

Section 32 92 19.16 – Hydraulic Seeding: High-Efficiency Hydraulic Mulch – HydroStraw® Bonded Fiber Matrix (BFM)

GENERAL

1.01 SUMMARY

- A. This section specifies the hydraulically-applied, erosion control product HydroStraw® High-Efficiency (HE) Bonded Fiber Matrix (BFM). HydroStraw HE BFM is 100% biodegradable, made in the United States and composed of renewable Heat & Mechanically Treated™ (HMT™) wheat straw fibers, refined pulp fibers and wetting agents (including cross-linked high-viscosity colloidal polysaccharides). The BFM shall contain no weed seeds or plastic components and upon application forms an intimate bond with the soil surface to create a porous, absorbent and flexible erosion resistant blanket that allows for rapid germination and accelerated plant growth.
- 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 USA.

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 +1-847-215-0577)
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2.02 MATERIALS

- A. The High-Efficiency Bonded Fiber Matrix shall be HydroStraw® HE BFM and conform to the following property values when uniformly applied at a rate of 3,000 pounds per acre (3,360 kilograms/hectare) under laboratory conditions:

Property	Test Method	Tested Value (English)	Tested Value (SI)
Physical			
Specification for Hydraulically-Applied Wheat Straw	ASTM D8202	Yes	Yes
Water Holding Capacity	ASTM D7367	≥ 1,200%	≥ 1,200%
ISTA Weed Free ¹	Purity Analysis	Pass	Pass
Color	Observed	Green	Green
Performance			
Cover Factor ²	ASTM D8298 – Type 1	≤ 0.05	≤ 0.05
% Effectiveness ³	ASTM D8298 – Type 1	≥ 95%	≥ 95%
Cure time ⁴	Observed	4 – 24 hours	4 – 24 hours
Vegetation Establishment	ASTM D7322	≥ 450%	≥ 450%
Functional Longevity ⁵	Observed	≤ 6-12 months	≤ 6-12 months
Environmental			
Ecotoxicity ⁶	EPA 2021.0	48-hr LC ₅₀ > 100%	48-hr LC ₅₀ > 100%
Elemental Impurity Limits	ASTM D8082	Pass	Pass
Biodegradability	ASTM D5338	Yes	Yes
USDA Certified			
Biobased Content ⁷	ASTM D6866	100%	100%

1. During manufacturing HMT Wheat Straw fibers are steamed to 212° Fahrenheit (100° Celsius) and later analyzed by an accredited International Seed Association (ISTA) Laboratory.
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. Cure time is time range required for product to fully dry and/or demonstrate erosion control effectiveness under non-saturated conditions.
5. Functional Longevity is 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.
6. 48-hr LC₅₀ refers to percent concentration of a substance in water when 50% mortality of an organism is reached. 50% mortality of the tested species (*Daphnia magna*) could not be achieved when subjected to 100% effluent concentration proving the material to be acutely non-toxic.
7. BioPreferred® Program is USDA-led initiative to assist in development and expansion of markets for biobased products.

2.03 COMPOSITION

- A. All components of the BFM shall be pre-packaged by the Manufacturer to assure both material performance and compliance with the following values. No chemical additives with the exception of fertilizer, liming and biostimulant materials should be added to this product.
1. Heat & Mechanically Treated™ (HMT™) Wheat Straw – 60%
 2. Refined Pulp Fibers – 30%
 3. Wetting Agents (including high-viscosity colloidal polysaccharides, cross-linked biopolymers and water absorbents) – 10%

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. Test reports shall include analysis and interpretation of results.
- C. 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 NeutralLime™ Dry or other amendments shall be specified according to Section 32 01 90.16 – Amending Soils and applied with 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 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 product to geotechnically stable slopes that have been designed and constructed to divert runoff away from 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 hydro-spraying machines with fan-type nozzle (50° tip). To achieve optimum soil surface coverage, apply BFM from opposing directions to soil surface. Rough surfaces (rocky terrain, cat tracks and ripped soils) may require higher application rates to achieve 100% cover. Slope interruption devices or water diversion techniques are recommended when slope lengths (on a 3H:1V gradient) exceed 50 feet (15.2 m). Slope interruption intervals may need to be decreased based on steeper slopes or other site conditions. BFM 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 Manufacturer, no chemical additives with the exception of fertilizer, liming and biostimulant materials should be added to this product.
- B. Erosion Control and Revegetation: To ensure proper application rates, measure and stake area. For maximum performance, apply BFM 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 of BFM for visual metering. Do not leave seeded surfaces unprotected, especially if precipitation is imminent.*
 - 2. *Step Two: Mix balance of seed and apply BFM at a rate of 75 lb per 100 gallons (34 kg / 379 liters) of water for tower applications or 60 lb per 100 gallons (27 kg / 379 liters) of water for hose application over freshly seeded surfaces. Confirm loading rates with equipment manufacturer.*

**Depending upon site conditions BFM 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 hydraulic-application machine is 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 75 lb of BFM per 100 gallons (34 kg/379 liters) for tower application or 60 lb per 100 gallons (27 kg/379 liters) of water for hose application. Contact Equipment manufacturer to confirm optimum mixing rates.*
 - 5. *All BFM 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 bonding additives and to obtain proper viscosity.*
 - 7. *Add fertilizer*
 - 8. *Shut off recirculation valve to minimize potential for air entrainment within slurry.*
 - 9. *Slow down agitator and start applying with a 50° fan tip nozzle.*
 - 10. *Spray in opposing directions for maximum soil coverage.*

- D. Application Rates: These application rates are for standard conditions. Designers may need to increase application rates on rough surfaces. Consult application and loading charts to determine number of bags to be added for desired area and application rate.

Slope Gradient / Condition	English	SI
≤ 3H to 1V	3,000 lb/ac	3,360 kg/ha
> 3H to 1V and ≤ 2H to 1V	3,500 lb/ac	3,920 kg/ha
> 2H to 1V and ≤ 1H to 1V	4,500 lb/ac	5,040 kg/ha

3.05 CLEANING AND PROTECTION

- A. Always flush residual slurry from hydraulic seeding/mulching equipment immediately following each application, at the end of each work period or when equipment will be left unattended. Compounds containing residual Urea, Nitrogen, Phosphorus, Potassium and other substances may form and can be hazardous to human health and equipment.
- 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 a Certified Professional in Erosion and Sediment Control (CPESC), Professional Engineer (PE) or other qualified professionals consistent with owner, engineer/specifier and regulatory entity(s) expectations.
- B. Initial inspections shall insure installations are in accordance with 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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