Standard Specifications for

Compost for Erosion/Sediment Control

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*** These specifications contain all of the technical text found in the 'Official' American Association of State Highway & Transportation Officials (AASHTO) versions found in their 2003 AASHTO Provisional Standards manual. The Compost for Erosion / Sediment Control 'Filter Berms' is designated as specification MP 9 - 03, and the 'Compost Blankets' as specification MP 10 - 03. For copy of the official AASHTO specifications, contact AASHTO's Publications and Communications Technical Assistant at 202-624-5800**

Standard Specification for
Compost for Erosion/Sediment Control (Filter Berms)

SCOPE

This specification covers compost produced from various organic by-products for use as a filter berm media for erosion/sediment control. The technique described in this specification is primarily used for temporary erosion/sediment control applications, where perimeter controls are required or necessary.

This technique is appropriate for slopes up to a 2:1 grade (horizontal distance : vertical distance) and on level surfaces and should only be used in areas that have sheetflow drainage patterns (not areas that receive concentrated flows).

GENERAL DESCRIPTION

Compost is the product resulting from the controlled biological decomposition of organic material, occurring under aerobic conditions, that has been sanitized through the generation of heat and stabilized to the point that it is appropriate for its particular application. Active composting is typically characterized by a high-temperature phase that sanitizes the product and allows a high rate of decomposition, followed by a lower-temperature phase that allows the product to stabilize while still decomposing at a slower rate. Compost should possess no objectionable odors or substances toxic to plants, and shall not resemble the raw material from which it was derived. Compost contains plant nutrients but is typically not characterized as a fertilizer.

Compost may be derived from a variety of feedstocks, including agricultural, forestry, food, or industrial residuals; biosolids (treated sewage sludge); leaf and yard trimmings; manure; tree wood; or source-separated or mixed solid waste.

Proper thermophilic composting, meeting the US Environmental Protection Agency's definition for a 'process to further reduce pathogens' (PFRP), will effectively reduce populations of human and plant pathogens, as well as destroy noxious weed seeds and propagules.

Compost is typically characterized as a finely screened and stabilized product that is used as a soil amendment. However, most composts also contain a wood based fraction (e.g., bark, ground brush and tree wood, wood chips, etc.) which is typically removed before use as a soil amendment. This coarser, woody fraction of compost plays an important role when compost is used in erosion and sediment control. It is even possible to add fresh, ground bark or composted, properly sized wood based materials to a compost product, as necessary, to improve its efficacy in this application.

Compost products acceptable for this application must meet the chemical, physical and biological properties outlined in the section below.

PRODUCT PARAMETERS

Compost products specified for use in this application must meet the criteria specified in Table 1. The products' parameters will vary based on whether vegetation will be established on the filter berm.

Only compost products that meet all applicable state and federal regulations pertaining to its production and distribution may be used in this application. Approved compost products must meet related state and federal chemical contaminant (e.g., heavy metals, pesticides, etc.) and pathogen limits pertaining to the feedstocks (source materials) in which it is derived.

Table 1 – Filter Berm Media Parameters

Parameters[1,4]	**Reported as (units of measure)**	**Filter Berm to be Vegetated**	**Filter Berm to be left Un-vegetated**
pH[2]	pH units	5.0 - 8.5	N/A
Soluble Salt Concentration[2] (electrical conductivity)	dS/m (mmhos/cm)	Maximum 5	N/A
Moisture Content	%, wet weight basis	30 – 60	30 – 60
Organic Matter Content	%, dry weight basis	25 – 65	25 - 100
Particle Size	% passing a selected mesh size, dry weight basis	• 3" (75 mm), 100% passing • 1" (25mm), 90% to 100% passing • 3/4" (19mm), 70% to 100% passing • 1/4" (6.4mm), 30% to 75% passing Maximum: • particle size length of 6" (152mm) (no more than 60% passing 1/4" (6.4 mm) in high rainfall/flow rate situations)	• 3" (75 mm), 100% passing • 1" (25mm), 90% to 100% passing • 3/4" (19mm), 70% to 100% passing • 1/4" (6.4mm), 30% to 75% passing Maximum: • particle size length of 6" (152mm) (no more than 50% passing 1/4" (6.4 mm) in high rainfall/flow rate situations)
Stability[3] Carbon Dioxide Evolution Rate	mg CO_2-C per g OM per day	< 8	N/A
Physical Contaminants (man-made inerts)	%, dry weight basis	< 1	< 1

