

MacMat® R

Reinforced geomats for soil stabilization

MacMat® R is a three-dimensional geomat that can be applied as an erosion control mat for sloped embankments, channel linings and soil-veneer applications.

It was developed to meet the need for an erosion control material which was both strong and environmentally acceptable.

MacMat® R is provided in various styles and thicknesses to meet the needs for several different applications and situations.

MacMat® R is a geocomposite manufactured with a reinforcement (generally a double twist steel wire mesh but also polymeric geogrids reinforcement) inside the geomat, to provide tensile mechanical strength and a stronger form of erosion protection, better ensuring the stability of the top-soil on both sliding surfaces (polymeric geomembranes), roadway embankments, drainage ditches, channels and other areas susceptible to erosion damages.

MacMat® R has several advantages:

- *The continuity of the lining is easily achieved by lacing the edges together with binding wire or metal rings without overlapping and minimising wastage.*
- *In many standard situations a simple fold into the top of the slope of an anchor trench could be used, being wooden stakes or other anchors sufficient to anchor the wire mesh to the ground.*
- *The double twist wire mesh protects the geomat from any potential damage limiting those to a single mesh opening.*
- *The steel reinforcement provides high stiffness to the geocomposite and an uniform adherence to the subsoil providing better protection of the covered surface.*
- *It may be easily fixed to any thicker lining or bottom protection (gabions, mattresses, etc.) providing a better and continuous protection and anchorage where the erosion is usually more critical or the stresses are concentrated.*
- *The combined use of a geocomposite reduces by 50% the installation costs.*
- *The steel wire mesh provides the lining with a high punch resistance (20-25 kN) and offer a very strong barrier to any wild animal (like coypu) that will burrow through the composite causing damage along river banks.*
- *The geocomposite can provide up to 200 kN/m strength resistance in soil reinforcement applications.*



The MacMat® R behaviour and performances

MacMat® R increase the soil's resistance to erosion by providing an environment that enhances the growth of vegetation through the mat. Initially the geomat blanket works to shield the soil slope from the effects of wind and rainfall, preventing the soil from washing out before the vegetation has a chance to become established. Then, as the vegetation matures, the roots anchor the mat to the soil to provide a superior soil reinforcement strength, capable of handling steeper embankment slopes and higher run-off flow velocities. In soil-veneer application on smooth sliding surfaces the reinforcement of the geocomposite provides the additional structural function to guarantee the required strength to achieve the equilibrium in long term service conditions. Due to the high roughness and permeability of the geocomposite **MacMat® R**, the pretreated surface allows for a more natural deposition of sediment discharged by the flow and offers a good retention to hydroseeding, without altering the natural existing conditions.



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Slopes & Rockfall protection

The soil erosion on embankments is a serious problem, especially when failure can cause a structural damage. Relying on the vegetation growth alone is very unpredictable, as it is extremely difficult to achieve a full vegetation coverage, leaving exposed areas vulnerable to erosion.

MacMat® R protects the soil surface by:

- *protecting exposed areas from direct impact of raindrops;*
- *protecting seeded topsoil from washing out before vegetation is established;*
- *reinforcing the root system and binding the soil surface;*
- *Reducing the velocity and volume of runoff by increasing the water seepage into the soil.*
- *Increase the cohesion of the soil layer where it's placed.*

MacMat® R is used to promote vegetation growth and reinforce the topsoil usually in combination with rockfall protection dedicated system to provide a full impact solution. Typical applications include the lining of highway and railway embankments, and in general any slope subject to erosion. Even though the slope may be preseeded before the installation of the geomat, it can also be seeded after the installation (hydroseeding), obtaining the same excellent vegetation growth.

MacMat® R facilitates the installation on steep slopes using soil nails or anchors.

The strength of the mesh allows the intermediate anchor points to be widely spaced over the surface of the revetment and can provide reinforcement efficiency to the slope when laid in combination with nails and other soil reinforcement technologies.



