 720 litres/hour. The circular shape of the mini-drains shall enable them to resist very high pressures of 900 kPa in the soil, and not collapse in the long term.

▲ the ultimate tensile strength of the product shall be 28 kN/m with a 45% elongation at break.

▲ the dynamic puncture resistance value shall be less than 9mm, with a CBR of 3 kN, so as to perform the protection function.

▲ the mass per unit area shall be 500 g/m².

▲ the product must be sized by computation.



Protecting the waterproofing and draining rainwater on embankments

▲ in order to stabilize the material covering against gully erosion, the earth cover shall be strengthened by a needle-punched, nonwoven, cellular geotextile structure such as teracro. The product shall have a filtering base reinforced by a network of polyester tensile reinforcement cables, regularly spaced, on which are bonded twisted strips forming filtering barriers 13 cm high, and a network of regularly spaced 20 mm perforated mini-drains.

▲ the product shall have a filtration opening of 100 μm , supported at all points by the nonwoven draining core; the whole system shall be self-healing in the event of localized tearing. The vertical drainage capacity of a mini-drain shall be 720 litres/hour.

The circular shape of the mini-drains shall enable them to resist very high pressures of 900 kPa in the soil, and not collapse in the long term. The system in ready-to-use rolls shall be unrolled on the embankments and head-anchored in a trench.

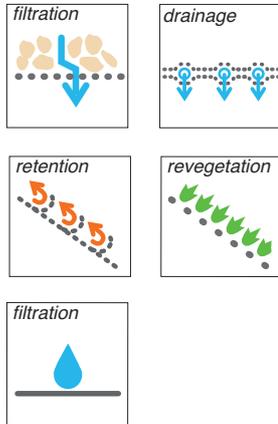
▲ the materials shall be added to a minimum thickness of 15 cm.

▲ the product and anchoring shall be sized in accordance with the XP G38-067 standard.

▲ the manufacturer, with ISO 9001 certification, shall have an engineering department capable of advising the designer and installer.



Depot coverings, rehabilitation of storage units

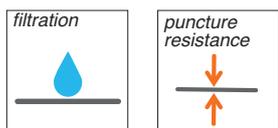


An all-in-one solution for landfill covering

▲ in order to execute covering of the storage facility and perform the expected functions of tightness to and drainage of rain and gases, and earth retention against gully erosion on embankments, the earth cover shall be strengthened by a composite cellular geocounter structure of the **teraplex** type with a non-woven base. The product shall have an impervious polyethylene film or membrane base, with tensile reinforcement by a network of polyester cables, regularly spaced, on which are bonded twisted strips forming filtering barriers 13 cm high, and incorporating a network of regularly spaced 20 mm perforated mini-drains.

▲ the product shall have a filtration opening of 100 µm, supported at all points by the nonwoven draining core; the whole system shall be self-healing in the event of localized tearing. The vertical drainage capacity of a mini-drain shall be 720 litres/hour. The circular shape of the mini-drains shall enable them to resist very high pressures of 900 kPa in the soil, and not collapse in the long term. The system in ready-to-use rolls shall be unrolled on the embankments and head-anchored in a trench.

- ▲ the roll lengths shall be appropriate for the project.
- ▲ the materials shall be added to a minimum thickness of 15 cm.
- ▲ the product and anchoring shall be sized in accordance with the XP G38-067 standard.
- ▲ the manufacturer, with ISO 9001 certification, shall have an engineering department capable of advising the designer and installer.
- ▲ a 500 g/m² woven sheet in natural coconut fibres, of the **teranat** type, shall be unrolled and tacked to the surface of the earth so as to limit the impact of surface runoff pending plant shooting.



Flexible drainage channels, trenches, gutters

▲ to collect runoff waters coming from the dome before they can damage the embankments, and to recover embankment waters at the base before they can seep into the storage unit, watertight recovery channels shall be executed, either visible or covered with earth.

▲ the visible channels of the teracan type shall have UV resistance, a CBR puncture resistance of 8 kN, a dynamic puncture resistance of 0 mm, an ultimate tensile strength of 50 kN/m, and a mass per unit area of 1500 g/m². The product shall consist of an impervious membrane in polyethylene protected on the underside by a puncture-resistant geotextile. This waterproof part can be used to line the ditch. The upper part shall be reinforced by a polyethylene geogrid and a nonwoven geotextile, to increase its mechanical strength and protect the waterproofing system. The edges of the roll, intended for anchoring and buried in the soil, shall be exclusively filtering so as to prevent their undermining.

- ▲ the product shall be supplied ready-to-use, in 2 m, 3 m or 4 m widths.
- ▲ roll packaging: width x 25 m.
- ▲ the earth-covered channels of the terapro FOS type shall have a CBR puncture resistance of 4 kN, a dynamic puncture resistance of 0 mm, an ultimate tensile strength of 30 kN/m, and a mass per unit area of 1000 g/m².
- ▲ the manufacturer, with ISO 9001 certification, shall have an engineering department capable of advising the designer and installer.

The technical specifications may be changed at any time. Please make sure you have up-to-date technical data sheets. **teragéos** is not liable for the use of its products.