# MANGANOX®

The most effective filter media for reducing iron, manganese and hydrogen sulphide.

CHEMSYS

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# MANGANOX

MANGANOX is a high rate, granular filter media used for removing hydrogen sulphide, iron and manganese compounds from water supplies. MANGANOX operates both as a classical filter working with an oxidant and as a catalytic media due to its ability to accelerate the reaction between the oxidizing agent and any prevalent dissolved oxygen with sulphide, iron and manganese present. Dissolved iron, manganese and hydrogen sulphide will stay in solution unless the equilibrium is changed. Iron and manganese that is not oxidized become catalytically precipitated and then adsorbed directly on the media. MANGANOX is a very dense media that stops oxidized (precipitated) forms of iron, manganese and hydrogen sulphide from passing through the bed. Most of the manganese is removed rapidly in the first few inches of the media where it is further oxidized to manganese dioxide. The adsorbed manganese, iron and precipitated sulphur are expelled during backwash. Any insoluble ferric hydroxide particulate growths are expelled during backwash. The media must be properly backwashed to break loose and remove the filtered contaminants and precipitated iron, manganese and hydrogen sulphide.

Proper system sizing of the control valve and tank are necessary to sustain media performance.

A continuous reaction occurs with the addition of an oxidant, regenerating the media surface and replenishing the MANGANOX. For difficult applications, MANGANOX filters can be enhanced with aeration, chlorination, or ozone. Because of MANGANOX's naturally high manganese dioxide content, it provides a higher adsorption capacity than other media. A MANGANOX filter is recommended before softeners to protect the ion exchange resin from fouling.

## Advantages

- Efficient reduction of manganese, iron and hydrogen sulphide
- Long service life
- Only regular backwashing is required
- Ability to process high flow rates with low pressure drop
- Continuous regeneration
- Ability to be utilized with common oxidants including: CL2 (gas) - Sodium hypochlorite – Potassium Permanganate
- 10 – 30 second reaction time with oxidant additive
- Converts ferrous iron to ferric iron
- Converts H2S to sulphur
- Converts Manganese to MnO2
- No chemical regeneration is required but may reduce service life
- Allows for adequate reaction time to permit for the formation of ferric hydroxide
- Allows for physical straining of the ferric hydroxide flock and sulphur until media requires
- Backwashing
- Allows for adsorption of MnO2
- NSF/ANSI Standard 61 - 2002 Certified

## Applications

- Removal of Iron up to 10 ppm
- Removal of Manganese up to 5 ppm
- Removal of Hydrogen Sulphide (rotten egg smell) up to 3 ppm
- Not recommended for Iron Bacteria and Manganese bacteria removal
- Not recommended for tannin and organics removal

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# MANGANOX

## Physical properties

| | |
|---|---|
| Color | Black |
| Purity | >85% |
| C.A.S No. | 1313-13-9 |
| Physical Form | Granular |
| Moisture content | <0.5% |
| Bulk density | 125 lbs/ft |
| Mesh size (mm) | 0.85-2.36/0.425-0.85 |
| Uniformity Coefficient | 1.77 |
| Specific gravity | 3.8 |

## Shipping information

| | |
|---|---|
| Packaging | 25 kg bags OR 1 Metric Ton SuperSack |
| Bags per pallet | (25 kg bags) 40 |
| NPFA Rating | Health: 2<br>Flammability: 0<br>Reactivity: 1 |

## Operating conditions

| | |
|---|---|
| PH | 6 – 9 |
| Bed depth | 36 – 48 inches (900 – 1200 mm) |
| Service flow rate | 5 –10 gpm / sq ft. (12 – 20 m/h) |
| Back wash flow rate | 22 – 30 gpm / sq ft. (50 - 72 m/h) |
| Back wash expansion | 15 – 30% |
| Freeboard | 70% of bed depth |
| Oxidant type | Chlorine |
| Oxidant Form | 12.5% Sodium Hypochlorite |
| Oxidant contact time | 10 – 30 seconds |
| Typical oxidant dosage | 0.5 – 2 ppm |
| Regeneration | Continuous w / oxidant addition |
| Removal efficiency | 95 – 99% for Iron - 99 % for Manganese |
| Back wash efficiency | Every 24 hours ( optimal ) |

## Comparative information

| Product name | Active ingredient | Relative life expectancy |
|---|---|---|
| ManganOX | 75% - 85% manganese dioxide | 7500 |
| Manganese greensand | 0.5% manganese dioxide | 50 |
| Birm | < 0.01% manganese dioxide | 1 |

## Water testing

The first step in the proper installation of a MANGANOX filtration system is to have a reliable knowledge of the subject water's chemistry. Always test the water as accurately as possible before designing a system. *The nature of the water's chemistry will affect how the system is to be designed and operated. MANGANOX by itself is capable of removing the following contaminant levels chemical free:

Iron . . . . . 15.0 ppm
Hydrogen Sulphide . . . . . .7.0 ppm
Manganese . . . . . 3.0 ppm

While MANGANOX is capable of removing higher contaminant levels, such applications should be considered as special cases. Pilot testing and the use of additional treatment such as oxidizing agents, chemical regeneration, or tannin removal media should be considered.

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## Backwashing

The next important step in ensuring a proper MANGANOX installation is to make sure the media receives a thorough backwashing. A strong backwash is important to break loose the contaminant particles and keep the bed clean so that it can continue to filter the water at peak level. MANGANOX is a rather heavy media, weighing 114+ lbs/cu. ft. A valve capable of lifting the bed at least 20% to 50% at a rate of12 to 15 gpm/sq. ft. @ 60°F during backwash must be used. If the media is not lifted during backwash, the bed will eventually foul and the system will fail. A daily backwash is highly recommended, but not always necessary, depending on the water's chemistry. Because of MANGANOX superior oxidation/filtration capabilities, it loads up much more quickly than other media. Daily backwashing is recommended to maximize MANGANOX removal capacity. Since MANGANOX has such great particle strength, it is able to withstand the rigors of frequent backwashing and at the same time deliver 20 to 100 times the oxidation/filtration capability of other Manganese – based media.

## Additional treatments

The third step is to consider the use of oxidizers, chemical regeneration, and other additional treatments in special cases. When the subject water's contaminant levels exceed the recommended removal limits, MANGANOX will continue to outperform the competition. However, the use of an additional oxidizing agent (e.g. oxygen, chlorine, ozone, hydrogen peroxide, potassium permanganate, etc.) is recommended. Oxidizers will not adversely affect MANGANOX. In fact, they will enhance its performance. They super - oxidize the media, which enables MANGANOX to perform quicker and keep cleaner. As a matter of good measure, it is always a safe practice to install an oxidation method upstream (in front) of the MANGANOX™ bed to ensure that the oxidation-reduction reaction is 100% complete. Similarly, the use of chemical regeneration, while often not necessary for MANGANOX to operate properly, will not harm the media, and if performed regularly, will extend the life of the media. Tannin removal media, mixed bed resins or carbon polishing filters may also be necessary depending upon the specific water's chemistry.

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WTC® Water Treatment Components