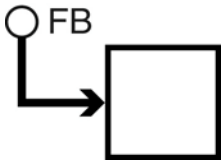
Filter Bags and Filter Tubes

DE-WATERING SEDIMENT CONTROL TECHNIQUE

Low Flow Rates	✓	Low Filtration		Sandy Soils	✓
Medium Flow Rates		Medium Filtration	✓	Clayey Soils	✓
High Flow Rates		High Filtration		Polluted Soils	



Symbol

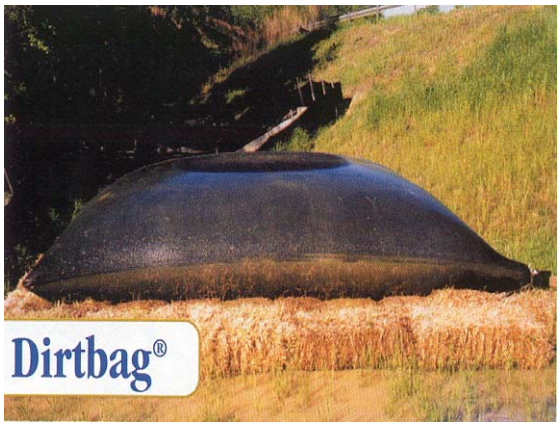


Photo 1 – Filter bag (Dirtbag ®)

Photo 2 – A filter tube is just another form of filter bag

Key Principles

1. Most geotextile filters have only a limited ability to capture and retain clay-sized particles; therefore, operators should not expect a significant change in the colour or clarity of water passing through the filter bags.
2. The treatment process can be improved if the filter bag discharges water as sheet flow onto a *Grassed Filter Bed*.

Design Information

Design flow rates can vary significantly depending on the type of geotextile used in manufacture of the filter bag. Pressure–discharge or head–discharge relationships should be obtained from the relevant manufacturer or distributor based on actual hydraulic testing of the fabric/bags.

If the manufacturer's head–discharge relationship is not available, then it can be estimated from the 'permittivity' of the geotextile (Equation 1) based on:

- 100% sediment blockage of the underlying surface area of the bag;
- 10 to 50% blockage of the upper surface area of the bag (depending on intended use).

$$Q = B.F. \times \Delta H \times A \times \Psi \qquad \text{(Eqn 1)}$$

where:

Q	=	Total flow rate through the geotextile [m^3/s]
B.F.	=	Blockage factor, assume 0.9 to 0.5 depending on usage
ΔH	=	Hydraulic head loss through geotextile [m]
A	=	Surface area of the geotextile [m^2]
Ψ	=	Permittivity of the geotextile (AS 3706-9) [s^{-1}]

Significant errors can result from the Equation 1 if applied to woven or composite fabrics.

Figures 1 to 4 display various installation arrangements for filter bags and filter tubes.

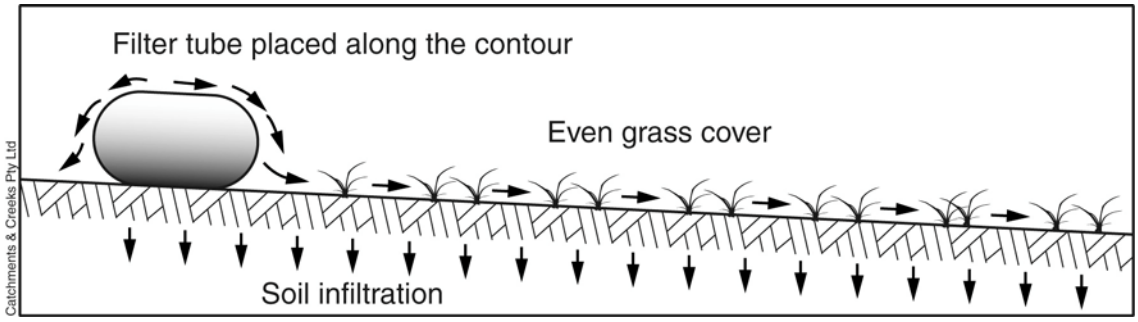


Figure 1 – Ideal placement of filter bag or filter tube up-slope of a grassed filter bed

