Section 31 25 14.13 – Hydraulically-Applied Erosion Control: Biotic Erosion Control Matrix

GENERAL

1.01 SUMMARY

A. This section specifies the Hydraulically-applied Biotic Erosion Control Matrix (BECM) ProGanics® DUAL™. ProGanics DUAL is non-toxic and contains bark and wood fibers that have been phyto-sanitized to eliminate potential weed seeds and pathogens. After phyto-sanitization, a proprietary blend of cross-linked, high-viscosity colloidal polysaccharide biopolymers, biochar, seaweed extract, humic acid, endomycorrhizae, beneficial bacteria, micro-pore granules and crimped, biodegradable interlocking fibers derived from regenerated plant sources are then added. The resulting ProGanics DUAL formulation will achieve Bonded Fiber Matrix (BFM) erosion control performance while acting to regenerate denuded soils and promote vegetative establishment. Upon application, ProGanics DUAL 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. ProGanics DUAL may require a 12-24 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 BECM shall be ProGanics DUAL and conform to the following typical property values when uniformly applied at a rate of 6,500 pounds per acre (7,290 kilograms/hectare) under laboratory conditions.

Property	Test Method	Tested Value (English)	Tested Value (SI)
Physical			
Topsoil & Engineered Soil Amendment	ASTM D5268-19	Compliant	Compliant
Organic Material	ASTM D586	$\geq$ 95%	$\geq$ 95%
Mass Per Unit Area	ASTM D6566[1]	≥ 21.4 oz/yd^2	≥ 729 g/m^2
Ground Cover	ASTM D6567[1]	≥ 99%	≥ 99%
Water Holding Capacity	ASTM D7367	≥ 850%	≥ 850%
pH	ASTM D1293	6.0 $\pm$ 1.0	6.0 $\pm$ 1.0
C:N Ratio	ASTM E1508 & EPA Method 1687	50:1 $\pm$ 10	50:1 $\pm$ 10
Material Color	Observed	Brown	Brown
Performance			
Cover Factor[2]	ASTM D8298-Type 1	≤ 0.05	≤ 0.05
% Effectiveness[3]	ASTM D8298-Type 1	≥ 95%	≥ 95%
Vegetation Establishment	ASTM D7322[1]	≥ 700%	≥ 700%
Functional Longevity[4]	ASTM D5338	≤ 12 months	≤ 12 months
Cure time	Observed	12 - 24 hours	12 – 24 hours
Environmental			
Ecotoxicity[5]	EPA 2021.0	Non-Toxic	Non-Toxic
Biodegradability	ASTM D5338	Yes	Yes
USDA BioPreferred Biobased Content	ASTM D6866	100%	100%
EPA 503 Metals – Pass/Fail	EPA 503 Metal Limits[6]	Pass	Pass
Pathogen Reduction	40 CFR 503 Class A Compost	Pass	Pass
Elemental Impurity Limits	ASTM D8082	Pass	Pass

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. Functional Longevity is the estimated time period, based upon 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.
5. 48-hour LC_{50} > 100% - LC_{50} refers to the percent concentration of a substance in water when 50% percent 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.
6. A list of Metals included in the EPA 503 Metal Limits Testing is available upon request.

2.03 COMPOSITION

A. All components of the BECM 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* Bark and Wood Fibers (within a pressurized vessel) – 85%
   *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. Proprietary Blend of cross-linked, high-viscosity colloidal polysaccharide biopolymers, biochar, seaweed extract, humic acid, endomycorrhizae, beneficial bacteria, and micro-pore granules - 11%
3. Crimped, Biodegradable Interlocking Fibers derived from regenerated cellulose sourced from sustainably harvested wood – 4%
4. Moisture Content – 12%

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. 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 is vital. Seed selection can be performed by a qualified seed supplier, consulting professional and/or regulatory agency. In lieu of this, a warm, extreme warm, or cool season Vegetator® variety mix can be utilized. 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 BECM 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 (on a 3H:1V gradient) exceed 50 feet (15 m). Slope interruption intervals may need to be decreased based on steeper slopes or other site conditions. BECM 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. Due to the higher application rates associated with this product and to achieve maximum performance, apply BECM using a layering process*:

    1. *Apply fertilizer with specified prescriptive agronomic formulations, seed and BECM mixed at a rate of 75 lb per 100 gallons (34 kg / 379 liters) of water over properly prepared surfaces.*

    **Layering of BECM is typically necessary to achieve higher application rates and more uniform coverage. Confirm loading rates with equipment manufacturer.*

    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. Do not apply if precipitation is imminent within 24-48 hours.

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 75 lb of BECM per 100 gallons of water (34 kg/379 liters). Contact Equipment manufacturer to confirm optimum mixing rates.*

5. *All BECM should be completely loaded before water level reaches 3/4 of tank capacity.*
6. *Add fertilizer and any other remaining amendments when tank is approximately 3/4 full.*
7. *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.*
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 on rough graded slopes. Designers and applicators may wish to increase application rates on cat tracked and extremely rough surfaces. If both Soil Organic Matter and Slope Gradient information are available, apply the higher rate of material per the two selection parameters.

% Soil Organic Matter	Slope Gradient / Condition	English (lb/ac)	Metric (kg/ha)
< 5.0 and ≥ 1.5	≤ 4H to 1V	4,000 lb/ac	4,480 kg/ha
< 1.5 and ≥ 0.75	> 4H to 1V and ≤ 3H to 1V	5,500 lb/ac	6,160 kg/ha
< 0.75	> 3H to 1V and ≤ 2H to 1V	6,500 lb/ac	7,290 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 BECM.

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 qualified professionals consistent with the owner, engineer/specifier and regulatory entity(ies) 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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