

Performance Media for Iron, Manganese & Sulfide Removal

AdEdge GS⁺ is a black filter media used for removing soluble iron, manganese, hydrogen sulfide, arsenic and radium from water supplies.

The manganese dioxide coated surface of GS⁺ acts as a catalyst in the oxidation reduction reaction of iron and manganese.

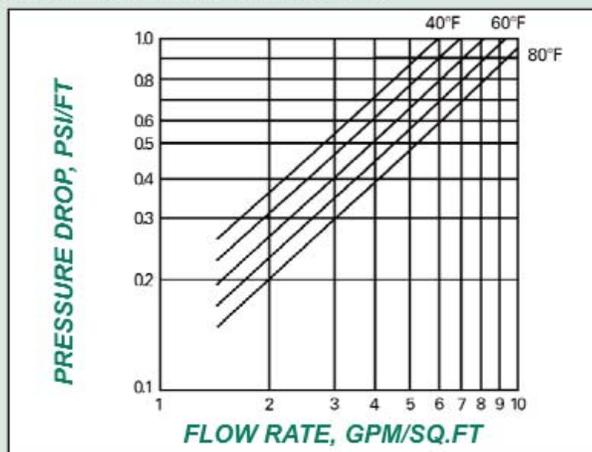
The silica sand core of GS⁺ allows it to withstand operating conditions in waters that are low in silica, TDS and hardness. When using GS⁺, you can eliminate the aluminate feed.

GS⁺ is effective at higher operating temperatures and higher differential pressures than ordinary manganese greensand. Tolerance to higher differential pressure can provide for longer run times between backwashes and a greater margin of safety.

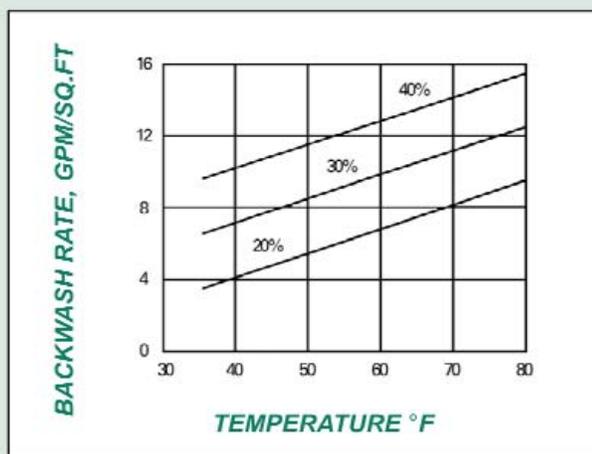
Systems may be designed using either vertical or horizontal pressure filters, as well as open gravity filters.

GS⁺ is a proven technology for iron, manganese, arsenic, radium and hydrogen sulfide removal. Unlike in-situ treated media feeds, there is no need for extensive preconditioning of filter media or lengthy startup periods, during which required water quality may not be met.

PRESSURE DROP (CLEAN BED)



BED EXPANSION DURING BACKWASHING



GS⁺ is an exact replacement for manganese greensand. It can be used in CR or IR applications and requires no changes in backwash rate or times or chemical feeds. Packaging is available in 1/2 cubic foot bags or 1 metric ton (2,205 lbs) bulk sacks.

PHYSICAL CHARACTERISTICS

Physical form

Black, nodular granules
shipped in a dry form

Apparent density

88 pounds per cubic foot net

Shipping weight

90 pounds per cubic foot gross

Specific gravity

Approximately 2.4

Porosity

Approximately 0.45

Screen grading (dry)

18 X 60 mesh

Effective size

0.30 to 0.35 mm

Uniformity coefficient

Less than 1.60

pH range

6.2-8.5 (see General Notes)