[1] Recommended test methodologies are provided in Test Methods for the Examination of Composting and Compost (TMECC, The US Composting Council)

[2] Each specific plant species requires a specific pH range. Each plant also has a salinity tolerance rating, and maximum tolerable quantities are known. When specifying the establishment of any plant or turf species, it is important to understand their pH and soluble salt requirements, and how they relate to the compost in use.

[3] Stability/Maturity rating is an area of compost science that is still evolving, and as such, other various test methods could be considered. Also, never base compost quality conclusions on the result of a single stability/maturity test.

[4] Landscape architects and project (field) engineers may modify the allowable compost specification ranges based on specific field conditions and plant requirements.

Very coarse (woody) composts that contain less than 30% of fine particles (1mm in size) should be avoided if optimum reductions in total suspended solids (TSS) is desired or if the berm is to be seeded.

In regions subjected to higher rates of precipitation and/or greater rainfall intensity, larger compost filter berms should be used. In these particular regions, coarser compost products are preferred as the filter berm must allow for an improved water percolation rate.

Notes: Specifying the use of compost products that are certified by the US Composting Council's Seal of Testing Assurance (STA) Program (www.compostingcouncil.org) will allow for the acquisition of products that are analyzed on a routine basis, using the specified test methods. STA participants are also required to provide a standard product label to all customers, allowing easy comparison to other products.

FIELD APPLICATION

The following steps shall be taken for the proper installation of compost as a filter berm for erosion/sediment control on both level and sloped areas.

Parallel to the base of the slope, or around the perimeter of affected areas, construct a trapezoidal berm at the dimensions specified in Table 2. In general, when compost filter berms are used to control erosion/sediment near, or on a slope, the base of the berm should be twice the height of the berm.

Compost shall be applied to the dimensions specified in Table 2.

Table 2 – Compost Filter Berm Dimensions

Annual Rainfall/Flow Rate	Total Precipitation & Rainfall Erosivity Index	Dimensions for the Compost Filter Berm (height x width)
Low	1-25”, 20-90	1’x 2’ – 1.5’ x 3’ (30 cm x 60 cm – 45 cm x 90 cm)
Average	26-50”, 91-200	1’x 2’ - 1.5’ x 3’ (30 cm x 60 cm – 45 cm x 90 cm)
High	51” and above, 201 and above	1.5’x 3’ – 2’ x 4’ (45 cm x 90 cm – 60cm x 120 cm)

Compost filter berm dimensions should be modified based on specific site (e.g., soil characteristics, existing vegetation) and climatic conditions, as well as particular project related requirements. The severity of slope grade, as well as slope length will also influence the size of the berm.

In regions subjected to higher rates of precipitation and/or rainfall intensity, as well as spring snow melt, larger berms should be used. In these regions, and on sites possessing severe grades or long slope lengths, berms possessing a larger dimension may be used. Berms may be placed at the top and the base of the slope, a series of berms may be constructed down the profile of the slope (15-25’ apart), or berms may be used in conjunction with a compost blanket (surface applied compost). In these particular regions, as well as regions subject to wind erosion, coarser compost products are also preferred for use in filter berm construction.

In regions subject to lower rates of precipitation and/or rainfall intensity, smaller berms may be used. However, the minimum filter berm dimensions shall be 1’ high (30 cm) by 2’ wide (60 cm). Also, specific regions may receive higher rainfall rates, but this rainfall is received through low intensity rainfall events (e.g., the Northwestern U.S.). These regions may use smaller berms.

Larger berms should also be used where required to be in place and functioning for more than one year.

Compost shall be uniformly applied using an approved spreader unit; including pneumatic blowers, specialized berm machines, etc. When applied, the compost should be directed at the soil surface, compacting (settling) and shaping the berm to some degree. The filter berm may also be applied by hand when approved by the Project Engineer or Landscape Architect/Designer.

