PFL Premium Grade Manganese Dioxide

Applications: Iron and Manganese removal from potable waters by catalytic oxidation.

Characteristics:

Appearance	Black, granular mineral
Specific Gravity	>3.5 < 4.1
Bulk Density	2.0 Tonnes/m^3

Quality Control: Certified to BS5750 Part II, ISO 9000

Typical Chemical Analysis: A natural crushed ore without additives and free from contamination.
Manganese content 75% to 80% as MnO_2
Moisture content less than 1% by weight
Hardness : 5 to 6 Moh scale.

Grades Available: The standard size is BS16/30 (0.50 to 1.00 mm).
Other grades are available upon request but at longer lead times.

Flow Rates: Typical filtration rate is 9 $m^3/m^2/hr$.
Typical backwash rates are 15 to 25 $m^3/m^2/hr$.

Packaging: 1 Tonne bulk bags, 50 kg or 25 kg bags, palletised, shrink wrapped or banded.

Catalytic Activity: A mixture of manganese Dioxide and sand in a filter bed will normally reduce the concentration of Manganese and Iron in water from 0.5 mg/l and 3 mg/l to 0.02 mg/l and 0.05 mg/l respectively (given the correct conditions of alkalinity and pH).

Discussion: See page 2

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Discussion:

In general, the most favoured method today for the removal of Iron and Manganese is catalytic oxidation. Currently two types of catalytic media are used; Manganese Greensand, a treated zeolite and natural Manganese Dioxide. There are considerable differences in the economics and methods of use between these two materials. The application of Manganese Greensand requires the replacement of the whole filter bed, regeneration with potassium permanganate along with its storage and dosing facilities, monitoring and manning. Manganese Dioxide requires only partial replacement of the filter media with no chemical dosing and regeneration apart from chlorination, and no monitoring to ensure efficient working.

Normally, between 10% to 20% of MnO_2 by volume of the filter sand is added to the filter. This is usually placed on top of the sand bed until thoroughly mixed, as it is important that the water passing through the filter comes into contact with as much MnO_2 as possible for as long a period as possible. Any precipitated iron or manganese adheres firmly to the catalytic grains without impairing their activity. The manganese Dioxide particles thus act as a filter of suspended solids as well as catalytically absorbing toxic metals.

Manganese removal efficiency is a direct function of the surface MnO_2 concentration; its oxidation state and the pH of the filtered water. The sorption of Mn_2 by MnO_2 ore is very rapid. Both the sorption kinetics and sorption capacity increase with the increasing pH, from 7 to 8 and the surface MnO_2 concentration. In the absence of a filter applied oxidant i.e. chlorine, Mn_2 removal would be sorption alone. Maintenance of free chlorine residuals thorough the filter aid Mn_2 removal, with the chlorine promoting the oxidation of Mn_2 directly on the MnO_2 surface. The net result being the continous regeneration of sorption sites for further Mn_2 adsorption. Hence, provided that there is sufficient Mn_2 concentration in the raw water influent to replace the small amounts of MnO_2 lost during backwashing, then the MnO_2 will continually regenerate itself without the resort to replacement or chemical dosing with permanganate.

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