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## Fleck 7000 Greensand Systems

# Using a Chlorine Feed to Replace Potassium Permanganate Regeneration

This is a supplement to the “Fleck 7000 Greensand Installation & Start-Up Guide” and details how to eliminate the need for regular regeneration with potassium permanganate, by setting up a chlorine or hydrogen peroxide feed for the greensand filter.



Questions?

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## Introduction

GreensandPlus is a purple-charcoal filter media used for removing soluble iron, manganese, hydrogen sulfide, arsenic, and radium from well water supplies.

Like its sister product, the old standard “manganese greensand,” the filter media has a manganese dioxide coated surface that acts as a catalyst in the oxidation-reduction reaction of iron and manganese. The difference between GreensandPlus and manganese greensand is the core of the media which, in GreensandPlus, is silica as opposed to greensand mineral. GreensandPlus is more durable, longer lasting, and more effective under a variety of water conditions compared to manganese greensand. It is NSF-approved for use in potable water.

Besides with these benefits, GreensandPlus is an exact replacement for the old manganese greensand. GreensandPlus, like regular greensand, will only remove so much iron, manganese, and odor from water before it needs to be regenerated. This is typically done with potassium permanganate, a purple powder that is added to the potassium permanganate tank that we include with each order.

## Using a Chlorine Feed to Regenerate the Greensand Media

However, in place of intermittent regeneration with potassium permanganate, the water can also be chlorinated prior to the greensand filter in a process called “continuous regeneration.”

In order for the chlorine to work as a replacement for potassium permanganate there must be sufficient chlorine residual in the water and there must be a long enough contact time after the chlorine has been injected.

Fortunately this is easy to accomplish by installing a chlorinator and contact tank ahead of the iron filter.

For most residential and commercial applications we recommend using a liquid bleach injector - that is, a chlorinator that uses a small metering pump to pump in a bleach solution. This is because the chlorine dosage is critical for successful operation of your system. The chlorine dose can be easily controlled with a standard metering pump chlorinator, whereas it is more difficult to control the dosage with a dry calcium pellet feeder.

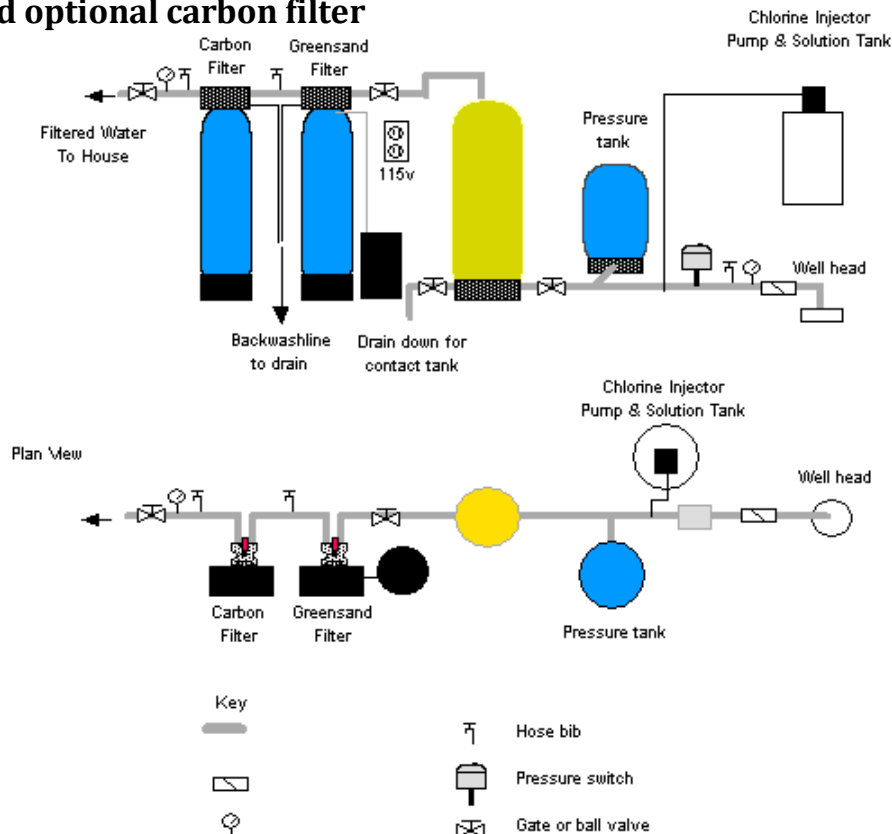
The goal is to inject the chlorine automatically and have at least 5 minutes of contact time after the chlorine has been injected before the iron filter (see Fig 1). After the greensand filter you want to see a free-chlorine residual of 0.2 to 0.4 ppm.

