

CLAY TIRE SAND (CTS) MEDIA SPECIFICATION

1.1. Description

Bold & Gold CTS filtration media is a Biosorption Activated Media (BAM) for stormwater treatment in conjunction with other structural or non-structural stormwater BMPs. Bold & Gold filtration media is a patented product developed at the Stormwater Management Academy of the University of Central Florida.

1.2. Responsibility

The contractor shall be responsible for the satisfactory delivery, stockpiling, installation, and maintenance of the CTS filtration media during construction based on information provided in the Contract Documents and as provided by the supplier. The CTS filtration media shall be purchased from an approved source.

Contact the local Ferguson Waterworks branch for pricing information. **A Certificate of Authenticity to the Engineer of Record at the completion of the project can be provided. The Certificate of Authenticity includes the quantity of media delivered to the project site and certifies CTS delivered meets the patent requirements of the University of Central Florida.**

1.3. Material

Composition: The CTS filtration media is manufactured with mineral materials and no organic materials. The final product has more than 2% but less than 6% passing the US #200 (75 micron opening size) sieve. The mix is composed of 85% poorly graded clean sand (washed) and 15% sorption materials by volume. The sorption materials are composed of recycled tire crumb with no metal contents and mined kaolin clay that has no less than 99% clay content.

Percentages shall be determined by in-place volume. Water passing through the media must not exhibit acute toxicity and not change the pH of the filtered water by more than 1.0 unit. The material shall have a water holding capacity (amount of water that the media can hold for crop use) of at least 10% as measured by porosity, and total porosity of 32%. The permeability as measured in the laboratory for a media at 95 pounds per cubic feet must be greater than 10.0 inches per hour.

Storage and Handling: The CTS filtration media is delivered pre-mixed and ready to install. Media shall not be stockpiled longer than 30 days before installation and must be covered to prevent separation of the material due to adverse weather and environmental conditions such as but not limited to rainfall and wind.

1.4. Construction

Delivery of the Material: CTS filtration media is delivered to the jobsite pre-mixed and ready for installation. The delivered material is certified to meet the patent requirements and a certificate shall be issued as stated in Section 1.2 of this specification.

Installation: Surface on which the CTS filtration media is placed shall be reasonably levelled within ± 1 -inch of the elevations shown in the plans. Unless a slope grade is specified in the plans, a level surface is recommended for the subgrade soil to ensure even infiltration of filtered stormwater spread over the entire surface area.

Subgrade: The surface of the subgrade soil underneath the CTS filtration media shall be compacted and/or scarified to meet the requirements as specified by the design engineer. All necessary construction practices shall be taken to minimize the compaction of the subgrade soil, above the specified subgrade density, to avoid the reduction of the infiltration rate at the soil-filter media interface. The contractor shall take all necessary measures needed to control the deposition of sediments on the surface of the subgrade soil prior to the placement of the CTS filtration media.

Adjacent Areas: The CTS filtration media shall not be installed until all areas that drain to it have temporal/permanent erosion and sedimentation stabilization in place. No runoff shall be directed to the specified location of the CTS filtration Media until all drainage area leading to the location are stabilized. If the installed CTS filtration media becomes contaminated with sediment, prior to the placement of the cover material, it shall be removed and replaced at the contractor's expense.

Compaction: CTS filtration media may be placed in one lift and compacted to the density specified in the plan by the design engineer. For traffic load-bearing BMP applications, the CTS filtration media shall be installed, in number and depth of lifts, as specified by the design engineer to achieve target installation density. The maximum dry density of the CTS filtration media ranges between 100 and 105 pounds per cubic feet. Unless specified by the design engineer; a) the suggested installation dry density of the CTS filtration media shall not be greater than 95 pounds per cubic feet for all non-traffic bearing BMP applications; or b) no less than 100 pounds per cubic feet for all traffic bearing BMP applications. The final in-place thickness of the CTS filtration media shall not be less than the thickness shown in the plans for the specific project.

Compaction of the CTS filtration Media shall be achieved by using industry-standard compaction techniques. Water free of contaminants (sediments and nutrients) may be sprinkled on to the CTS filtration media to achieve the compaction requirements. If the compacted CTS filtration media has an in-place density greater than 105% of the required density, the material will be reworked to meet density requirements.

