

Manganese Greensand is capable of reducing iron, manganese and hydrogen sulfide from water through oxidation and filtration.

# Manganese Greensand

Manganese Greensand is formulated from a glauconite greensand and is capable of reducing iron, manganese and hydrogen sulfide from water through oxidation and filtration. Soluble iron and manganese are oxidized and precipitated by contact with higher oxides of manganese on the greensand granules. The hydrogen sulfide is reduced by oxidation to an insoluble sulfur precipitate. Precipitates are then filtered and removed by backwashing. When the oxidizing capacity power of the Manganese Greensand bed is exhausted, the bed has to be regenerated with a weak potassium permanganate (KMnO<sub>4</sub>) solution

thus restoring the oxidizing capacity of the bed. 1½ to 2 ounces of potassium permanganate, in solution, per cubic foot of Manganese Greensand is considered sufficient for normal regeneration. It is required to vigorously backwash and regenerate the bed when it is placed in service and before its oxidation capacity is totally exhausted.

**Operating the bed after oxidation capacity is exhausted will reduce its service life and may cause staining.**

**Untreated water should periodically be monitored for raw water parameters. Treated**

**water should periodically be monitored for manganese and if present iron and hydrogen sulfide shortly before a regeneration and immediately after a regeneration to monitor how the filter system is functioning. Elevated treated water manganese concentrations before regeneration may mean that the filter media is being destroyed or bed reduction capacity has been exceeded. Take corrective actions as necessary.**

**Low pH, lack of chlorine oxidant or lack of permanganate oxidant are the most likely conditions leading to media destruction.**

## ADVANTAGES

- Iron reduction over wide pH range
- Effective reduction of hydrogen sulfide in addition to iron and/or manganese
- No harmful effects from a chlorine feed
- Low attrition for long bed life

## PHYSICAL PROPERTIES

- Color: Black
- Bulk Density: 85 lbs./cu. ft.
- Specific Gravity: 2.4-2.9
- Effective Size: 0.30-0.35 mm
- Uniformity Coefficient: 1.6
- Mesh Size: 18-60
- Attrition Loss Per Year: 2%

## CONDITIONS FOR OPERATION

- Water pH range: 6.2-8.5
- Maximum water temperature: 80°F/26.7°C
- Bed depth: 30 in.
- Freeboard: 50% of bed depth (min.)
- Service flow rate: 3-5 gpm/sq. ft., 8-10 gpm/sq. ft. intermittent flow possible
- Backwash flow rate: 10-12 gpm/sq. ft.
- Backwash bed expansion: 40% of bed depth (min.)
- Maximum practical limit of iron (Fe++) or manganese (Mn++) in raw water: 15 ppm
- Maximum practical limit of hydrogen sulfide (H<sub>2</sub>S): 5 ppm

## INTERMITTENT REGENERATIONS

- The largest Clack Pot Perm Feeder delivers a maximum of 6 oz of potassium permanganate. As a result if using potassium permanganate to regenerate a tank containing more than 3 cubic feet of media use continuous regeneration.
- Regeneration: 1.5-2 oz of KMnO<sub>4</sub> by weight per cu. ft.
- Use an injector size that is two sizes larger than one that is sized for a typical softener application
- Draw/slow rinse time greater than 50 minutes
- Down flow rinse (Fast Rinse) 8 minutes minimum
- Rinse until all traces of KMnO<sub>4</sub> are gone
- 10,000 gallons of water containing 1 mg/L Iron per cu.ft. regeneration
- 5,000 gallons of water containing 1 mg/L Manganese per cu.ft. regeneration
- 2,000 gallons of water containing 1 mg/L Hydrogen Sulfide per cu.ft. regeneration
- For dilute solutions mg/L = ppm
- 37,850 mg KMnO<sub>4</sub> demand
- $KMnO_4 \text{ demand} = [1 \times \text{mg/L Fe}] + [2 \times \text{mg/L Mn}] + [5 \times \text{mg/L H}_2\text{S}]$

### Example Calculation:

Soluble Fe = 3.0 mg/L Fe, Soluble Mn = 0.3 mg/L Mn, H<sub>2</sub>S = 0.2 mg/L H<sub>2</sub>S

$KMnO_4 \text{ demand} = [1 \times 3.0 \text{ mg/L Fe}] + [2 \times 0.3 \text{ mg/L Mn}] + [5 \times 0.2 \text{ mg/L H}_2\text{S}]$

$KMnO_4 \text{ demand} = [3.0 \text{ mg/L}] + [0.6 \text{ mg/L}] + [1.0 \text{ mg/L}]$

$KMnO_4 \text{ demand} = 4.6 \text{ mg/L}$

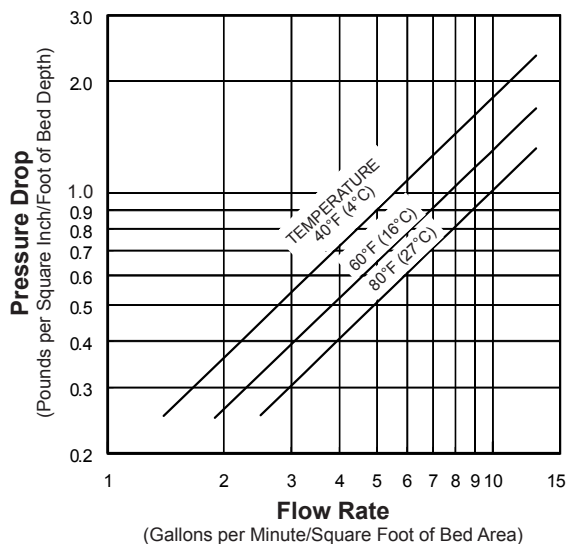
$\left( \frac{37,850 \text{ mg KMnO}_4 \text{ demand per cu. ft. regen.}}{4.6 \text{ mg/L KMnO}_4 \text{ demand}} \right) \times$

$\frac{1 \text{ gallon}}{3.785 \text{ Liters}}$

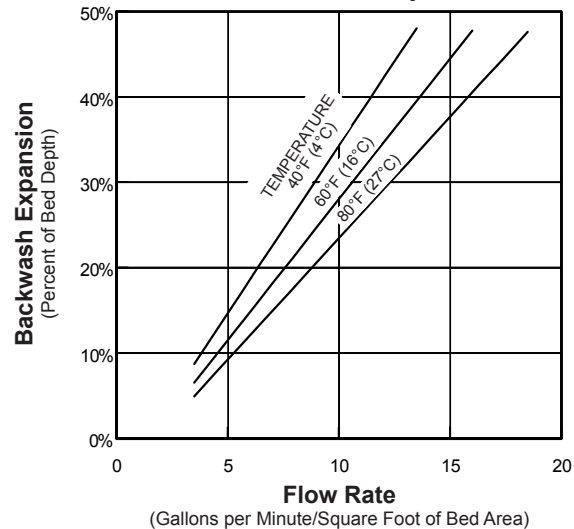
2,174 gallons per cu. ft. regenerated



### Service Flow Pressure Drop



### Backwash Bed Expansion



Manganese Greensand is manufactured by Inversand Co.

## ORDER INFORMATION

Part No.	Description	Cu. Ft./Bag	Wt./Cu. Ft.*	Bags/Pallet	Weight/Pallet	Pallet Dimensions
A8041	Manganese Greensand	1	85 lbs.	25	2175 lbs.	48" x 40" x 27"

\*Weight per cubic foot is approximate.

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