

# BIOMEDIA FOR BIOTRICKLING FILTERS

PRD Tech's media(s) have the following characteristics:

- High contact surface area, depending on type;
- Low gas-phase pressure drop;
- Water retention capacity;
- Low bulk density;
- Capability to allow excessive biomass growth to exit the bed during "washing" periods => non-clogging characteristics;
- Randomly packed, so that they can be changed without destroying the vessel; and
- Reasonable cost

Specific data below quantifies some of the above characteristics. One of the major differences with other types of media is that PRD Tech's media is **randomly packed**. **No media will last forever; 10 year warranties will always be shorter than any system's operating lifetime of 15 to 20 years.** With monolith media, after 10 years, it is difficult to change the media, since the monolith is difficult to take out of the vessel, especially since after 10 years, the monolith has calcined and hardened due to deposition of insoluble salts and other inorganic scale from the water. However, with random media, the media can be taken out through the vessel manways. Further, if the media is kept clean, by periodic washing, bridging of media pieces in the randomly packed bed does not occur. **In addition, monolith media is difficult to wash to remove excessive biomass growth => a major disadvantage, which eventually leads to media clogging in heterotrophic systems.**

PRD Tech has developed several types of media with different characteristics that can be used for any application of Biotrickling Filters. In many cases, the various media are mixed within the same bed, or used in separate beds within the same vessel.

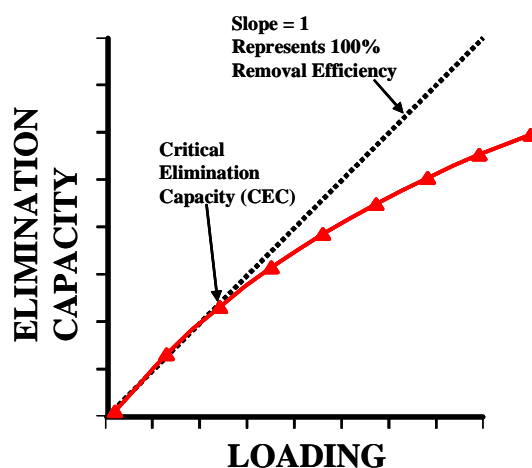
The Table below gives some of the characteristics of four media types that PRD Tech has used in some of its installations:

Properties Table				
Model No.	Nominal Size (in)	Surface Area (ft <sup>2</sup> /ft <sup>3</sup> )	Bulk Density (lb/ft <sup>3</sup> )	Pressure Drop Factor (in. H <sub>2</sub> O/ft)/(ft/min)
BM-1	1	400	2.0	0.003
BM-2	2	450	2.0	0.004
BM-3	3	500	2.0	0.005
BM-4	3	100	5.6	0.002

The gas-phase pressure drop across the biomedica bed is calculated by multiplying the gas superficial velocity in ft/min and the bed height in ft by the pressure drop factor. For example, for a gas velocity of 100 ft/min within the

vessel and a biomedica bed height of 4 ft using BM-1 media, the estimated gas-phase pressure drop across the bed will be 0.003 x 100 x 4 = 1.2 inches of water. Note that the media has large surface area and low bulk density, which maximizes contact area between the active biofilms and the gas-phase contaminants while minimizing the weight of the media that has to be supported. The bulk density of the media is without the biofilms, and when biofilms grow on the media surface, the weight of the media will increase by a factor of 10.0. Hence, a 4 ft height of BM-1 media in a 6-ft diameter vessel will have a dry weight of 226 lbs and with biomass growth will weigh about 2,260 lbs.

The performance of the media in a Biotrickling Filter can be characterized by its Critical Elimination Capacity (CEC), shown below.



$$\text{Loading} = (\text{Gas Flowrate} \times \text{Inlet Conc.}) / \text{Media Volume}$$

$$\text{Elimination Capacity} = \text{Loading} \times \text{Removal Efficiency}$$

The table below gives the Critical Elimination Capacities (CEC) values for the various types of PRD Tech's Biomedica for several contaminants typically encountered in wastewater treatment plants.

Media Type	Critical Elimination Capacity (g.m <sup>-3</sup> .h <sup>-1</sup> )					
	H <sub>2</sub> S	NH <sub>3</sub>	DMS	DMDS	Ethanol	Styrene
BM-1	160	120	60	34	356	172
BM-2	135	100	45	25	278	149
BM-3	120	85	32	17	178	124
BM-4					110	83

PRD Tech guarantees all of its media against deterioration, chemical/biological breakdown and clogging due to biomass growth for 10 years.