## Understanding Free-Chlorine vs Total Chlorine

It is important to have a simple chlorine test kit where you can test the total chlorine and free chlorine. Chlorine combines with iron, manganese, hydrogen sulfide gas, bacteria, and other contaminants in a process known as oxidation. As an example, say you were to add 2 ppm (2 mg/L) of chlorine to some water and wait several minutes. You then measure the total-chlorine and find you have 2.0 ppm, but when you measure the free-chlorine, you find that the water has 0.5 ppm of free-chlorine. The difference between the 2.0 ppm of total chlorine and the 0.5 ppm of free-chlorine is 1.5 ppm. This is the “chlorine-demand.” In other words, your water has a chlorine-demand of 1.5 ppm. The 0.5 ppm of free-chlorine is the amount of leftover chlorine that can still kill bacteria.

By setting up your system correctly, you can leave a small free-chlorine residual after the greensand filter. This ensures that the greensand media will be properly and continually regenerated, which allows it to work correctly and remove iron and manganese. Proper chlorine residual and contact time also ensures that the water is disinfected and prevents the spread of harmful bacteria and viruses, if present, in addition to killing iron and sulfur bacteria which are commonly found in residential well water systems.

**Fig. 1 Typical installation showing chlorine pump, contact tank, greensand filter and optional carbon filter**



### Setting up a Chlorine Feed Pump

In Fig. 1 the chlorine metering pump is 220v and is wired to the same 220v circuit as the well pump. When the well pump turns on, the chlorine metering pump also turns on and injects 1 to 2 ppm of chlorine for every 1 ppm of iron.

#### Chlorine Calculation and Setting the Metering Pump:

Assume 10 gallons per minute flow rate and 2 ppm of chlorine to be injected.

Assume a solution strength of 10,000 ppm, or 1 gallon of 10% to 12% pool chlorine for every 10 gallons of water.

$[10 \text{ GPM} \times 2 \text{ PPM} \times 1440 \text{ (minutes in a day)}] \text{ Divided by } 10,000 \text{ ppm} = 2.88 \text{ Gallons per Day}$

In the above scenario, you would need a metering pump that has an output of 2.8 gallons per day. For instance, the Stenner 45MP2 has a maximum output of 3.0 gallons per day. So if your well flows at 10 gallons per minute, and you use a solution strength of 1 gallon of pool chlorine for every 10 gallons of water, and you set your 45MP2 to 90%, then you will be injecting approximately 2 ppm of chlorine into the water.

After you start up your chlorinator, test the chlorine residual after the greensand filter and before the carbon filter. You should have between 0.2 and 0.4 ppm of free-chlorine. If you have more or less, then you can adjust the Stenner pump, or adjust the solution strength.

**TIP:** Start out with 1 or 2 gallons of solution in the solution tank, so you can easily change the solution strength if you need to.

