ozogram

Water treatment systems

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THE GreensandPlus CATALYTIC FILTER SYSTEM

is more economical, requires less operation cycles and allows a higher flow rate

Catalytic oxidation process for the removal of:

- IRON
- MANGANESE
- HYDROGEN SULPHIDE
- ARSENIC
- RADIUM

TYPICAL INSTALLATION

Typical Performance Data

Flux Rate	20 m/h (8.2 gpm/ft²)
Backwash	30 m/h (12 gpm/ft²)
Raw Water	Fe 1.0 mg/L Mn 0.3 mg/L
Effluent Water	Fe <0.02 mg/L Mn 0.025 mg/L
Cl_2 Dosage	Pre-feed 1.5 mg/L Residual 0.5 mg/L
Pressure Drop	Start of Run 30 kPa (4 psi) End or Run 70 kPa (10 psi)
Run Length/Backwash	24 hours

Advantages:

- *extends filter runs*
- *cuts operating costs*
- *generates higher flow rates*
- *eliminates permanganate soaking*
- *reduces plant capital cost*
- *smaller footprint*
- *less water required for backwash*

For more than 30 years, manganese greensand (listed ANSI/NSF Standard 61) has proven itself a cost-effective system for the **removal of iron and manganese from ground water**, with "built-in" flexibility for varying conditions.

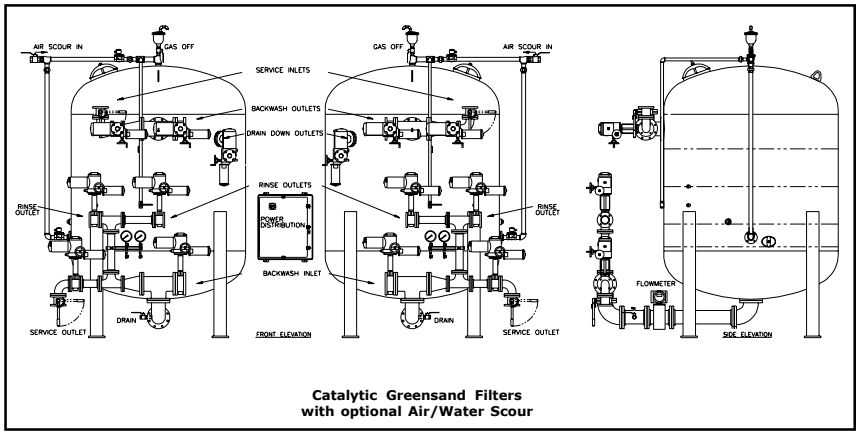
The unique chemical and physical characteristics of GreensandPlus allow flexibility of design using several methods of operation: Continuous permanganate Regeneration, with chlorine (CR) and without chlorine (CM). These two methods are recommended for predominantly iron waters, the CM method eliminates THM effluents.

For groundwaters in which manganese predominates, Ozogram proposes the Catalytic Oxidation process.

The Catalytic (CO) process, based on the catalytic action of the manganese oxide coating on the GreensandPlus in the presence of chlorine, is well recognized and as efficient as the above processes, but will also reduce capital andf operation costs. The higher valance manganese oxides are maintained in a regenerated condition by the oxidizing environment provided by the chlorine. No potassium permanganate is needed with a catalytic iron and manganese removal process. The reaction equation is:

$$Cl_2 + Mn^{+2} \xrightarrow{Z*MnO_2} MnO_2$$

The flow rate for the catalytic process is generally up to 20 m/h (8.2 gpm/ft²), twice as high as the CM, CR & IR processes where the flow rates are 10-12 m/h (4-5 gpm/ft2), and, due to the fact that no permanganate soaking is necesssary, less water will be required for backwashing, and global exploitation costs will be reduced.



Catalytic Greensand Filters with optional Air/Water Scour

Suggested Operating Conditions for the CO Process

Bed Type

Dual media: Anthracite 300-450mm (12-18") and GreensandPlus 450-900mm (18-36"). 900mm (36") is used without anthracite for colloidal iron or manganese removal.

Pressure Drop

Maximum pressure drop: 70-80 kPa (10-12 psi).

Capacity

1000-1200 grains/ft² of oxidized iron and manganese of bed area based on permanganate (MnO_4) demand[1]. Some ground waters contain iron in a form that filters in depth and the pressure drop may not exceed 4-6 psi before iron appears in the filter effluent.

Backwash

Sufficient rate using treated water to produce 40% bed expansion. 30 m/h (12 gpm/ft²) is typical.

Air/Water Scour (Optional)

Using 250-600 L/min./m² (0.8-2.0 CFM/ft²) with a simultaneous treated water backwash at 10-12 m/h (4-5 gpm/ft²).

Raw Water Rinse

At normal service flow rate for 3-5 minutes or until effluent is acceptable.

Flow rate

Recommended flow rates are up to 20 m/h (8.2 gpm/ft²) for the CO process. Extremely high concentrations manganese could require lower flow rates for equivalent run lengths. For optimum design parameters, pilot plant testing is recommended.

The run length between backwashes can be estimated as follows:

Run length for water containing 1.0 mg/L iron and 0.3 mg/L manganese at a 20 m/h (8.2 gpm/ft²) operating rate using a 0.1 m² (1 ft²) cross-sectional vessel:

Run length = Capacity / (MnO_4 demand x Flow)

Capacity = 1100 (grains/ft²) x 1.0 ft² x 17.1 (mg/L //grains/gal.)

MnO_4 demand[1] x flow = ((1 x mg/L Fe) + (2 x mg/L Mn)) x 20 m/h (8.2 gpm)

$$\text{Run length} = \frac{1100 \times 1.0 \times 17.1}{1.6 \times 8.2 \times 60} = 23.9 \text{ hours}$$

The backwash frequency, to an 70-80 kPa (10-12 psi) pressure drop, is approximately every 22-24 hours of actual operation.

[1] The MnO_4 demand is constant even though there is no injection, thus:
MnO_4 demand (mg/L) = (1 x mg/L Fe)+(2 x mg/L Mn)

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