American Excelsior Company®
Earth Science Division

Proud Participant in NTPEP and Proud Member of:

Curlex® Enforcer®
EROSION CONTROL BLANKET
SPECIFICATION

PART I - GENERAL

1.01 Summary

A. The biocomposite Turf Reinforcement Mat (TRM) contains excelsior wood fiber for the purpose of erosion control and revegetation as described herein.

B. This work shall consist of furnishing and installing the biocomposite TRM; including fine grading, blanketing, stapling, and miscellaneous related work, in accordance with these standard specifications and at the locations identified on drawings or designated by the owner's representative. This work shall include all necessary materials, labor, supervision, and equipment for installation of a complete system.

C. All work of this section shall be performed in accordance with the conditions and requirements of the contract documents.

D. The biocomposite TRM shall be used to prevent surface erosion and enhance revegetation. Based on a project-by-project engineering analysis, the biocomposite TRM shall be suitable for the following applications:

1. Slope protection
2. Channel and ditch linings
3. Reservoir embankments and spillways
4. Culvert inlets and outfalls
5. Dikes, levees, and riverbanks

1.02 Performance Requirements

A. Biocomposite TRM shall provide a cover material to enhance germination, reduce slope and/or channel erosion, and permanently reinforce vegetation. Biocomposite TRM performance capabilities shall be determined by ASTM D 6460, "Determination of Erosion Control Blanket (ECB) Performance in Protecting Earthen Channels from Stormwater-Induced Erosion."

B. Biocomposite TRM performance requirements:

Slopes:	≤ .5H:1V
C factor:	.022
Shear Stress:	3.25 lbs/ft^2 (156 Pa) unvegetated
	10.0 lbs/ft^2 (480 Pa) vegetated
Velocity:	11 ft/sec (3.4 m/sec) unvegetated
	17 ft/sec (5.2 m/sec) vegetated
Functional Longevity[a]:	≤ 36 months (fibers only) / Permanent

[a] Functional Longevity varies from region to region because of differences in climatic conditions.

1.03 Submittals

A. Submittals shall include complete design data, Product Data Sheets, Product Netting Information, SDS, Staple Pattern Guides, Installation Guidelines, Manufacturing Material Specifications, Manufacturing Certifications, CAD details, and a Manufacturing Quality Control Program. In addition, the Manufacturer shall provide a test report providing data showing the performance capabilities of the biocomposite TRM along with reference installations similar in size and scope to that specified for the project.

1.04 Delivery, Storage, and Handling

A. Biocomposite TRM shall be furnished in rolls and wrapped with suitable material to protect against moisture intrusion and extended ultraviolet exposure prior to placement. Each roll shall be labeled with a date code identification, which allows for sufficient tracking of the product back to date of manufacturing and for quality control purposes.

B. Biocomposite TRM shall be of consistent thickness with fibers distributed evenly over the entire area of the blanket.

C. Biocomposite TRM shall be free of defects and voids that would interfere with proper installation or impair performance.

D. Biocomposite TRM shall be stored by the Contractor in a manner that protects them from damage by construction activities.

PART II - PRODUCTS

2.01 Biocomposite TRM

A. Biocomposite TRM shall be Curlex Enforcer, as manufactured by American Excelsior Company, Arlington, TX (1-866-9FIBERS).

B. Curlex Enforcer a biocomposite Turf Reinforcement Mat (TRM) consists of a specific cut of naturally seed free Great Lakes Aspen curled wood excelsior. It is of consistent thickness with fibers evenly distributed throughout the entire area of the blanket. The top and bottom of each blanket is covered with extra heavy-duty UV stabilized polypropylene netting. Curlex Enforcer is also available as QuickGRASS® (green pigment). Curlex Enforcer shall be manufactured in the U.S.A.

C. Biocomposite TRM shall have the following material characteristics:

Width	8.0 ft (2.4 m)
Length	67.5 ft (20.6 m)
Area	60.0 yd^2 (50.2 m^2)
Mass per Unit Area[b] (± 10%)	1.25 lb/yd^2 (0.68 kg/m^2)
Net Openings	0.75 in x 1.0 in (19.1 mm x 25.4 mm)

TYPICAL INDEX VALUES

Index Property	Test Method	Value
Thickness	ASTM D 6525	0.393 in (9.98 mm)
Light Penetration	ASTM D 6567	9.3%
Resiliency	ASTM D 1777/ECTC	55%
Mass per Unit Area	ASTM D 6475	1.029 lb/yd^2 (0.558 kg/m^2)
MD-Tensile Strength Max.	ASTM D 6818	499.2 lb/ft (7.29 kN/m)
TD-Tensile Strength Max.	ASTM D 6818	512.4 lb/ft (7.48 kN/m)
MD-Elongation	ASTM D 6818	24.9%
TD-Elongation	ASTM D 6818	30.5%
Swell	ECTC Procedure	33%
Water Absorption	ASTM D 1117/ECTC	241%
UV Stability	ASTM D 4355 (1,000 hr)	90% minimum
Bench-Scale Rain Splash	ASTM D 7101	SLR = 24.66 @ 2 in/hr [c,d]
Bench-Scale Rain Splash	ASTM D 7101	SLR = 31.43 @ 4 in/hr [c,d]
Bench-Scale Rain Splash	ASTM D 7101	SLR = 41.34 @ 6 in/hr [c,d]
Bench-Scale Shear	ASTM D 7207	3.56 lb/ft^2 @ 0.5 in soil loss [d]
Germination Improvement	ASTM D 7322	503%

[b] Weight is based on a dry fiber weight basis at time of manufacture. Baseline moisture content of Great Lakes Aspen excelsior is 22%.

[c] SLR is the Soil Loss Ratio, as reported by NTPEP/AASHTO. [d] Bench-scale index values should not be used for design purposes.

