

Installation Guidelines

MacMat® is manufactured with one rough and one smooth surface. The material should be unrolled onto the slope with the smooth side in contact with the soil.

Site preparation

- Grade and compact the slope to a smooth even surface.
- Leave the last 25-50 mm layer of soil loose to minimize soil pockets and improve seed germination.
- When used as an erosion control mat, the seed and fertilizer can be applied either before or after the MacMat® is installed.
- When used as turf reinforcement, place the top soil and seed (or hydroseed) after the MacMat® has been installed.

Anchoring

- Use 150-300 mm U-shaped, 8 gauge, metal staples to anchor the mat to the slope.
- Fasten anchors through the TRM and drive flush with the soil surface to provide the maximum pullout strength and slope stability.

Tie-down trenching

- A simple fold into the slope is normally sufficient to anchor MacMat® R. For highly erodible soils, excavate a trench approximately 300 mm deep by 300 mm wide and anchor the mat along the bottom of the trench.
- Backfill and compact to an even surface.

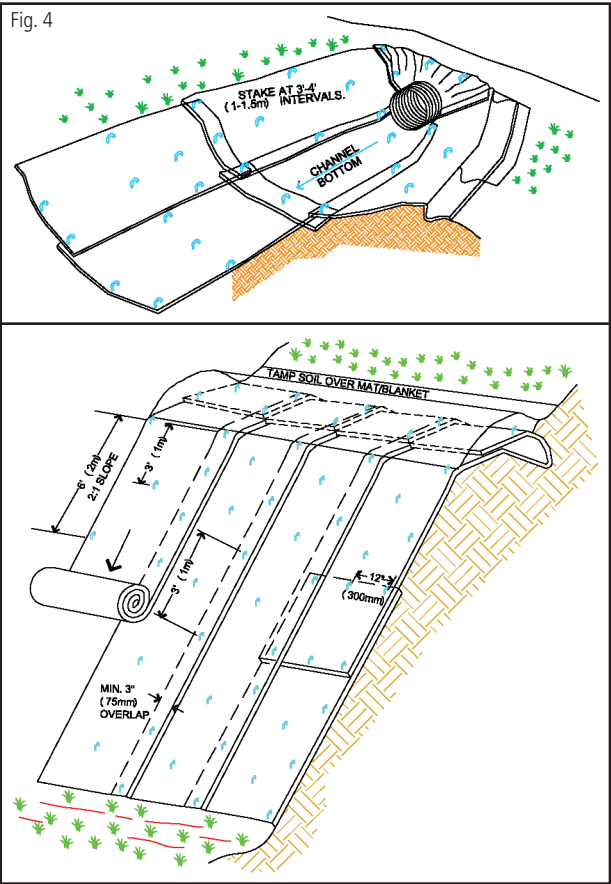
Channel linings

- For channel linings, lay the MacMat® parallel to the direction of the flow (see Fig. 4).
- Adjacent panels of MacMat® should be overlapped like shingles.

Anchor spacing and overlapping

The user shall establish the anchor specifications and spacing recommendations depending upon the existing soil and site conditions. Typical details (see Fig. 4) are:

- Space anchors at 1 m intervals along the top edge of the embankment slope and along the bottom of the tie-down trench 600-900 mm back from the top edge of the slope.



- For slope angles of 1:1 (or flatter) and channel linings, install anchors at 1 m intervals perpendicular to the angle of the slope and 1.2 m intervals (staggered) parallel to the angle of slope. For steeper slopes, comply with the engineer's recommendations.
- MacMat® edges shall be anchored together with a minimum of 75-100 mm overlap.
- MacMat® R does not need to be overlapped. The integral steel wire mesh enables adjacent panels to be connected directly to one another using staples or "hog rings", depending upon your application.



After installation and before vegetation



Adjacent MacMat® R panels connected using "hog rings"



After vegetation



Permanent Soil Erosion Control Mats
MacMat®

MACCAFERRI

MACCAFERRI

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Erosion Protection for Vulnerable Surfaces

Erosion of soil from embankments and channels is a serious problem. It becomes critical when the erosion results in expensive structural damage to infrastructure or when it leads to the pollution of watercourses. Relying upon vegetation growth alone is very unpredictable and unreliable as it is extremely difficult to achieve 100% vegetation coverage, leaving exposed areas vulnerable to erosion. Furthermore, vegetation can die back or become diseased, reducing the erosion control capability.

Turf Reinforcement Mats (TRMs)

Maccaferri's MacMat® and MacMat® R are TRMs: three dimensional permanent erosion control mats composed of UV stabilized, non-degradable synthetic fibers. MacMat® R has an additional structural skeleton of Maccaferri double twisted steel wire mesh within the polymer matrix (see Fig. 1).

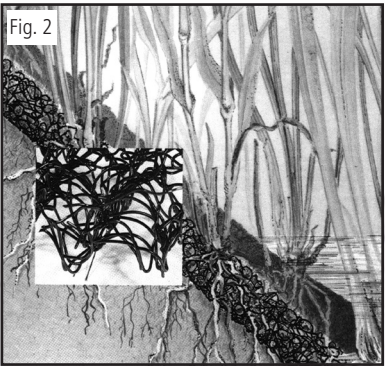
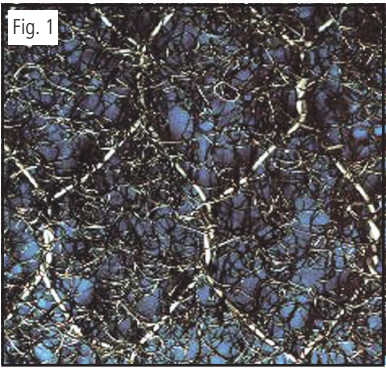
MacMat® immediately increases the soil's resistance to erosion by providing an environment that enhances the growth of vegetation through the mat (see Fig. 2).