### Starting up Your New GreensandPlus Iron Filter

The greensand media must be soaked in a chlorine bleach solution for several hours before being put into service. Follow the steps in the guide "Greensand Installation and Start-Up Guide" and backwash and rinse the media. Then turn up your chlorine injection pump to maximum setting, and allow it to pump in undiluted bleach so a higher concentration of bleach is pumped into the pipe. Allow this water to flow through the greensand filter, and then when the water has a high chlorine level inside the greensand, turn it off and allow to sit for several hours. Backwash and rinse again before putting into service to clean out any excess chlorine.

After your greensand filter is online and in service, make sure there is 0.2 to 0.4 ppm of free-chlorine residual in the water AFTER the greensand filter.

### Reprogramming Your Fleck 7000 GreensandPlus Iron Filter

The Fleck 7000 comes set up to regenerate the greensand intermittently or periodically with potassium permanganate, after the start-up this needs to be re-programmed:

The Fleck 7000 has five cycles:

Cycle 1: Backwash 10 minutes

Cycle 2: Brine Draw 60 minutes

Cycle 3: Backwash 6 minutes

Cycle 4: Rapid Rinse 10 minutes

Cycle 5: Pot Perm Tank Refill 12 minutes

When you are using the Fleck 7000 Greensand Filter with a chlorine feed, **you do not need Cycle 2 (Brine Draw) nor Cycle 5 (Pot Perm Tank Refill)**. It easy to reset these parameters:

#### Enter Master Programming Mode:

1. Press and hold either the Up or Down buttons until the programming icon replaces the service icon and the parameter display reads TD. Adjust the time of day to display 12:01 PM
2. Press the Extra Cycle button once (to exit Setting Time of Day mode).
3. Push and hold the Set Up and Set Down buttons for 5 seconds until the Display Format screen (DF) appears. The options settings below can be changed by pushing either the Set Up or Set Down button.

Note that when the Master Programming Mode is entered, all available option setting displays may be viewed and set as needed. Depending on current option settings, some parameters cannot be viewed or set.

### **Use These Settings for your Greensand 7000 When Using a Chlorine Feed:**

- 1. Display Format (Display Code DF): Set display to GAL** (stands for U.S. Gallons), or change to Liters or Cubic Meters if outside of the U.S. Press the Extra Cycle button to go to the next step.
- 2. Valve Type (Display code VT): Set to DF2b.** This means it is set for standard Downflow mode, similar to a water softener, but we won't be using all the 5 cycles that the water softeners use. Press the Extra Cycle button to go to the next step.
- 3. Control Type (Display Code CT): Set to TC for Time Clock.** Press the Extra Cycle button.
- 4. Unit Capacity (Display Code C): Set to 30** (not applicable for greensand filters). Press the Extra Cycle button.
- 5. Feedwater Hardness (Display Code H):** (not applicable for greensand filters). Press the Extra Cycle button.
- 6. Reserve Selection (Display Code RS): Set to SF.** It is not relevant to filter control valves.
- 7. Safety Factory (Display Code SF):** Set to 0.
- 8. Day Override (Display Code DO): Set to 1 to 7** based on your particular filter system requirements. Use the Up or Down arrows to change the setting. This is the critical setting that allows your filter to backwash every fixed number of days. See your Installation and Start-up Guide for more information, or contact us for suggestions for this setting. Press the Extra Cycle button.

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## Fleck 7000 Greensand System Installation & Startup Guide

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9. **Regeneration Time (Display Code RT): Set to 2:00 am** generally or sometime when no water is being used, and no other filter or softener is likely to be in a regeneration cycle. Press the Extra Cycle button.
10. **Regeneration Cycle Step Times:** Use this display to set the various minutes of each cycle. Some of the cycles will be set to 0. **Do not set any of the cycles to Off.** Use the Up or Down arrows to select the desired setting. Press the Extra Cycle button to accept the setting and move to the next parameter.
- B1 – Backwash: Set to 8 to 10 minutes.**
  - BD - Brine Draw: Set to 0**
  - B2 - 2<sup>nd</sup> Backwash: Set to 6 minutes.**
  - RR - Rapid Rinse: Set to 6 minutes**
  - BF - Brine Fill: Set to 0. This is what fills the permanganate tank. The goal is to have 1” of permanganate solution above the pad in the permanganate tank.**
  - SV - Service (meaning it is in Service or filtering mode): no setting is needed for this.** Press the Extra Cycle button
11. Press the Extra Cycle button to save all settings and exit Master Programming Mode. Note that the control valve may take several minutes to re-home and re-set after the Master Programming steps. **Do not unplug the control during this process.**