On highly unstable soils, use compost filter berms in conjunction with appropriate structural measures. If used in conjunction with a silt fence, the silt fence fabric shall be laid on the soil surface with the lip facing the slope. The compost filter berm shall be constructed at the base of the silt fence (downhill side) and over the entire fence fabric lip.

Seeding the berm may be done, if desired, in conjunction with pneumatic blowing, or following berm construction with a hydraulic seeding unit, or by hand.

Standard Specification for
Compost for Erosion/Sediment Control (Compost Blanket)

SCOPE

This specification covers compost produced from various organic by-products, for use as a surface mulch for erosion/sediment control on sloped areas. This technique may be used for both temporary and permanent erosion/sediment control applications.

This technique is appropriate for slopes up to a 2:1 grade (horizontal distance : vertical distance), and should only be used in areas that have sheetflow drainage patterns (not areas that receive concentrated flows). This technique may also be used on up to 1:1 slopes with proper consideration to length of slope and compost application rates (depth).

GENERAL DESCRIPTION

Compost is the product resulting from the controlled biological decomposition of organic material, occurring under aerobic conditions, that has been sanitized through the generation of heat and stabilized to the point that it is appropriate for its particular application. Active composting is typically characterized by a high-temperature phase that sanitizes the product and allows a high rate of decomposition, followed by a lower-temperature phase that allows the product to stabilize while still decomposing at a slower rate. Compost should possess no objectionable odors or substances toxic to plants, and shall not resemble the raw material from which it was derived. Compost contains plant nutrients but is typically not characterized as a fertilizer.

Compost may be derived from a variety of feedstocks, including agricultural, forestry, food, or industrial residuals; biosolids (treated sewage sludge); leaf and yard trimmings; manure; tree wood; or source-separated or mixed solid waste.

Proper thermophilic composting, meeting the US Environmental Protection Agency's definition for a 'process to further reduce pathogens' (PFRP), will effectively reduce populations of human and plant pathogens, as well as destroy noxious weed seeds and propagules.

Compost is typically characterized as a finely screened and stabilized product that is used as a soil amendment. However, most composts also contain a wood based fraction (e.g., bark, ground brush and tree wood, wood chips, etc.) which is typically removed before use as a soil amendment. This coarser, woody fraction of compost plays an important role when compost is used in erosion and sediment control. It is even possible to add fresh, ground bark or composted, properly sized wood based material to a compost product, as necessary, to improve its efficacy in this application.

Compost products acceptable for this application must meet the chemical, physical and biological properties outlined in the section below.

PRODUCT PARAMETERS

Compost products specified for use in this application are described in Table 1. The product's parameters will vary based on whether vegetation will be established on the treated slope.

Only compost products that meet all applicable state and federal regulations pertaining to its production and distribution may be used in this application. Approved compost products must meet related state and federal chemical contaminant (e.g., heavy metals, pesticides, etc.) and pathogen limit standards pertaining to the feedstocks (source materials) in which it is derived.

Table 1 – Compost Blanket Parameters

Parameters[1,4]	**Reported as (units of measure)**	**Surface Mulch to be Vegetated**	**Surface Mulch to be left Un-vegetated**
pH[2]	pH units	5.0 - 8.5	N/A
Soluble Salt Concentration[2] (electrical conductivity)	dS/m (mmhos/cm)	Maximum 5	Maximum 5
Moisture Content	%, wet weight basis	30 – 60	30 – 60
Organic Matter Content	%, dry weight basis	25 – 65	25-100
Particle Size	% passing a selected mesh size, dry weight basis	• 3" (75 mm), 100% passing • 1" (25mm), 90% to 100% passing • 3/4" (19mm), 65% to 100%passing • 1/4" (6.4 mm), 0% to 75% passing • Maximum particle length of 6" (152mm)	• 3" (75 mm), 100% passing • 1" (25mm), 90% to 100% passing • 3/4" (19mm), 65% to 100%passing • 1/4" (6.4 mm), 0% to 75% passing • Maximum particle length of 6" (152mm)
Stability[3] Carbon Dioxide Evolution Rate	mg CO_2-C per g OM per day	< 8	N/A
Physical Contaminants (man-made inerts)	%, dry weight basis	< 1	< 1

[1] Recommended test methodologies are provided in Test Methods for the Examination of Composting and Compost (TMECC, The US Composting Council)

[2] Each specific plant species requires a specific pH range. Each plant also has a salinity tolerance rating, and maximum tolerable quantities are known. When specifying the establishment of any plant or turf species, it is important to understand their pH and soluble salt requirements, and how they relate to the compost in use.