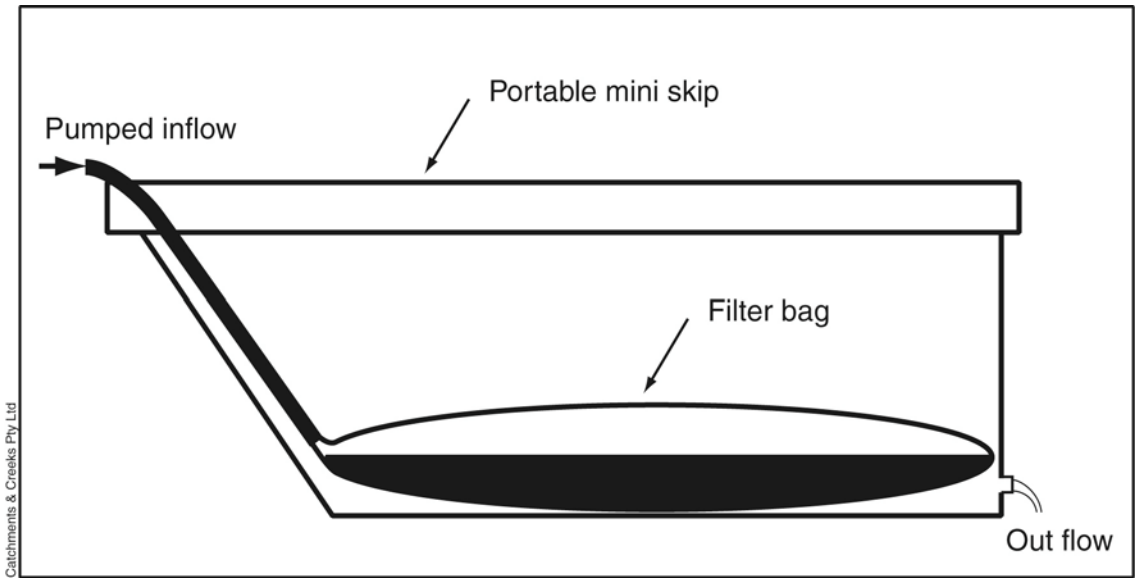


Figure 2 – Placement of filter bag within a free-draining mini-skip

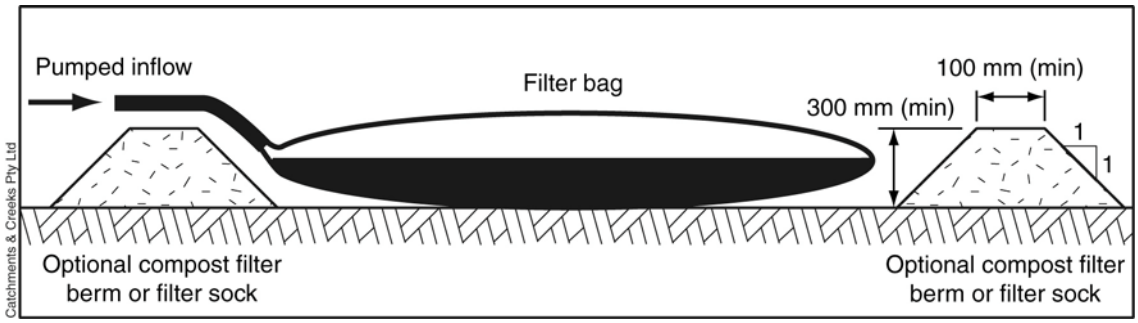


Figure 3 – Placement of filter bag within a compost-filled filter berm enclosure

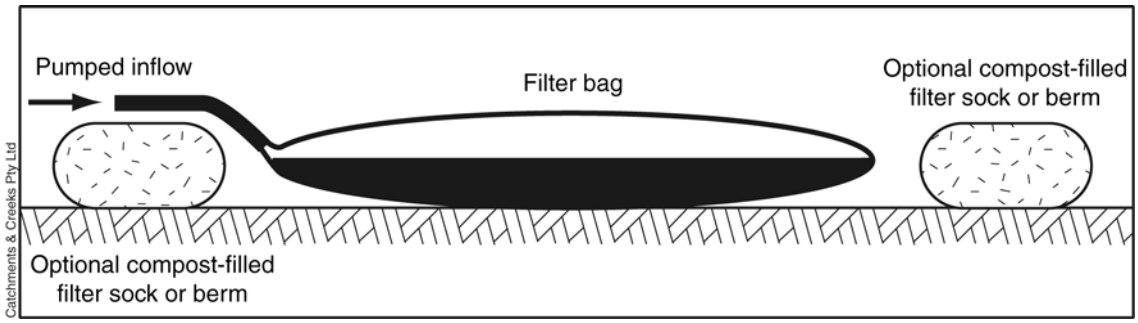


Figure 4 – Placement of filter bag within a compost-filled filter sock enclosure

Description

Large porous geotextile bags or tubes into which sediment-laden water is pumped.

Purpose

Used to filter medium to coarse sediment particles and other particulate matter from pumped water.

Typically used when de-watering small quantities of sediment-laden water.

Limitations

Only suitable for low flow rates.

Inflow must be via a pressurised system.

Generally has only limited control over turbidity levels, thus best used when the effluent from the bag is allowed to filter through an unsaturated grassed area prior to entering a creek, drain or gutter.

Advantages

Commercially available product.

Bags are small and easy to handle (when empty).

Disadvantages

Bags can be difficult to handle when full.

Their use is limited to low flow rates and/or small volumes of water.

Special Requirements

Consideration **must** be given to how the bag, when full of sediment, can be collected and disposed of. The bag may need to be placed on a pallet or inside a mini skip to how easy removal (Figure 2).

Where practicable, the filter bag should be located up-slope of a *Grassed Filter Bed* to assist in the capture of fine sediments passing through the bag.

Materials

- Manufactured from a non-woven, polyester or polypropylene geotextile fabric reinforced with a UV-stabilised, geotextile mesh or woven geotextile fabric.