Surface Slope: Unless specified by the design engineer, the surface of the CTS filtration media shall have a slope of between zero and 0.5 percent in preparation for the placement of the top cover material. The top cover material shall serve as a spreader of runoff over the filter media and prefilter of gross pollutants from contaminating the CTS filtration media. In the event of clogging, the top cover material shall be removed and

replaced with clean top cover material, at the same depth, to rejuvenate flow into the filter media. The top cover shall be free-draining material that is free of organics, sediments and all other pollutants that negates the purpose for the installation of the CTS filtration media. Top cover materials shall be, but not limited to clean sand, gravel, geotextile, grass, and others that may be specified by the design engineer and does not hinder the performance of the CTS filtration media.

Cover Crop: If required by the design engineer, sod or seed shall be placed over the CTS filtration media within two days of placement. The sod used as cover for the CTS filtration media shall have been grown in a predominantly sandy site with less than 5% of the soil attached to the sod passing the #200 (75 micron opening size) sieve and have no added fertilizer.

After placement of the topsoil over the CTS filtration media, driving and parking on the installed CTS filtration media maybe allowed, if the surface is intended for traffic loading. If rutting to the CTS filtration media occurs due to vehicles or equipment during installation, the contractor shall repair it to the grades and elevations in the plans.

1.5. Maintenance

Maintenance requirements for the CTS filtration media shall be dependent on the proper functioning and maintenance of the applicable BMP in which the filter media is used. To prevent the clogging of the voids of the CTS filtration media, there shall be installed an intermediary aggregate media that is free-draining and free of organics (clean sand, acceptable aggregates, etc.) as cover material directly above the top of the filter media surface. In addition, the cover material shall serve to control the erosion of CTS filtration media.

In case of the clogging resulting from the reduction of permeability through the cover material and the filter media, the sediment-laden cover material shall be removed. The filter should be "disced" at a depth of at least 2 inches to help maintain the treatment rate, until the treatment flow rate is restored. Once the treatment rate is restored, install new cover material meeting the original specifications. Reduction in permeability shall be described as the increase of the drawdown time that exceeds the design duration for the specific BMP application.

CTS filtration media is typically designed to last the life span of the applicable BMP. However, maintenance shall be performed if the CTS filtration media has shown a reduction in the performance efficiencies on the reduction of Total Phosphorus (TP) below the design value before and/or at the expiration of the design service life. The maintenance procedure shall involve the removal of the cover material and CTS filtration media and replaced with new material and filter media meeting the original specifications. The spent filter media and cover material shall be disposed of at an approved landfill.

1.6. Applications

CTS filtration media is recommended for stormwater nutrient removal to be used in low loading or slow-flow filters, either in 12-, 24-inch depth filters, after a wet pond or within a dry basin, swale, and strips.

It is also used in stormwater low impact development applications in either a detention or retention capacity, and in a wastewater rapid Infiltration Basin for nutrient reduction.

It is not intended for storage in volume attenuation but provides some storage capacity to the limits of the available porosity of 0.25 of the volume occupied by the filter media.

Typical names of Stormwater BMPs where it can be used:

- Side-bank and shelf filters after wet detention ponds and retention ponds with deep seasonal high groundwater table elevations
- Bottom of retention pond; to include roadside ditches; swales; trench underdrains; permeable pavements; vegetated filter strips (VFS)
- Underneath rain gardens and subsurface storage systems
- Low Impact Development (LID) devices such as – tree wells, rain gardens, bioretention, bioswales, and other user-defined slow-flow BMPs

1.7. Design Considerations

The primary control for sizing the CTS filtration media is to capture the water quality volume to achieve a specific removal effectiveness and to pass it through the filter media with a specified hydraulic residence time to achieve the target level pollutant mass removal within a specific recovery time. There are two primary calculations needed, namely surface area and for a given thickness of media an expected service life.

Surface Area: Surface area is the area through which the water flows. The minimum surface area is dependent on the treatment rate and the volume of runoff to be treated. The volume of runoff to be treated is a function of the rainfall excess at the water quality treatment depth. A factor of safety is applied to the area or to the treatment rate to recognize clogging over a period of time. Most applications required a minimum depth to achieve the removal. Thus, the volume and mass of media is calculated based on the surface area and the depth of the media. If used in a filter that requires complete drainage before the next loading event, a larger surface may be needed than calculated using the treatment rate and volume of runoff.

Expected Service Life: Expected service life is dependent on the removal rate of a mass of pollutant, usually orthophosphate, per unit weight of filter media, as well as the mass of pollutant that must be removed in a period of time, usually one year. Thus, the expected service life in years is the removed mass of the pollutant achieved by the media divided by the removal rate per year.