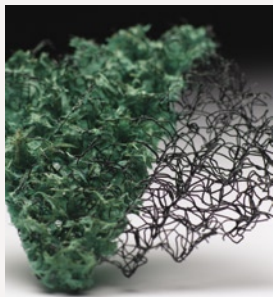
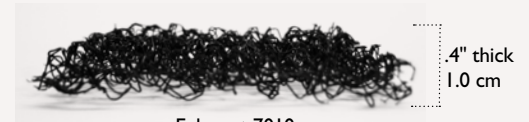


# GreenArmor™ 7010

## Extend the Boundaries of Natural Vegetation



The GreenArmor™ System begins with Enkamat® TRM (Turf Reinforcement Mat), which provides a permanent, lofty and open matrix. It is then hydraulically infilled with Flexterra® FGM™ (Flexible Growth Medium™) to intimately bond soil and seeds while accelerating growth. This unique system protects against elevated levels of hydraulic lift and shear forces while encouraging turf establishment and long-term root reinforcement. The synergistic combination of cost effective technologies enables the GreenArmor System to provide unprecedented levels of design safety.



Enkamat 7010



Enkamat 7020

### GENERAL

#### 1.01 SUMMARY

##### (Section 35 43 00 - Permanent Geosynthetic Turf Reinforcement Mat)

- A. This section specifies a permanent Geosynthetic Turf Reinforcement Mat (TRM) with Flexible Growth Medium (FGM) infill, to prevent long-term soil and vegetation loss resulting from excessive water flow (velocity and shear stress) in which unreinforced vegetation could not resist. The FGM provides immediate and temporary protection against movement and/or loss of soil until vegetation can be established. The FGM infill also provides an ideal environment for rapid seed germination and accelerated plant and root establishment within the matrix of the TRM.
- B. Related Sections: Other Specification Sections, which directly relate to the work of this Section include, but are not limited to the following:
1. Section 01 57 13 - Temporary Erosion and Sedimentation Controls
  2. Section 31 25 00 - Erosion and Sedimentation Controls
  3. Section 31 35 00 - Slope Protection

4. Section 32 91 00 - Planting Preparation
5. Section 32 92 00 - Turf and Grasses
6. Section 35 30 00 - Shoreline Protection

#### 1.02 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions. Include required substrate preparation, list of materials and application rate.
- B. Certifications: Manufacturer shall submit a letter of certification that the product meets or exceeds all physical property, endurance, performance and packaging requirements.

#### 1.03 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials and products in UV and weather-resistant factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from damage, weather, excessive temperatures and construction operations.

### PRODUCTS

#### 2.01 MANUFACTURERS/OR THEIR REPRESENTATIVES

- A. PROFILE Products LLC  
750 Lake Cook Road—Suite 440  
Buffalo Grove, IL 60089  
800-508-8681 (Fax 847-215-0577)  
[www.profileproducts.com](http://www.profileproducts.com)

#### 2.02 MATERIALS

- A. Turf Reinforcement Mat shall be Enkamat 7010, manufactured for the purpose of permanent channel lining and turf reinforcement. The TRM shall be made from 100% synthetic material and contain no biodegradable or photodegradable components or materials.
1. The TRM shall be a homogeneous, three-dimensional matrix made of continuous monofilament yarns which are thermally fused at the crossover points to provide a structure that will maintain its three dimensional stability without laminated or stitched layers. No nettings or stitching shall be permitted. The TRM shall have a sufficient Area Holding Capacity and a minimum 95% open space available for soil, FGM and root interaction. The TRM shall not lose its structural integrity and shall not unravel or separate when TRM is cut in the field.
  2. The TRM shall exhibit no buoyancy factor (i.e., the specific gravity of the fibers used should be greater than 1.0) so as to allow the TRM to maintain intimate contact with the soil (particularly between fasteners) under low flow or submersed conditions.

3. The TRM, when infilled with FGM, shall meet the property values noted.
- B. Flexible Growth Medium for hydraulic infill of TRM shall be Flexterra® FGM™ and conform to the property values as presented in the Flexterra data sheet.

All components of the FGM shall be pre-packaged by the Manufacturer to assure material performance and in compliance with the following values. **Under no circumstances will field mixing of additives or components be accepted.**

Thermally Processed Wood Fibers – 74.5% ± 3.5%

Proprietary Crosslinked Hydro-Colloid Tackifiers and Activators – 10% ± 1%

Proprietary Crimped, Interlocking Fibers – 5% ± 1%

Moisture Content – 10.5% ± 1.5%

## EXECUTION

### 3.01 PREPARATION

- A. The installation site shall be prepared by clearing, grubbing and excavation or filling the area to the design grade.
- B. The surface to receive the TRM shall be prepared to relatively smooth conditions free of obstructions, rocks, dirt clods, roots, stumps, depressions, debris and soft or low density pockets of material. The material shall be capable of supporting a vegetative cover.
- C. Erosion features such as rills, gullies, etc. must be graded out of the surface before TRM deployment. Smooth roll drum compaction will be required before deploying TRM to make sure the TRM makes immediate contact with the soil and to ensure that the soil has been compacted.
- D. Cut trenches for initial anchor trenches, termination trench and longitudinal anchor trenches (12 inches wide and 12 inches in depth) as shown on the drawings.