- Wide strip tensile strength (AS3706.2) minimum 20kN/m in both directions.
- Pore size (EOS, O_{95}, AS 3706.7) less than 90µm.
- Mass per unit area (AS3706.1) minimum 300g/m^2.

Installation

1. Refer to approved plans for location and operational details. If there are questions or problems with the method of installation or operation, contact the engineer or responsible on-site officer for assistance.
2. Where practicable, position the filter bag to maximise the filtration and/or infiltration of the outflow water prior to it discharging into a gutter, drain or water. The grassed area should be an even surface without drainage depressions.
3. Install the filter bag or tube in a manner than will allow its efficient removal without damage to the bag/tube or allow the release of sediment.

Maintenance

1. Inspect the filter bag regularly and at least daily during de-watering operations. Make repairs as needed to the hose and bag.
2. Filter bags must be replaced if damaged.
3. Replace the filter bag when sediment blockage of the bag decreases the flow rate to an unacceptable level, or when the bag is full of sediment.
4. Where appropriate, regularly (e.g. once a day) brushing the surface of the bag with a stiff-bristle broom can reduce surface blockages and improve the flow rate through the bag.

Removal

1. Allow the filter bag to de-water either into a suitable sediment trap, *Grass Filter Bed,* or onto an area of non-saturated soil, such that water readily infiltrates into the soil.
2. Suitably dispose of the bag and sediment in a manner that will not create further erosion, sedimentation or environmental problems.