Landfill applications

The stabilisation of soil on smooth inclined surfaces is a very typical problem to be faced during the design of a cover of a landfill site. In such a situation the contribution of the friction between the soil and the membrane is very low (up to limit values of 8-10°) and tensile strength and retention capacity is required for the composite to be placed on top of the geomembrane. In addition to this primary structural function the geocomposite provides an efficient protection of the geomembrane itself against puncture damage occurring during the soil placement.

MacMat®R improves the efficiency of the lining system by:

- *Increasing the shear resistance along the soil 's surface;*
- *providing the strength required to guarantee the equilibrium conditions;*
- *minimising the stress applied directly to the geomembrane from external loadings;*
- *protecting the geomembrane from puncturing damage during the soil placement;*
- *allowing the growth of vegetation in order to provide an environmentally friendly aspect and an efficient UV protection to the sealing membrane.*



Hydraulic works & Waterproofing applications

Channel erosion is the result of a slow deterioration of the soil bank as a direct result of the hydraulic shear stresses acting on the soil's surface.

MacMat®R protects the channel from erosion by:

- *increasing the shear resistance along the soil 's surface;*
- *reducing the velocity of flow along the channel section;*
- *limiting the loss a fine soil particles;*
- *protecting the bank integrity from wild animal intrusion.*

MacMat®R provides also a good support for vegetative soil on smooth surface working as stabilization layer on Geomembrane and Geocomposite barriers used currently in waterproofing applications.



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Installation notes

MacMat® R is manufactured with a surface having both a rough and a smooth side. The material shall be unrolled along the slope having the smooth side in contact with the soil. Before the placement of the mat the sub-soil will be well graded and finished to achieve a smooth even surface leaving the last 4/5 cm of sub-base soil loose (eventually a seeding will be done in this phase). The mat will be anchored to the soil with metallic or timber pins according to the application.

The mat can be fixed by simply anchoring the metallic mesh to the ground; as an alternative, embedding the mat in a trench excavated at the top of the slope (check the dimension

of the trench in case of structural use of the reinforced mat).

In the case of channel linings please ensure that:

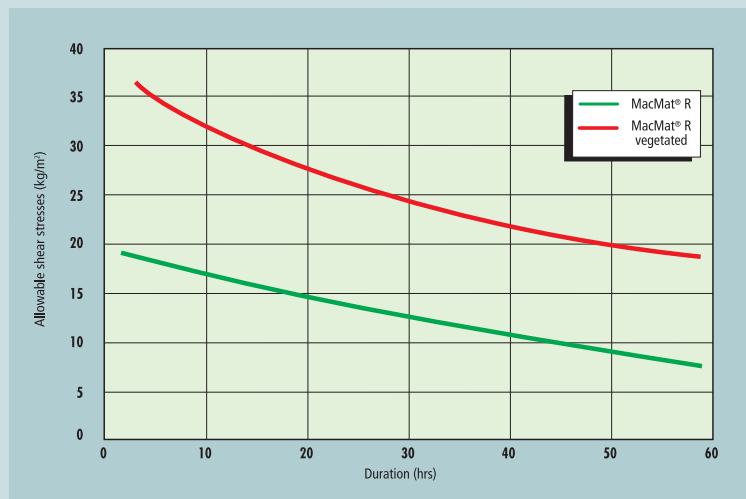
- The mat is layed parallel to the direction of the flow for smaller channels and perpendicular to the direction of flow for larger channels with steeper slopes;
- the joints between two following rolls must be made in the same direction of the flow, overlapping the end of each roll on the top of the beginning of the second one.

More detailed information about any detail and sketches or typical drawings are available by contacting our technical teams.

Research & development

To determine **MacMat® R** performance under various hydraulic conditions, a series of tests have been carried at Utah State University (USA) to evaluate the anti-erosion capability of the geocomposite during a flow; the allowable shear stresses on the geocomposite have been evaluated according to different durations of the flood event. The diagram on the right side reports the results of this research about vegetated and unvegetated mats.

More detailed information about these tests are available on request contacting our technical teams.



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