**Section 32 92 19.16 – Hydraulic Seeding: Hydraulic Mulch – Cellulose**

GENERAL

1.01 SUMMARY

1. This section specifies a hydraulically-applied, 100% biodegradable Hydraulic Mulch (HM) – Cellulose. The Cellulose HM shall be 100% biodegradable, made in the United States and composed of 100% recycled Cellulose Fibers. The HM shall be phytosanitized, free from plastic netting, and upon application form 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.
2. 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

1. Product Data: Submit manufacturer’s product data and installation instructions. Include required substrate preparation, list of materials and application rate.
2. 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

1. 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

1. 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](http://www.profileproducts.com)

2.02 MATERIALS

1. The Hydraulic Mulch – Cellulose shall be a Profile Products HM Cellulose brand (Conwed Fibers® Cellulose, Terra-Mulch® Cellulose, HydroCover® Cellulose, or SoilCover® Cellulose) and conform to the following property values when uniformly applied at a rate of 2,000 pounds per acre (2,240 kilograms/hectare) under laboratory conditions.

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| **Property** | **Test Method** | **Tested Value (English)** | **Tested Value (SI)** |
| **Physical** |  |  |  |
| Mass Per Unit Area | ASTM D65661 | ≥ 6.6 oz/yd2 | ≥ 224 g/m2 |
| Water Holding Capacity | ASTM D73671 | ≥1,000%  | ≥ 1,000%  |
| Color | Observed | Green | Green |
| Performance |  |  |  |
| Cover Factor2 | Large Scale Testing4 | ≤ 0.55 | ≤ 0.55 |
| % Effectiveness3 | Large Scale Testing4 | ≥ 45%  | ≥ 45%  |
| Vegetation Establishment | ASTM D73221 | 200% | 200% |
| Functional Longevity5 | ASTM D5338 | ≤ 3 months | ≤ 3 months |
| Environmental |  |  |  |
| Ecotoxicity | EPA 2021.0 | 48-hr LC50 > 100% | 48-hr LC50 > 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**

1. All components of the HM 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. Cellulose Fiber – 100%

**2.04 PACKAGING**

1. 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

1. 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.
2. The tests shall include analysis and interpretation of results.
3. 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.
4. Soil Analysis shall include results for:
	1. Soil pH
	2. Soluble Salts
	3. Excess Carbonate
	4. Organic Matter
	5. Nutrient readings for:
		1. Nitrogen, Phosphorus, Potassium
		2. Magnesium, Calcium, Sodium, Manganese, Sulfur, Zinc, Copper, Iron, Boron
	6. Cation Exchange Capacity
	7. Percent Base Saturation Sodium
5. 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

1. 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.
2. Site and project specific information considered for species selection shall include:
	1. Project Location and Planning
		1. Climate
		2. Elevation
		3. Aspect
		4. Slope/Gradient
		5. Permanent or Temporary Planting
		6. Installation Date(s)
	2. Soil Conditions
		1. Soil Texture
		2. Soil pH
		3. Toxicities/Deficiencies noted in the previous section.
	3. Site Maintenance Requirements
		1. Mowing
		2. Irrigation
		3. Animal grazing preference
	4. Preferred Vegetation
		1. Drought Tolerant
		2. Native Vegetation
		3. Shrub Species
		4. Turf Grasses
		5. Cool Season
		6. Warm Season
		7. Blend of Cool and Warm Season
		8. Legume Species
		9. Cover Crops

3.03 SUBSTRATE AND SEEDBED PREPARATION

1. 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 the face of the slope. Do not proceed with installation until satisfactory conditions are established.
2. Depending upon project sequencing and intended application, prepare seedbed in compliance with other specifications under Section 1.01 B

3.04 INSTALLATION

1. Strictly comply with equipment manufacturer's installation instructions and recommendations. Use approved hydro-spraying machines with fan-type nozzle (50-degree tip). To achieve optimum soil surface coverage, apply HM from opposing directions to soil surface. Rough surfaces (rocky terrain, cat tracks and ripped soils) may require higher application rates to achieve 75% cover. Slope interruption devices or water diversion techniques are recommended when slope lengths exceed 15 feet (4.5 m). For application on slopes steeper than 4H:1V, slope interruption lengths may need to be decreased based on actual site conditions. Not recommended for channels or areas with concentrated water flow. No chemical additives with the exception of fertilizer, liming and biostimulant materials should be added to this product.
2. For Erosion Control and Revegetation: To ensure proper application rates, measure and stake area.
3. *Apply fertilizer with specified prescriptive agronomic formulations, seed and HM at a rate of 50 lb per 100 gallons (23 kg / 380 liters) of water over properly prepared surfaces. Confirm loading rates with equipment manufacturer.*

 *Do not apply on saturated soils or substrates. Do not apply if precipitation is anticipated within 24-48 hours.*

1. Mixing: A mechanically agitated hydraulic-application machine is recommended:
2. *Fill 1/3 of mechanically agitated hydroseeder with water. Turn pump on for 15 seconds and purge and pre-wet lines. Turn pump off.*
3. *Turn agitator on and load low density materials first (i.e. seed).*
4. *Continue slowly filling tank with water while loading fiber matrix into tank.*
5. *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 of HM per 100 gallons (23 kg/380 liters). Contact Equipment manufacturer to confirm optimum mixing rates.*
6. *All HM should be completely loaded before water level reaches 75% of the top of tank.*
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. *Add fertilizer*
9. *Shut off recirculation valve to minimize potential for air entrainment within the slurry.*
10. *Slow down agitator and start applying with a 50-degree fan tip nozzle.*
11. *Spray in opposing directions for maximum soil coverage.*
12. 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.

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| --- | --- | --- |
| **Slope Gradient / Condition** | **English** | **SI** |
| < 4H to 1V  | 1,500 – 2,000 lb/ac\* | 1,680 – 2,240 kg/ha\* |

\*For Maximum performance, 2,000 lb/acre (2,240 kg/ha) is recommended

3.05 CLEANING AND PROTECTION

1. 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.
2. 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

1. All inspections and maintenance recommendations shall be conducted by qualified professionals consistent with the owner, engineer/specifier and regulatory entity(s) expectations.
2. 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.
3. 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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