Section 31 25 14.13 – Hydraulically-Applied Erosion Control Engineered Fiber Matrix™

GENERAL

1.01 SUMMARY

A. This section specifies the hydraulically-applied erosion control product ProMatrix™ Engineered Fiber Matrix™ (EFM™). ProMatrix EFM is 100% biodegradable, made in the United States and is composed of 100% recycled, thermally refined (within a pressurized vessel) virgin wood fibers, crimped interlocking biodegradable fibers, mineral activators and wetting agents (including high-viscosity colloidal polysaccharides, cross-linked biopolymers, and water absorbents). The EFM is phytosanitized, free from plastic netting, and when cured forms an intimate bond with the soil surface to create a continuous, porous, absorbent and flexible erosion resistant blanket that allows for rapid germination and accelerated plant growth. The EFM performs as a Bonded Fiber Matrix (BFM) product and may require a 4-24 hour curing period to achieve maximum performance.

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 00 – Temporary Erosion and Sediment Control*
2. *Section 02 24 23 – Chemical Sampling and Analysis of Soils*
3. *Section 31 00 00 – Earthwork*
4. *Section 31 91 00 – Planting Preparation*
5. *Section 32 01 90.16 – Amending Soils*
6. *Section 32 92 00 – Turf and Grasses*

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 technical and packaging requirements and is made in the U.S.A.

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 ACCEPTABLE MANUFACTURER

A. PROFILE Products LLC
750 Lake Cook Road – Suite 440
Buffalo Grove, IL 60089
International - +1-847-215-1144
United States and Canada – 800-366-1180 (Fax 847-215-0577)
www.profileproducts.com

2.02 MATERIALS

A. The EFM shall be ProMatrix EFM and conform to the following typical property values when uniformly applied at a rate of 3,500 pounds per acre (3,900 kilograms/hectare) under laboratory conditions.

Property	Test Method	Tested Value (English)	Tested Value (SI)
Physical			
Mass Per Unit Area	ASTM D6566[1]	≥ 11.6 oz/yd^2	≥ 390 g/m^2
Thickness	ASTM D6525[1]	≥ 0.16 inch	≥ 4 mm
Ground Cover	ASTM D6567[1]	≥ 98 %	≥ 98%
Water Holding Capacity	ASTM D7367	≥ 1,400%	≥ 1,400%
Material Color	Observed	Green	Green
Performance			
Cover Factor[2]	Large Scale Testing[4]	≤ 0.05	≤ 0.05
% Effectiveness[3]	Large Scale Testing[4]	≥ 95 %	≥ 95 %
Cure time	Observed	4 – 24 hours	4 – 24 hours
Vegetation Establishment	ASTM D7322[1]	≥ 600 %	≥ 600 %
Functional Longevity[5]	ASTM D5338	≤ 12 months	≤ 12 months
Environmental			
Ecotoxicity	EPA 2021.0	48-hr LC_{50} > 100%	48-hr LC_{50} > 100%
Biodegradability	ASTM D5338	Yes	Yes

1. ASTM test methods developed for Rolled Erosion Control Products and have been modified to accommodate Hydraulically-Applied Erosion Control Products.
2. Cover Factor is calculated as soil loss ratio of treated surface versus an untreated control surface.
3. % Effectiveness = One minus Cover Factor multiplied by 100%.
4. Large scale testing conducted at Utah Water Research Laboratory. For specific testing information please contact a Profile technical service representative at 800-508-8681 (US and Canada) or +1-847-215-1144 (International).
5. Functional Longevity is the estimated time period, based upon ASTM D5338 testing and field observations, that a material can be anticipated to provide erosion control and agronomic benefits as influenced by composition, as well as site-specific conditions, including; but not limited to – temperature, moisture, light conditions, soils, biological activity, vegetative establishment and other environmental factors.