### User Programming

In the future, you can go into User Programming and make adjustments if you want to change the Day Override setting. Use the User Programming to avoid having to go through the Master Programming for quick changes to these settings below:

1. Press the Up and Down buttons for five seconds while in service, and the time of day is NOT set to 12:01 PM.
2. **Day Override (Display Code DO): Set to 1 to 14** based on your particular filter system requirements. Use the Up or Down arrows to change the setting. This is the critical setting that allows your filter to backwash every fixed number of days. See your Installation and Start-up Guide for more information, or contact us for suggestions for this setting. Press the Extra Cycle button.
3. **Regeneration Time (Display Code RT): Set to 2:00 am** generally or sometime when no water is being used, and no other filter or softener is likely to be in a regeneration cycle. Press the Extra Cycle button.
4. **Feed Water Hardness:** Use this setting to adjust the feed water hardness. Set for 20 for most applications. Press the Extra Cycle button.
5. **Fixed Reserve Capacity (Display Code RC): Set to 0.** No fixed reserve capacity is required for filters. Press the Extra Cycle button.
6. Press the Extra Cycle button to end User Programming Mode.

### How To Remove Media From Control Head

Sometimes, when doing the Initial Backwash, the media gets lifted up into the control head. You can tell this happened because you will have little or no flow, either going out to drain while in the backwash position, or when in the service position.

To remove media from a control head, do the following:

- 1) Put the Inlet Bypass in the Closed position.
- 2) From the Service Mode, initiate a manual regeneration, by pressing and holding the regen button (button on far left).
- 3) The valve will advance to the BW (backwash) position, and start counting down. Press the Regen button again, and wait for the valve to advance and stop at the Rapid Rinse (RR) position.
- 4) With the valve in the RR position, open and close the Inlet Bypass valve several times. After the third or fourth time, leave it in the open position and check the drain line- do you have a good solid flow? 90% of the time, the answer is yes, but sometimes, even after opening and closing the valve many times, you still don't have good flow... But, in either case (good or no flow), continue...
- 5) With the Inlet Valve OFF, Advance the valve back to Service position again, and again press and hold the Regen button, we are putting the valve back to the Backwash position.
- 6) Open the Inlet valve just enough so you can hear the water passing thru the valve- you should notice a corresponding slow flow out of the drain line. After a minute, if there are no air bubbles present, open the valve about another quarter inch- again, you should see a corresponding increase in the flow... And you will continue until the valve is full open.

#### **IMPORTANT:**

Any time that you are in the Backwash or Rapid Rinse position, you may need to unplug the power- this will hold the valve in its current position, so it doesn't 'time out' and go to the next position. When you plug the valve back in, after a minute it will return to where it was when you unplugged it (i.e. 2:32 remaining in BW). Understand, it is not possible to jam media into the head while in Rapid Rinse, or Service, just in the Backwash, when the flow direction is reversed.

What you are trying to accomplish, after you have pushed the media back in to the tank in the Rapid Rinse position, is to get the Inlet valve all the way open in the Backwash position, without it jamming media back in the head, and this is the part where you have to go slow, open up the Inlet valve a little bit at a time and let it run for a few minutes- this is why you may have to unplug it- and then, once you have done that, finally, do one more backwash, starting with the Inlet valve open, just as it will be when it does it automatically at night. Once it does that successfully, you are done.