[3] Stability/Maturity rating is an area of compost science that is still evolving, and as such, other various test methods could be considered. Also, never base compost quality conclusions on the result of a single stability/maturity test.

[4] Landscape architects and project (field) engineers may modify the allowable compost specification ranges based on specific field conditions and plant requirements.

Very coarse compost should be avoided if the slope is to be landscaped or seeded as it will make planting and crop establishment more difficult.

In regions subject to higher rates of precipitation and/or rainfall intensity, higher compost application rates should be used. In these particular regions, as well as regions subject to wind erosion, coarser compost products are preferred.

Notes: Specifying the use of compost products that are certified by the US Composting Council's Seal of Testing Assurance (STA) Program (www.compostingcouncil.org) will allow for the acquisition of products that are analyzed on a routine basis, using the specified test methods. STA participants are also required to provide a standard product label to all customers, allowing easy comparison to other products.

Where water quality is an issue, or in areas in proximity to sensitive water bodies, the appropriate compost product should be used, and vegetating the compost blanket should be considered.

FIELD APPLICATION

The following steps shall be taken for the proper installation of compost as a soil blanket for erosion/sediment control on sloped areas.

Slightly roughen (scarify) slopes and remove large clods, rocks, stumps, roots larger than 2 inches in diameter and debris on slopes where vegetation is to be established. This soil preparation step may be eliminated where approved by the Project Engineer or Landscape Architect/Designer, or where seeding or planting is not planned.

Where practical, track (compact) perpendicular to contours on the slope using a bulldozer before applying compost as soil blanket.

Apply compost at the rates specified in Table 2.

Table 2 – Compost Blanket Application Rates

Annual Rainfall/Flow Rate	Total Precipitation & Rainfall Erosivity Index	Application Rate For Vegetated* Compost Surface Mulch	Application Rate For Unvegetated Compost Surface Mulch
Low	1-25”, 20-90	½ - ¾ ” (12.5 mm - 19 mm)	1” – 1 ½” (25 mm – 37.5mm)
Average	26-50”, 91-200	¾ - 1” (19 mm - 25 mm)	1 ½” – 2” (37 mm – 50 mm)
High	51” and above, 201 and above	1-2” (25 mm - 50 mm)	2-4” (50mm – 100mm)

*these lower application rates should only be used in conjunction with seeding, and for compost blankets applied during the prescribed planting season for the particular region.

Compost blanket application rates should be modified based on specific site (e.g., soil characteristics, existing vegetation) and climatic conditions, as well as particular project related requirements. The severity of slope grade, as well as slope length, will also influence compost application rates.

In regions subjected to higher rates of precipitation and/or rainfall intensity, higher compost application rates should be used. In these regions, as well as those with spring snow melt, and on sites possessing severe grades or long slope lengths, the compost blanket may be used in conjunction with a compost filter berm. The filter berm may be 1-2 feet high (30 cm – 60 cm), by 2-4 feet wide (60 cm – 120 cm), and may be placed at the top or base (or both) of the slope. In these particular regions, as well as regions subject to wind erosion, coarser compost products are also preferred.

In regions subject to lower rates of precipitation and/or rainfall intensity, lower compost application rates may be used. Specific regions may receive higher rainfall rates, but this rainfall is received through low intensity rainfall events (e.g., the Northwestern U.S.). These regions may use lower compost application rates.

Compost shall be uniformly applied using an approved spreader unit, including bulldozers, side discharge manure spreaders, etc. Alternatively, apply compost using a pneumatic (blower) unit, or other unit that propels the product directly at the soil surface, thereby preventing water from moving between the soil-compost interface. Thorough watering may be used to improve settling of the compost. Apply compost layer approximately 3 feet (90 cm) over the top of the slope, or overlap it into existing vegetation.