2.03 COMPOSITION

A. All components of the EFM shall be pre-packaged by the Manufacturer to assure both material performance and compliance with the following values. Under no circumstances shall field mixing of components be permitted. No chemical additives with the exception of fertilizer, soil neutralizers and biostimulant materials should be added to this product.

1. Thermally Processed* (within a pressurized vessel) Virgin Wood Fibers – 77%
   *Heated to a temperature greater than 380 degrees Fahrenheit (193 degrees Celsius) for 5 minutes at a pressure greater than 50 psi (345 kPa)
2. Wetting agents (including high-viscosity colloidal polysaccharides, cross-linked biopolymers, and water absorbents) – 18%
3. Crimped Biodegradable Interlocking Fibers – 2.5%
4. Micro-Pore Granules – 2.5%

2.04 PACKAGING

A. Bags: Net Weight – 50 lb (22.7 kg), UV and weather-resistant plastic film
Pallets: Weather-proof, stretch-wrapped with UV resistant pallet cover
Pallet Quantity: 40 bags/pallet or 1 ton (909 kg)/pallet

EXECUTION

3.01 SOIL TESTING

A. Soil Samples shall be taken and sent to a third-party, independent lab for analysis and in compliance with Section 02 24 23 – Chemical Sampling and Analysis of Soils, if applicable.

B. The tests shall include analysis and interpretation of results.

C. The soil testing methods used shall be compliant with recognized agronomic testing standards, as outlined in Section 02 24 23, for revegetation of disturbed sites.

D. Soil Analysis shall include results for:

1. Soil pH
2. Soluble Salts
3. Excess Carbonate
4. Organic Matter
5. Nutrient readings for:
    i. Nitrogen, Phosphorus, Potassium
    ii. Magnesium, Calcium, Sodium, Manganese, Sulfur, Zinc, Copper, Iron, Boron
6. Cation Exchange Capacity
7. Percent Base Saturation Sodium

E. ProGanics® BSM, BioPrime™, JumpStart™, Aqua-pHix™ and NeutraLime™ Dry or other amendments shall be specified according to Section 32 01 90.16 – Amending Soils and applied with the hydroseeding slurry at Manufacturer recommended rates based on soil test results.

3.02 VEGETATION SPECIES SELECTION

A. Once soils have been analyzed for agronomic potential and amendment recommendations, selection of suitable plant species for achieving sustainable growth and effective erosion control shall be determined by a qualified seed supplier, consulting professional and/or regulatory agency. Species selection and establishment shall be compliant with Section 32 92 00 – Turf and Grasses, if applicable.

B. Site and project specific information considered for species selection shall include:

1. Project Location and Planning
    i. Climate
    ii. Elevation
    iii. Aspect
    iv. Slope/Gradient
    v. Permanent or Temporary Planting
    vi. Installation Date(s)
2. Soil Conditions
    i. Soil Texture
    ii. Soil pH
    iii. Toxicities/Deficiencies noted in the previous section.
3. Site Maintenance Requirements
    i. Mowing
    ii. Irrigation
    iii. Animal grazing preference
4. Preferred Vegetation
    i. Drought Tolerant
    ii. Native Vegetation
    iii. Shrub Species
    iv. Turf Grasses

v. Cool Season
vi. Warm Season
vii. Blend of Cool and Warm Season
viii. Legume Species
ix. Cover Crops

3.03 SUBSTRATE AND SEEDBED PREPARATION

A. Examine substrates and conditions where materials will be applied. Apply products to geotechnically stable slopes that have been designed and constructed to divert runoff away from the face of the slope. Do not proceed with installation until satisfactory conditions are established.