Supplied in rolled form, MacMat® is anchored to the surface to be protected using staples or pins. Topsoil is brushed into the voids within the matrix. Seed can be applied to the surface before or after MacMat® is installed as vegetation will develop unhindered by the matrix.

- MacMat® solutions protect the soil surface by:
- Providing immediate protection of exposed areas from direct effects of wind and rainfall impact
 - Protecting seeded topsoil from washing out before vegetation has established
 - Creating an environment that enhances the growth of vegetation through the mat
 - Reinforcing the root system of plants, further binding the soil surface and increasing shear resistance of the surface
 - Reducing the velocity and volume of run-off flow by increasing water percolation into the soil

MacMat® and MacMat® R have a high roughness, yet are also 95% voids. Unlike other TRMs in the market, this 95% void volume is easily accessible to soil and seeds due to the random open configuration of the polymer fibers within the matrix.

Therefore, the polymer matrix provides superior retention of hydroseeding, allowing seed to easily percolate through the mat and into contact with the nutritious topsoil beneath. This is essential to give seeds the best possible opportunity to germinate.



MacMat® & MacMat® R Protection Applications

- Highway embankments
- Channel linings
- Slopes and embankments
- Railway cuttings

The tensile strength of MacMat® R with its integral steel wire mesh facilitates its use in other structural applications:

- Used in conjunction with soil-nailing / ground anchors to reinforce structurally unstable slopes
- Replaces the lid of Reno mattresses and gabions to rapidly establish vegetation within the mattress by trapping and containing silts and seeds in the flow

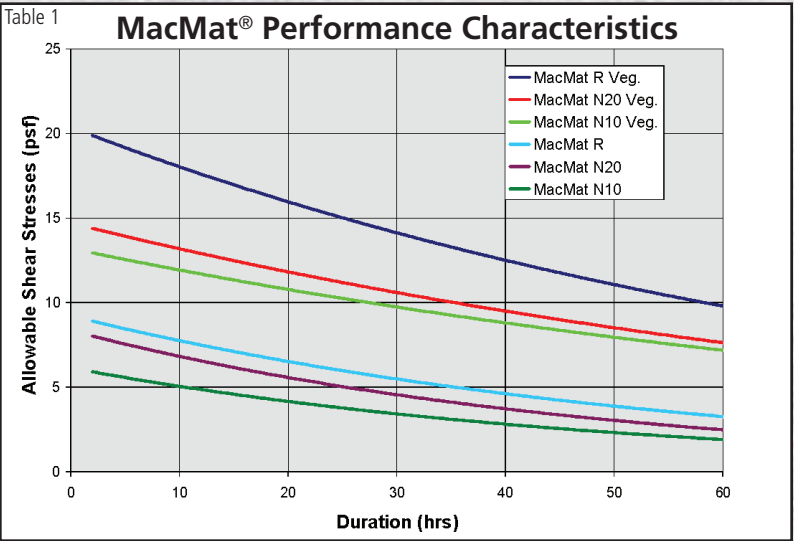


Table 2					
MacMat® Physical Characteristics					
Style	Mesh Type	Wire Diameter mm	Thickness mm	Length m	Width m
MacMat® R6	6 x 8	2.2	10	25	2
MacMat® R8	8 x 10	2.7	20	25	2
MacMat® N10	N/A	N/A	10	152.5 / 27.5	1 / 1.9
MacMat® N20	N/A	N/A	17	84.5 / 27.5	1 / 1.9
MacMat® R6 and MacMat® R8 are available in Galfan® coated or Galfan® and PVC coated wire. Note: All sizes and dimensions are nominal. Please see the separate MacMat® technical data sheets available from Maccaferri or www.maccaferri.ca .					

MacMat® Research and Development

Maccaferri is committed to the improvement of its solutions through research and development.

The Utah State Water Research Laboratory was commissioned to identify the shear stress limits of MacMat® under various hydraulic conditions within highly erodible channels.

Both vegetated and unvegetated MacMat® solutions were tested in a 1.2 m wide flume at various water velocities, ranging from 0.6 m/s to 6 m/s, for periods of up to 60 hours.

The following conclusions were drawn from the testing regime:

- The presence of the reinforcing steel wire mesh (in MacMat® R) improves the performance of the mat, especially after vegetation has established.
- The selection of the appropriate erosion control solution must be based upon its stability during the critical period of vegetation establishment—i.e. always base the design upon unvegetated performance parameters, so that soil erosion is minimized. By keeping the soil in place throughout the growing period, the solution maximizes the potential for vegetation to establish successfully.
- Vegetation established through the erosion control material will contribute to the formation of a thicker, stronger and more durable layer of reinforced soil surface.

MacMat® Design Criteria

Various factors affect the erosive action of water (rainfall runoff or flow) and have to be considered when evaluating erosion control solutions:

- Flow velocity
- Flow depth
- Bank slope angle
- Water course geometry
- Flood / storm duration
- Adherence of the protection to the slope
- Effectiveness of the protection at the toe of the slope

Design parameters for MacMat® TRMs were generated by applying Factors of Safety to the results of the Utah State research, to allow for variables in the design process.

Table 1 shows the allowable design shear stresses for MacMat® solutions resulting from the research.