On highly unstable soils, use compost in conjunction with appropriate structural measures.

Dry or hydraulic seeding may be completed following compost application, as required, or during the compost application itself, where a pneumatic unit is used to apply the compost.

APPENDIX FOR SPECIFICATIONS

COMPOST SAMPLING AND CHARACTERIZATION OF COMPOST

Sampling procedures to be used for purposes of this specification (and the Seal of Testing Assurance program) are as provided in 02.01 Field Sampling of Compost Materials, 02.01-B Selection of Sampling Locations for Windrows and Piles of the Test Methods for the Examination of Compost and Composting (TMECC), Chapter 2, Section One, Sample Collection and Laboratory Preparation, jointly published by the USDA and USCC (2002 publishing as a part of the USDA National Resource Conservation Technical Bulletin Series). The sample collection section is available online at http://tmecc.org/tmecc/.

Test Methods to be used for purposes of this specification are as provided in The Test Methods for the Examination of Compost and Composting (TMECC), Jointly published by the USDA and USCC (2002 publishing as a part of the USDA National Resource Conservation Technical Bulletin Series). A list of such methods is provided in the table below and online at http://tmecc.org/tmecc/.

Test Methods for Compost Characterization

Compost Parameters	Reported as	Test Method	Test Method Name
pH		TMECC 04.11-A	Electrometric pH Determinations for Compost. 1:5 Slurry Method
Soluble salts	dS/m (mmhos/cm)	TMECC 04.10-A	Electrical Conductivity for Compost. 1:5 Slurry Method (Mass Basis)
Primary plant nutrients:	%, as-is (wet) & dry weight basis		
Nitrogen	Total N	TMECC 04.02-D	Nitrogen. Total Nitrogen by Combustion
Phosphorus	P_2O_5	TMECC 04.03-A	Phosphorus. Total Phosphorus
Potassium	K_2O	TMECC 04.04-A	Potassium. Total Potassium
Calcium	Ca	TMECC 04.04-Ca	Secondary and Micro-Nutrient Content. Calcium
Magnesium	Mg	TMECC 04.04-Mg	Secondary and Micro-Nutrient Content. Magnesium
Moisture content	%, wet weight basis	TMECC 03.09-A	Total Solids and Moisture at 70±5°C
Organic matter content	%, dry weight basis	TMECC 05.07-A	Matter Method. Loss On Ignition Organic Matter Method
Particle size	Screen size passing through	TMECC 02.12-B	Laboratory Sample Preparation. Sample Sieving for Aggregate Size Classification.
Stability (respirometry)	mg CO_2-C per g TS per day mg CO_2-C per g OM per day	TMECC 05.08-B	Respirometry. Carbon Dioxide Evolution Rate
Maturity (Bioassay) Percent Emergence Relative Seedling Vigor	 % (average) % (average)	TMECC 05.05-A	Biological Assays. Seedling Emergence and Relative Growth

ADDITIONAL INFORMATION

For additional information on regional precipitation rates or rainfall erosivity indexes go on-line at http://www.cpc.ncep.noaa.gov/products/analyses_monitoring/regional_monitoring/us_12-month_precip.html or http://danpatch.ecn.purdue.edu/~wepphtml/wepp/wepptut/jhtml/imagedir/usa.gif

US Composting Council Seal of Testing Assurance Program documents, at http://tmecc.org/sta/, or www.compostingcouncil.org.

REFERENCES

ASTM Standards:
•D 2977, Standard Test Method for Particle Size Range of Peat Materials for Horticultural Purposes.

US EPA Test Methods:
• US EPA Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. SW-846. 3rd Edition.

TMECC Sampling and Test Methods:
• Test Methods for the Examination of Compost and Composting (TMECC), Jointly published by the USDA and USCC (2002 publishing as a part of the USDA National Resource Conservation Technical Bulletin Series).

Other Standards:
• US Composting Council Seal of Testing Assurance Program documents.

Development of Landscape Architecture Specifications for Compost Utilization, The U.S. Composting Council and the Clean Washington Center. 1997.

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