2.02 Staples

A. Staples shall be a minimum 4 in biodegradable E-Staple®, as provided by American Excelsior Company, or 6 in wire for cohesive soils and 6 in biodegradable E-Staple®, as provided by American Excelsior Company, or 8 in wire for non-cohesive soils. For additional pull-out resistance, consider using TL-TA2 Gripple twist anchors for tough/cohesive soils or TL-TA1 Gripple twist anchors for moderate/non-cohesive soils.

PART III - EXECUTION

3.01 Blanket Supplier Representation

A. Contractor shall coordinate with the biocomposite TRM supplier for a qualified representative to be present at the job site on the start of installation to provide technical assistance as needed. Contractor shall remain solely responsible for the quality of installation.

3.02 Site Preparation

A. Before placing biocomposite TRM, the Contractor shall certify that the subgrade has been properly compacted, has been graded smooth, has no depressions, voids, soft or uncompacted areas, is free from obstructions such as tree roots, protruding stones or other foreign matter, and is seeded and fertilized according to project specifications. The Contractor shall not proceed until all unsatisfactory conditions have been remedied. By beginning construction, the Contractor signifies that the preceding work is in conformance with this specification.

B. Contractor shall fine grade the subgrade by hand dressing where necessary to remove local deviations.

C. No vehicular traffic shall be permitted directly on the biocomposite TRM.

NOTE: Topsoiling, seeding, and fertilizing is not included in this specification.

3.03 Slope Installation

A. Biocomposite TRM shall be installed as directed by the owner's representative in accordance with manufacturer's Installation Guidelines, Staple Pattern Guides, and CAD details. The extent of biocomposite TRM shall be as shown on the project drawings.

B. Biocomposite TRM shall be orientated in vertical strips and anchored with staples, as identified in the Staple Pattern Guide. Adjacent strips shall be abutted or overlapped to allow for installation of a common row of staples that anchor through the nettings of both biocomposite TRMs. Horizontal joints between biocomposite TRM shall be sufficiently overlapped with the uphill end on top for a common row of staples so that the staples anchor through the nettings of both biocomposite TRMs.

C. Where exposed to overland sheet flow, a trench shall be located at the uphill termination. Biocomposite TRM shall be stapled to the bottom of the trench. The trench shall be backfilled and compacted. Where feasible, the uphill end of the biocomposite TRM shall be extended three feet over the crest of the slope.

D. Slope biocomposite TRM shall be overlapped by the channel biocomposite TRM sufficiently for a common row of staples to anchor through the nettings of both biocomposite TRMs when terminating into a channel.

3.04 Channel Installation

A. Biocomposite TRM shall be installed as directed by the owner's representative in accordance with manufacturer's Installation Guidelines, Staple Pattern Guides, and CAD details. The extent of biocomposite TRM shall be as shown on the project drawings.

B. Biocomposite TRM shall be installed parallel to the flow of water. The first roll shall be centered longitudinally in mid-channel and anchored with staples as identified in the Staple Pattern Guide. Subsequent rolls shall follow from channel center outward and be overlapped to allow installation of a common row of staples so that the staples anchor through the nettings of both biocomposite TRMs.

C. Successive lengths of biocomposite TRM shall be overlapped sufficiently for a common row of staples with the upstream end on top. Staple the overlap across the end of each of the overlapping lengths so that staples anchor through the nettings of both biocomposite TRMs.

D. A termination trench shall be located at the upstream termination. Biocomposite TRM shall be stapled to the bottom of the trench. The trench shall be backfilled and compacted.

3.05 Quality Assurance

A. Biocomposite TRM shall not be defective or damaged. Damaged or defective materials shall be replaced at no additional cost to the owner.

B. Product shall be manufactured in accordance to a documented Quality Control Program. At a minimum, the following procedures and documentation shall be provided upon request:
   1. Manufacturing Quality Control Program Manual
   2. First piece inspection and documentation of products produced to assure component materials and finished product tolerances are within manufacturer specifications.
   3. Additional inspections for product conformance shall be conducted during the run after the first piece inspection.
   4. Moisture content readings recorded for each manufacturing day.
   5. Recorded weight of every erosion control blanket manufactured.
   6. Each individual erosion control blanket shall be inspected, weighed, and documented prior to packaging for conformance to manufacturing specifications.
   7. Documentation and record retention for at least two years.

3.06 Clean-up

A. At the completion of this scope of work, Contractor shall remove from the job site and properly dispose of all remaining debris, waste materials, excess materials, and equipment required of or created by Contractor. Disposal of waste materials shall be solely the responsibility of Contractor and shall be done in accordance with applicable waste disposal regulations.

3.07 Method of Measurement

A. The biocomposite TRM shall be measured by the square yard of surface area covered. No measurement for payment shall be made for overlaps, fine grading, trenching, staples, or other miscellaneous materials necessary for placement of the erosion control biocomposite TRM.

3.08 Basis of Payment

A. The accepted quantities of biocomposite TRM shall be paid for at the contract unit price per square yard, complete in place.

Payment shall be made under:

Pay Item	**Pay Unit**
Biocomposite TRM	Square Yards

Disclaimer: Curlex is a system for erosion control and revegetation on slopes and channels. American Excelsior Company (AEC) believes that the information contained herein to be reliable and accurate for use in erosion control and re-vegetation applications. However, since physical conditions vary from job site to job site and even within a given job site, AEC makes no performance guarantees and assumes no obligation or liability for the reliability or accuracy of information contained herein for the results, safety, or suitability of using Curlex, or for damages occurring in connection with the installation of any erosion control product whether or not made by AEC or its affiliates, except as separately and specifically made in writing. These specifications are subject to change without notice.