### 3.02 INSTALLATION

- A. Care shall be taken during installation to avoid damage occurring to the TRM as a result of the installation process. Should the TRM be damaged during installation, a TRM patch shall be placed over the damaged area extending 1 m (3.28 ft) beyond the perimeter of the damage.
- B. Install anchoring devices at a frequency of 2½ pins/staples per square yard. Additional anchoring devices may be required depending on site conditions or alignment of the slope or channel. Always staple (1' centers) the seams between individual TRM rolls.
- C. When overlapping successive TRM rolls, the rolls shall be overlapped upstream over downstream and/or upslope over downslope.
- D. For channels, begin at the downstream end in the center of the channel. Inspect trenches for position accuracy and depth and re-dig to required dimensions. If trenches have not yet been constructed, dig initial anchor trenches, check slot trenches and longitudinal anchor trenches as illustrated in installation guidelines or as directed on the plans. Unroll

	TEST METHOD	ENGLISH	SI
<b>PHYSICAL</b>			
Mass Per Unit Area	ASTM D6566	19.5 oz/yd <sup>2</sup>	661 g/m <sup>2</sup>
Thickness	ASTM D6525	0.40 in	10 mm
Tensile Strength - MD	ASTM D6818	170 lb/ft	2.5 kN/m <sup>2</sup>
Light Penetration	ASTM D6567	1.0%	1.0%
Ground Cover	ASTM D6567	99.0%	99.0%
Absorption	ASTM D1117	498.0%	498.0%
UV Resistance	ASTM D7238 & D6818	80.0%	80.0%
Bench Scale C-Factor <sup>2</sup> (average)	ASTM D7101	0.01	0.01
Resiliency	ASTM D6524	90.0%	90.0%
<b>ENDURANCE</b>			
Functional Longevity <sup>1</sup>	Observed	> 36 months	> 36 months
<b>PERFORMANCE</b>			
C-Factor	Large Scale <sup>3</sup>	0.01	0.01
Manning's n Range	ASTM D6460	0.022 - 0.045	0.022 - 0.045
Permissible Vegetated Shear	ASTM D6460	8.0 lb/ft <sup>2</sup>	0.38 kN/m <sup>2</sup>
Permissible Vegetated Velocity	ASTM D6460	16.0 ft/s	4.9 m/s
Permissible Unvegetated Shear	ASTM D6460	3.3 lb/ft <sup>2</sup>	0.16 kN/m <sup>2</sup>
Permissible Unvegetated Velocity	ASTM D6460	12.0 ft/s	3.7 m/s
Vegetation Establishment	ASTM D7322	800%	800%

1. Functional longevity depends on moisture, light and environmental conditions.

2. Cover Factor is calculated as soil loss ratio of treated surface versus an untreated control surface.

3. Large scale testing conducted at Utah Water Research facility using rainfall simulator on 2.5H:1V slope, sandy-loam soil, at a rate of 5" per hour for a duration of 60 minutes.

- approximately 10' of the TRM, positioning the roll face down (as it unrolls) over the initial anchor trench, extending several inches beyond the trench with the roll sitting on the down stream side of the anchor trench. Positioning roll in this manner permits backfilling and compaction of soil into the trench while allowing installer to proceed with proper deployment of TRM by unrolling upstream, over the anchor trench.
- E. Position second TRM with a minimum 4-inch overlap of the previous TRM and secure it into the anchor trench. After entire width area is installed with the TRM, then backfill and compact the anchor trench.
- F. Continue deploying TRM upstream to the next check slot. Overlay a minimum of 18 inches the ends of rolls with the next roll(s) being deployed, or position in bottom of check slot, anchor and backfill and compact check slots. Continue the processes until you reach the upstream starting point of the TRM.
- G. For slopes, construct top anchor trench 1-3' beyond crest of slope, or as illustrated in drawings or shown in manufacturers recommended installation guidelines. Position TRM roll at crest of slope with sufficient material to line the entire anchor trench plus enough material left over to cover the trench. Position adjacent rolls to facilitate 6" overlaps. Anchor TRM in trench with appropriate pins/staples at 1' centers. Once several rolls are anchored in trench, begin to backfill and compact trench to original elevation. The preferred method of deploying roll down slope is to stand in front of the roll and pin it as it rolls out down the

slope, minimizing foot traffic on TRM, which will eliminate depressions under the mat. Always allow the mat to drape over the soil, never pulling it taut, to minimize tenting. Place additional pins into any apparent depressions to maintain contact with the soil.

- H. Hydraulically fill the TRM with 0.35 inches of FGM, applied with hose at close range. Optimum application rate is 3500 lbs/acre or to the depth of where the tips of TRM are still exposed.
- I. Strictly comply with FGM manufacturer's installation instructions and recommendations. For optimum FGM pumping and application performance, use approved mechanically agitated, hydraulic seeding/mulching machines, hose of sufficient length to reach the TRM, use of a 50 degree tip/nozzle is highly recommended. Apply FGM from hose positioned over shoulder with nozzle approximately at chest level (48-60") to achieve optimum TRM infill.
- J. For optimum hydraulic performance and vegetative establishment, be careful not to overfill the TRM. The tips of the TRM shall be slightly exposed.
- K. Apply supplemental water over the area as directed by site personnel during germination and initial three months of vegetation growth.

### 3.03 CLEANING AND PROTECTION

- A. Clean spills promptly. Advise owner of methods for protection of treated areas. Do not allow treated areas to be trafficked or subjected to grazing.

**An electronic text file of this CSI formatted specification can be obtained by contacting a technical service representative at 800-508-8681.**

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