SETUP & ACTIVATION OF DMI-65 FILTER

Sodium hypochlorite is used to activate and condition the catalytic surfaces of DMI-65 filter medium. The method is described below followed by a step by step guide. The chemical process of curing of the DMI-65 catalytic surfaces – is done by soaking the media for at least 3 hours prior to its use. Ideally the longer the soaking and conditioning period is, the stronger and harder the catalytic surfaces become.

Clean water is added to fill the filtration unit, fill until 50% of the free board is submerged. Typically a solution of 12.5% sodium hypochlorite is then introduced into the unit in a ratio of 10 liters of 12.5% solution sodium hypochlorite to 1m3 of DMI-65. DMI-65 is poured into the filter unit, with the allowance of sufficient support media such as filter quartz, so that the bottom of the DMI-65 bed sits above the lowest backwash laterals. The mixture is then lightly agitated and the wash valve opened to drain off the water until the water is at the level of the surface of the filtration medium. The wash valve is then closed. The DMI-65 is then soaked for at least 3 hours. The longer the soaking, the better.

The wash valve is then opened and all the water is drained from the system. The sodium hypochlorite of the soak water will be concentrated to several hundred ppm and discharge must be considered. The DMI-65 is then continuously backwashed while sodium hypochlorite is continually injected, maintaining a chlorine residual level of at least 0.1 – 0.3 mg/L (ppm) in the backwash water. This process should continue until the residual manganese level in the backwash water reduces to a value that is “three times the times the maximum contaminant limit” of manganese in your region. Typically the manganese level should be reduced to about 0.15mg/L (or ppm). In this process, the excess manganese dioxides left over from the proprietary infusion manufacturing process, that have not cured to the DMI-65 catalytic layers need to be backwashed washed into waste. The time taken for this to occur is usually between 20 and 40 minutes and up to a number of hours for larger applications, depending on backwash velocity and filter volume.

Once the manganese concentration has fallen to 0.15 ppm or less, the injection of hypochlorite or chlorine is adjusted to bring the level of residual chlorine to between 0.1 and 0.3 ppm in the filtrate. The use of a reducing agent such as sodium thiosulphate may be necessary to neutralise high levels of residual chlorine when discharge of the backwash water is not allowable.

Hypochlorite and chlorine are in a chemical equilibrium in water; the position of the equilibrium is pH dependent and low pH (acidic) favors chlorine. Therefore the prescribed ratio of: 12.5% solution of chlorine, at a ratio 10 litres per 1m3 of DMI-65, which is used to condition the DMI-65 will naturally be at a low pH.

Addition of chlorine to water gives both hydrochloric acid (HCl) and hypochlorous acid and inevitably will lower pH. Because the pH scale is logarithmic, pH 6 is 10 times more acidic than neutral pH 7. And pH 5 is 100 times more acidic than neutral. This means during the soaking and conditioning procedure when 10 liters of chlorine (12.5%) per 1m3 of DMI-65 is lowering pH to less than pH 3, we can estimate the solution is more than 10,000 times more acidic than neutral.

During service filter mode, strong chlorine dosing causes highly acidic conditions that are less than pH 5.8. This should never be allowed to occur with a programmed chemical dosing pumps fitted for regulated dosing to maintain operation in a neutral to basic pH range. It's definitely wise to have monitoring system and alarm

in place to maintain free chlorine residual level 0.1 - 0.3 ppm and a neutral to basic pH. This will encourage high oxidation rates of target heavy metals and a long whole of life.

Activating DMI-65 Step by Step Procedure

1. Fill the filter vessel half of its height or internal volume, or a little more, with clean water and add a minimum of 10 liters of a sodium hypochlorite (12.5% NaClO) per cubic meter of DMI-65. This is about the same as 10 fl oz of chlorine (12.5%) per cubic foot of DMI-65. See the supplied calculator named “Initial Chlorine Required for Soaking DMI-65 at Set up Stage”

2. Pour the support media followed by DMI-65 into the upper hole of filter. Bed depth has to be according to filter bed design depth (For example 750mm – 1000mm or 30” to 40”) plus approximately 5%. A 40% free board above the DMI-65 is needed for bed expansion during backwash. If the water level is not well above the DMI-65 bed add more clean water. See the supplied calculator named “LV-SV Calculator” to calculate volume and bed depth required.

3. Let the DMI-65 filter bed soak in the chlorine solution for 3 hours or more. The longer the DMI-65 is left to soak the better. The DMI-65 may be left to soak overnight or even perhaps over the weekend.

4. The chlorine in the solution used for soaking and conditioning the DMI-65 is at several hundred ppm. Where discharge is not permissible a reducing agent such as sodium thiosulphate should be used to neutralize the chlorine before discarding to waste.

5. Backwash the DMI-65 while continually injecting chlorine solution. The backwash velocity should be about 30 to 40 m3 / m2 / hour depending on the bed depth. This is about 12 – 15 gpm / square foot. Ensure that the residual chlorine level in the backwash water is minimum 0.1 – 0.3 ppm but not higher than maximum intended concentration for treated water. Keep backwashing the DMI-65 until the residual manganese (Mn) in the backwash water reduces in value to less than 3 times the Maximum Contaminant Limit (MCL) of your region. For example, in the USA the MCL for Mn is 0.05 mg/L. Therefore the DMI-65 needs to be backwashed until the residual Mn reads less than 0.15 ppm (0.05 x 3 = 0.15 mg/L).

6. Ensure that the back wash velocity is sufficient enough to expand and raise the DMI-65 so that the very fine material is removed from the bed. During the early stages of the backwash there will be many fine black particles removed and the backwash water will be of a dark colour. During the later stages of the backwash, the water will become clearer, depending on the volume of DMI-65, the time this takes can be some number of hours. Monitor the residual Mn level until it has fallen below, “three times the MCL”.

7. Turn the filter to Rinse Mode. The same concentration of chlorine must be injected during rinse so to maintain the free chlorine residual of 0.1 – 0.3 ppm. This water must be discharged to waste until the residual Mn levels fall below the MCL. This limit may vary from country to country.

8. Once the residual Mn level of water has fallen below the local MCL in the Rinse Mode turn the filter to Service Mode. Start the Service Mode while at the same time continually injecting chlorine. Total free chlorine may be reduced if needed. However, ensure that there is always free chlorine residual in the treated water. Running with residual free chlorine of less than 0.1 ppm is not recommended. Service flow rate will be in the range of about 5 m3 – 20 m3 / m2 / hour or 2 – 8 gpm per square foot. This depends on filter bed depth and water quality.

9. Monitoring Raw Water Quality
If residual Iron (Fe) and Manganese (Mn) is found to “break through” the DMI-65 media bed at greater concentrations than your areas MCL, check the following:

• Is there a free chlorine residual?
• Is the pH abnormally low?
• Is the DMI-65 filter bed being backwashed adequately?
• Is the DMI-65 old?
• Is there an equipment failure such as chemical dosing system?

10. Please check to make sure that the following elements below are not in high concentrations in the raw water. If these elements are high in concentrations please contact Quantum Filtration Medium or your local DMI-65 agent.

• Salt
• Ammonia
• Silica
• Calcium and Magnesium (excessive hardness)