PECIFICATION FOR HYDRAULIC GROWTH MEDIUMS (HGMs) & ORGANIC SOIL AMENDING MATERIALS

PART 1 GENERAL
1.01 SUMMARY
This section specifies Hydraulic Growth Mediums (HGMs) composed from a combination of thermally and mechanically processed straw and flexible flax fibers; sphagnum peat moss or certified compost and other organic growth enhancing additives. The HGMs require no curing time, provides exceptional seedling germination and plant establishment, assist in soil building, and provides erosion control. The HGMs shall be one of the two as listed below based on their composition for different soil building, vegetation establishment and erosion control characteristics. All materials shall be prepackaged and at no time shall it be allowed for on site mixing of fiber materials.

A hydraulically-applied matrix containing a two part system composed of:

1. an organic fiber material component consisting of a combination of thermally and mechanically processed straw, flexible flax fibers, a minimum of 30% sphagnum peat moss or compost; and other growth enhancing additives which is a substance on or in which plants can be grown.

2. a soil chemistry and stabilizer material containing both long chain and cross-linking molecules in conjunction with a hydrocolloid based bonding agent.

The HGM shall be used to provide a substance on or in which plants can be grown, for seed germination, plant growth/establishment and soil building characteristics in conditions of marginal or extremely poor soils where there is minimal to no organic matter present.

HGMs are typically applied at a minimum rate of 3500 pounds per acre with 35-70 pounds per acre of the soil chemistry materials. Special application rate considerations are required depending on environmental and soil conditions along with erosion potential on the site.

Organic Fiber Materials - At no time will field mixing of organic fiber materials be allowed.

Type 1. HGM Green – shall be 70% by volume of thermally and mechanically processed straw, flexible flax fibers and 30% by volume sphagnum peat moss or compost. Type 1 material is for use on areas where a minimal amount of organic material >3% is present and there is some soil structure.

Type 2. HGM Black - shall be 40% by volume of thermally and mechanically processed straw, flexible flax fibers; 58% by volume of sphagnum peat moss or compost, 2% by volume of addition materials that provides plant derived valuable trace minerals, sugars, starches, proteins, fiber and 16 amino acids including folic acid, vitamin A, and tricontanol growth stimulant/regulator; and mycorrhiza inoculants. Type 2 material is for use on areas where <3% organic material is present or the soil has not supported growth in the last 18 months.

Soil Chemistry Materials

Type 1. Soil chemistry and stabilizer shall be a composition of materials made from long chain polymer and cross-linking molecules in conjunction with a hydrocolloid based bonding agent
to provide effective soil structure stabilization, water infiltration, and most importantly to adhere mulch to the soil surface. Type 1 material is for use on areas where a minimal amount of organic material is present and there is some soil structure.

Type 2. Soil chemistry and stabilizer shall be a composition of materials made from long chain polymer and cross-linking molecules in conjunction with a hydrocolloid vegetable gum based bonding agent to provide effective soil structure stabilization, water infiltration, and most importantly to adhere mulch to the soil surface. Type 2 material is for use on areas where no organic material is present and there is no soil structure.

1.02 SUBMITTALS
A. Product Data: Manufacturer or representative shall submit Application Rates Guide, Installation and Mixing Instructions, and Product Specifications.

B. Certifications: Manufacturer or representative shall submit a letter of certification that the products meets or exceeds all material composition requirements, laboratory testing properties, and product packaging requirements. Certification shall detail that the straw or fiber was processed at over 160 degrees Fahrenheit to ensure material is weed free.

1.03 DELIVERY, STORAGE, AND HANDLING
All materials shall be delivered in ultraviolet and weather resistant factory labeled packages. Material shall be store in a cool dry place away from open flames ensuring strict adherence to manufacturer recommendations.

PART 2 TESTING, COMPOSITION AND PACKAGING
2.00 TEST METHOD ENGLISH SI
Laboratory Analysis
Type 1. HGM Green
A. Sphagnum Peat Moss, Compost Content = Minimum 40% by volume (30%)
B. Thermally and mechanically Processed Straw/Flax Fibers = Minimum 60% by volume.
C. Total Organic Matter Content = minimum of 93%
D. Carbon:Nitrogen Ratio = maximum of 50:1
E. pH = 5-8

Type 2. HGM Black
A. Sphagnum Peat Moss, Compost Content = Minimum 57% by volume
B. Thermally and mechanically Processed Straw/Flax Fibers = Minimum 40% by volume.
C. Total Organic Matter Content = minimum of 93%
D. Carbon:Nitrogen Ratio = maximum of 50:1
E. pH = 5.0-7.8

2.01 PLANT ESTABLISHMENT ENDURANCE
Functional longevity observed for plant establishment
Type 1. HGM Green for use in areas where there are marginal soils and vegetation establishment will take up to 6 months and mild erosive forces.