Maximum temperature

No limit

Backwash rate

Minimum 12 gpm/sq. ft. at 55°F

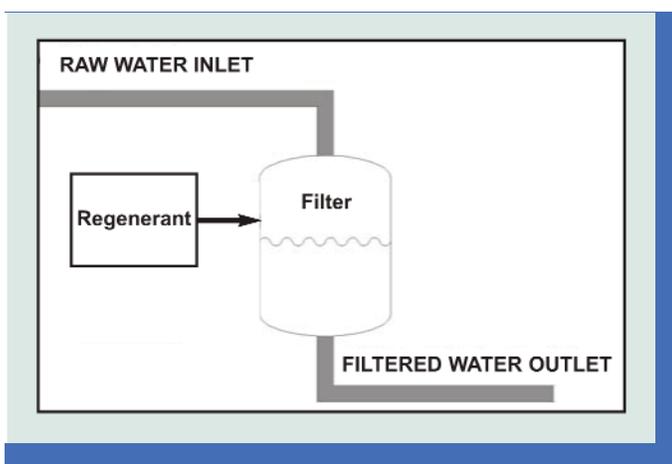
Service flow rate

2 –12 gpm/sq. ft.

Minimum bed depth

15 inches of each media for dual beds or
30 inches of GS⁺ alone.

METHOD OF OPERATION CR



Continuous regeneration (CR) operation is recommended in applications where iron removal is the main objective in well waters with or without the presence of manganese. This method involves the feeding of a predetermined amount of chlorine (Cl₂) and /or potassium permanganate (KMnO₄), directly to the raw water before the GS⁺ Filter.

Chlorine should be fed at least 10-20 seconds upstream of the KMnO₄, or as far upstream as possible to insure adequate contact time. KMnO₄, if required, should be fed to produce a “just pink” color in the filter inlet. This slight excess of KMnO₄ or a Cl₂ residual carried through the filter will maintain GS⁺ in a continuously regenerated condition.

The dosage of Cl₂ and KMnO₄ may be estimated as follows:

$$\text{mg/L Cl}_2 = \text{mg/L Fe}$$

$$\text{mg/L KMnO}_4 = (0.2 \times \text{mg/L Fe}) + (2 \times \text{mg/L Mn})$$

For operation using only Cl₂ the demand can be estimated as follows:

$$\text{mg/L Cl}_2 = (1 \times \text{mg/L Fe}) + (3 \times \text{mg/L Mn})$$

SUGGESTED OPERATING CONDITIONS

Bed Type

Dual media: anthracite (10-14 in.) and GreensandPlus (20-24 in.)

Capacity

700-1200 grains of oxidized iron and manganese/sq.ft. of bed area based on oxidant demand and operation to iron break through or DP limitations.

Backwash

Sufficient rate using treated water to produce 40% bed expansion.

Air/Water Scour

Optional using 0.8-2.0 cfm/sq. ft. with a simultaneous treated water backwash at 4.0-4.5 gpm/sq. ft.

Raw Water Rinse

At normal service flow rate for 2-4 minutes or until effluent is acceptable.

Flow Rate

Recommended flow rates with CR operation are 2-12 gpm/sq. ft. High concentrations of iron and manganese will require lower rates for

Flow Rate (Cont.)

equivalent run lengths. Higher flow rates can be considered with very low concentrations of iron and manganese. For optimum design parameters, contact AdEdge.

What is the run length for a water containing 1.7 mg/L iron and 0.3 mg/L manganese at a 5 gpm/sq. ft. operating rate?

$$\begin{aligned}\text{Contaminant} &= (1 \times \text{mg/L Fe}) + (2 \times \text{mg/L Mn}) \\ \text{+ Loading} &= (1 \times 1.7) + (2 \times 0.3) \\ &= (2.3 \text{ mg/L or } 2.3/17.1 = 0.13 \\ &\quad \text{grains/gal. (gpg)})\end{aligned}$$

At 1,000 grains/sq. ft. loading \div 0.13 gpg = 7,672 gal./sq.ft.

At 5 gpm/sq. ft. service rate $7,692 / 5 = 1,538$ min.

The backwash frequency is approximately every 22-26 hours of actual operation.

pH

Raw waters having natural pH of 6.2 or above can be filtered through GS+ without pH correction. Raw waters with a pH lower than 6.2 should be pH-corrected to 6.5 before filtration. Additional alkali should be added following the filters if a pH higher than 6.5-6.8 is desired in the treated water. This prevents the possible adverse reaction and formation of a colloidal precipitate that sometimes occurs with iron and alkali at a pH above 6.8.