B. Depending upon project sequencing and intended application, prepare seedbed in compliance with other specifications under Section 1.01 B

3.04 INSTALLATION

A. Strictly comply with equipment manufacturer's installation instructions and recommendations. Use approved hydroseeding machines with fan-type nozzle (50-degree tip). To achieve optimum soil surface coverage, apply EFM from opposing directions to soil surface. Rough surfaces (rocky terrain, cat tracked and ripped soils) may require higher application rates to achieve 100% cover. Slope interruption devices or water diversion techniques are recommended when slope lengths (3H:1V) exceed 50 feet (15 m). Slope interruption intervals may need to be decreased based on steeper slopes or other site conditions. EFM is not recommended for channels or areas with concentrated water flow unless used in conjunction with a rolled erosion control product designed to accommodate the anticipated hydraulic conditions. Unless approved by the Manufacturer, no chemical additives with the exception of fertilizer, soil neutralizers and biostimulant materials should be added to this product.

B. For Erosion Control and Revegetation: To ensure proper application rates, measure and stake area. For maximum performance, apply EFM in a two-step process*:

1. *Step One: Apply fertilizer with specified prescriptive agronomic formulations and typically 50% of specified seed mix with a small amount EFM for visual metering. Do not leave seeded surfaces unprotected, especially if precipitation is imminent.*
2. *Step Two: Mix balance of seed and apply EFM at a rate of 50 lb per 83.3 gallons (22.7 kg/316 liters) of water over freshly seeded surfaces. Confirm loading rates with equipment manufacturer.*

**Depending upon site conditions EFM may be applied in a one-step process where all components may be mixed together in single tank loads. Consult with Manufacturer for further details.*

Best results and more rapid curing are achieved at temperatures exceeding 60°F (15°C). Curing times may be accelerated in high temperature, low humidity conditions with product applied on dry soils.

C. Mixing: A mechanically agitated hydroseeding machine is strongly recommended:

1. *Fill 1/3 of mechanically agitated hydroseeder with water. Turn pump on for 15 seconds and purge and pre-wet lines. Turn pump off.*
2. *Turn agitator on and load low density materials first (i.e. seed).*
3. *Continue slowly filling tank with water while loading fiber matrix into tank.*
4. *Consult application and loading charts to determine number of bags to be added for desired area and application rate. Mix at a rate of 50 lb per 83.3 gallons (22.7 kg/316 liters).*
5. *All EFM should be completely loaded before water level reaches 75% of the top of tank.*
6. *Top off with water and mix until all fiber is fully broken apart and hydrated (minimum of 10 minutes — increase mixing time when applying in cold conditions). This is very important to fully activate the bonding additives and to obtain proper viscosity.*
7. *Add fertilizer and any other remaining amendments.*
8. *Shut off recirculation valve to minimize potential for air entrainment within the slurry.*
9. *Slow down agitator and start applying with a 50-degree fan tip nozzle.*
10. *Spray in opposing directions for maximum soil coverage.*

D. Application Rates: These application rates are for standard conditions. Designers may wish to increase application rates on rough surfaces.

Slope Gradient / Condition	English	SI
≤ 3H to 1V	3,000 lb/ac	3,400 kg/ha
> 3H to 1V and ≤ 2H to 1V	3,500 lb/ac	3,900 kg/h
> 2H to 1V and ≤ 1H to 1V	4,000 lb/ac	4,500 kg/ha

For additional details including mixing ratios/loading rates for specific machine sizes and visual keys for proper application, please consult Profile® Application Guide for Engineered Fiber Matrix™.

3.05 CLEANING AND PROTECTION

A. After application, thoroughly flush the tank, pumps and hoses to remove all material. Wash all material from the exterior of the machine and remove any slurry spills. Once dry, material will be more difficult to remove.

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

3.06 INSPECTION AND MAINTENANCE

A. All inspections and maintenance recommendations shall be conducted by qualified professionals consistent with the owner, engineer/specifier and regulatory entity(s) expectations.

B. Initial inspections shall insure installations are in accordance with the project plans and specifications with material quantities and activities fully documented. Refer to Section 32 92 00 – Turf and Grasses for any additional details.

C. Subsequent inspections shall be conducted at pre-determined time intervals and corrective maintenance activities directed after each significant precipitation or other potentially damaging weather or site event.

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