Type 2. HGM Black HGM for use in areas where there are extremely poor soils for vegetative growth and/or exposed sub soils and vegetation establishment will take up to 12 months and moderate erosive forces.
2.02 COMPOSITION
All components of the HGM shall be pre-packaged by the Manufacturer to assure material performance and in compliance with the following values. **At no time will field mixing of fibers be allowed.**

2.03 PACKAGING
Bags = 50 lbs (22.5 kg) +/- 10%
Bag size = 2.2 ft³ (0.062 m³)

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### Rates

<table>
<thead>
<tr>
<th>Product</th>
<th>Parent Soil Organic Content</th>
<th>Recommended Rate lbs/acre (kg/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HGM Green</td>
<td>&gt;3%</td>
<td>3500 (3900)</td>
</tr>
<tr>
<td></td>
<td>&gt;4%</td>
<td>3000 (3400)</td>
</tr>
<tr>
<td>HGM Black</td>
<td>&lt;1%</td>
<td>4500 (5000)</td>
</tr>
<tr>
<td></td>
<td>&lt;2%</td>
<td>3500 (3900)</td>
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<tr>
<td></td>
<td>&lt;3%</td>
<td>3000 (3400)</td>
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<tr>
<td>Soil Chemistry</td>
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<td></td>
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<tr>
<td>Earthbound 2000</td>
<td>Sand</td>
<td>35lbs per acre</td>
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<tr>
<td>Slopes &gt;3:1</td>
<td>Clay</td>
<td>70lbs per acre</td>
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<tr>
<td>Earthbound Scientific</td>
<td>Sand</td>
<td>70lbs per acre</td>
</tr>
<tr>
<td>Slopes &lt;3:1</td>
<td>Clay</td>
<td>140lbs per acre</td>
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</tbody>
</table>

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### PART 3 EXECUTION

3.02 INSTALLATION
A. Strictly comply with manufacturer's installation instructions and recommendations.
B. Mixing:
   1. Fill hydroseeder tank with water to a level where the paddles are ¼ covered and may be activated.
   2. Activate the mechanical agitation system.
   3. Prime pump and any discharge hoses before adding any HGMs.
   4. Add the appropriate amount and type of soil stabilizer and tackifier as recommended for the site specific application. Allow soil stabilizer and tackifier and water to mix for 5 minutes prior to adding HGMs. Please see manufacturer application rate chart for amounts of specific Soil Stabilizer & Tackifier and HGMs.
   5. Continue filling tank with water to approximately ¾ full and begin adding bags of HGMs.
   6. All quantity of HGMs should be added before the water level reaches 85% of the tanks capacity.
   7. Add seed and/or other amendments to slurry as required.
   8. Completely fill tank with water and allow slurry to mix for a minimum of 5 minutes or until all HGMs are mixed into a consistent slurry.

C. Application:
   1. Prior to application and mixing of the HGM it is recommended that the site be measured and marked to known areas to ensure appropriate seed, amendment, and HGMs application rates.
   2. Bring hydroseeder to appropriate operating speed and agitator speed for slurry application.
   3. Apply in a consistent and even manner across soil surface.
4. Apply from opposite directions to ensure the highest level of coverage, effectiveness, and performance.
5. If you need to stop spraying at anytime, close the spray nozzle at the end of the hose to avoid water draining from the hose. If you are using a tower applicator, stop normally and upon restart remove the spray tip, discharge a small amount of HGMs, replace the tip and return to applying the product.
6. Tillage of HGM into subsoil strictly not recommended in any situation.

HGMs can be used in channels, swales or other concentrated flow areas when used in conjunction with a rolled erosion control product. On slopes or areas of sheet flow, Verdyol Virgin BFM can be applied over top Biotic Earth.

3.03 CLEANING
Clean equipment per the equipment manufacturer’s recommendations.