



HIGH PERFORMANCE TURF REINFORCEMENT MAT (HP-TRM) THE NEXT GENERATION OF HIGH MODULUS TURF REINFORCEMENT

PP5-Xtreme™ represents the next generation of HP-TRMs. By providing high performance faster, yielding greater performance, and meeting or exceeding all requirements for an HP-TRM, PP5-Xtreme™ is extending the capabilities and reliability of vegetated armor systems.

PP5-Xtreme™ is a fully synthetic, UV stable, High Performance Turf Reinforcement Mat (HP-TRM) manufactured by weaving continuous, synthetic thread elements by way of a proprietary (patent pending) process to form a lofty, three-dimensional pattern. The product is a woven, homogeneous, single layer HP-TRM that contains no lamination or stitching. The proprietary manufacturing process yields a material that provides outstanding strength at low strain, meaning more strength faster. Finally, PP5-Xtreme™ is resistant to environmental and climatic conditions. Physical properties of PP5-Xtreme™ are presented in Table 1. Table 2 presents a summary of the material performance properties (mechanical). Table 3 presents hydraulic performance properties of the product.

The industry leading strength of PP5-Xtreme™ is demonstrated by the ultimate tensile strength, tensile strength at 15% strain and the initial tangent modulus. By providing higher strength at a lower strain, the HP-TRM strength is mobilized faster to resist anticipated high loading/maintenance conditions. PP5-Xtreme™ meets the definition of an HP-TRM at 15% strain, faster than any other HP-TRM. The high initial tangent modulus shows PP5-Xtreme™ ideal for resisting the forces of wheel loading, the abrasion of debris loading and high-strength anchoring for Anchor Reinforced Vegetated Systems (ARVS). Additionally, the hydraulic performance envelope, quantified in Table 3, shows extraordinary thresholds for resisting the forces of flowing water. The unique blend of material physical properties (Table 1) yields a mulching layer well-suited for the establishment of vegetation from seed or sod, as evidenced by the Vegetation Establishment values shown in Table 2. Finally, the UV stability of the material provides confidence in long-lasting field performance.

Each roll of PP5-Xtreme™ is manufactured under Western Excelsior's Quality Assurance Program to ensure consistent coverage, mass and strength. Quality control testing is performed at a GAI-LAP accredited facility in compliance with ASTM D4354. The material is made in the USA.

Table 1- Material Physical (Index) Properties

Property	Test Method	Value
Mass Per Unit Area ²	ASTM D6566	9.2 oz/yd ² (312 g/m ²)
Thickness ²	ASTM D6525	0.3 in (8 mm)
Light Penetration ²	ASTM D6567	30 % open
Porosity ²	Computed	96 %

Table 2- Material Performance Properties

Property	Test Method	Value
Tensile Strength (MD) x (TD) ¹	ASTM D6818	4000 lb/ft (59 kN/m) x 3000 lb/ft (44 kN/m)
Elongation (MD) x (TD) ²	ASTM D6818	25 % x 20 %
Tensile Strength (MD) x (TD) @ 15% Strain ²	ASTM D6818	3000 lb/ft (44 kN/m) x 3000 lb/ft (44 kN/m)
Initial Tangent Modulus (MD) x (TD) ²	ASTM D6818	10.5 kip/ft (12.8 kN/m) x 17.5 kip/ft (213 kN/m)
UV Stability ²	ASTM D4355 ASTM D7238	100% (500hr) 90% (6000hr)
Vegetation Establishment ²	ASTM D7322	552%

Table 3- Hydraulic Performance Properties

Property	Test Method	Value
Maximum Permissible Vegetated Shear Stress	ASTM D6460	17 psf (814 PA)
Maximum Permissible Vegetated Velocity	ASTM D6460	25 fps (7.6 m/s)
Permissible Vegetated Shear Stress @ 20-30% Coverage	ASTM D6460	5 psf (239 PA)
Permissible Vegetated Velocity @ 20-30% Coverage	ASTM D6460	12 fps (3.7 m/s)
Permissible Vegetated Shear Stress @ 60-70% Coverage	ASTM D6460	12 psf (575 PA)
Permissible Vegetated Velocity @ 60-70% Coverage	ASTM D6460	16 fps (4.4 m/s)
HEC-15 (Tau-veg/Tau-TRM)	ASTM D6460	0.26

1) MARV/MIN 2) Typical

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