HYDROGEN PEROXIDE (H2O2)

The aim of this treatment is to solve problems that normal chlorine treatments do not solve. Hydrogen peroxide is more aggressive than chlorine to loosen residues in pipes.

Product

Hydrogen peroxide reduces the incidence of Fusarium and Verticillium fungi in soils and growth mediums.
It reduces the growth of algae and slime in volcanic rock medium, greenhouse containers as well as irrigation systems. Hydrogen peroxide is used in water at 30 to 50 ppm in vegetables and flowers to reduce the above mentioned.

The advantage of using Hydrogen Peroxide is:

- Rapid reaction
- Environmentally friendly
- Do not cause the creation of dangerous residues

Product	Concentration	Product pH	Specific Gravity	Oxygen
Hydrogen peroxide 35	35%	2 – 3	1.13	16%
Hydrogen peroxide 50	50%	1 – 2	1.20	23%

Corrosion:

Hydrogen Peroxide is a corrosive agent for steel, aluminium, cement coating and asbestos cement. In contrast, tanks made of Polyethylene and PVC is not sensitive to Hydrogen Peroxide. It is vital to take these factors into consideration when planning treatment.

Hydrogen Peroxide is a strong oxidizer, and is efficient in attaining the following objectives:

Preventing the accumulation of bacterial slime in pipes and dripper line extensions. Cleaning the dripper line system in which organic sedimentation and bacterial slime have accumulated.

- Oxidation of microelements to prevent the development and reproduction of bacteria (iron, manganese and sulphur).
- Improving the efficiency of initial filtering under high organic stress conditions.
- Disinfecting sewage and wastewater, irrigation water, drinking water and

swimming pool water.

- Prevention and removal of odours in the water, impairing biological activity.
- Lowering BOD / COD values by oxidizing the polluting substance, both organic and inorganic.
- H2O2 is **not efficient** for the prevention or dissolution of **scale sediments, sand and silt**.

Recommendations

Treatment	When*	Injection concentration (ppm)**	Concentration at end of system (ppm)
Shock treatment	Yearly	200 – 500	100 – 250
Once off treatment	As required	30 – 50	8 – 10
Normal maintenance	Every second week	5 – 10	2 - 3

Notes:
1. * Depending on water quality.
2. Do not do this treatment continuously.
3. ** Never exceed 500 ppm concentration of Hydrogen Peroxide.

Calculations

Formula 1

Determination of the solution concentration with the use of a fixed injection rate:

$$\text{Concentration peroxide (\%)} = \frac{\text{Needed peroxide (ppm) * system flow rate (m3/hour)}}{\text{Injection rate of pump (l/hour) * 10 (constant)}}$$

Formula 2

Determination of the quantity hydrogen peroxide (liters) needed for a given container:

$$\text{Peroxide needed (l)} = \frac{\text{Concentration peroxide solution (\%) * capacity of container (liter)}}{\text{\% Hydrogen peroxide (35 or 50)}}$$

Example:

Required 200 ppm hydrogen peroxide for injection.
Use product with 50% concentration.
System delivery is 30 m3/hour.
Delivery of injection pump is 100 liters per hour.
Holding tank is 200 liters. Fill with 150 liters of water.

$$\text{Concentration peroxide solution (\%)} = \frac{\text{Required 200 ppm * 30 m3/hour}}{\text{100 liters per hour * 10}} = \textbf{6.0 \% concentration ->}$$

$$\text{Liters peroxide needed} = \frac{\text{6.0\% concentration * 150 liters water}}{\text{50 \% H2O2}} = \textbf{18 liters H2O2 ->}$$

Summary
We must ad 18 liters hydrogen peroxide in 150 liters water. This gives us a 6.0% hydrogen peroxide
solution. If we then inject this 6.0% solution at a rate of 100 liters per hour in a system with a flow of 30 m3/hour, we will get the required concentration of 200 ppm hydrogen peroxide at the injection point.

Duration of injection
Keep on with the injection for one hour or time of travel (time it takes for a drop to travel from injection point to last dripper) See “Flow time for systems”. Use the method that takes the longest. The higher the biological activity is in the water, the longer it will take.
Use hydrogen peroxide kit (paper strips) to measure concentration (ppm), if value is higher than the ability of the measuring strip, the sample should be diluted with water. To calculate results multiply the value received by the dilution factor. See recommendation for the concentration at the end of the system.

Standing time
Let the system stand for 12 to 36 hours so that the chemicals that have not drained out of the system can work. The lifespan of peroxide is a few days and not as short as chlorine. Flush the system after this time, see flushing of the system.

Point of injection
Do the injection at the block valves. In the case where injection is done at a central point, the main-line must first be totally flushed before any block hydrants are opened, if this is not done, all the dirt from the main-line will move to the drip lines and increase the existing problem.

Flushing of the system
Firstly flush the main and sub-main and then the drip lines, only one or two lines must be flushed at a time, otherwise the flow velocity is reduced to < 0.5 m/s and flushing becomes ineffective. Flush before and after treatment. See “Flushing”.

Influence of the pH of irrigation water
Hydrogen peroxide is not sensitive to high pH like chlorine is.

Safety:

Measures during handling
Hydrogen peroxide solutions are very dangerous for man and animals. Follow the producer's instructions with regard to use and handling.

- Avoid eye and skin contact. Wear protective clothes, gloves and glasses.
- Avoid drinking or inhalation of gasses.
- Store apart from other chemicals.
- Always add hydrogen peroxide to water and not vice versa.
- Use clean water, not fertilizer rich water during hydrogen peroxide treatment.

Remember

- Contact with the Hydrogen Peroxide preparation may cause burns, contact with the eyes may cause blindness, and swallowing may cause death.
- In any case of operations related to Hydrogen Peroxide preparation (filling the storage tank, etc.), always use protective goggles, gloves, and shoes and clothes suitable for preventing contact between the substance and exposed skin. Before filling the tank with the substance, verify that it was thoroughly rinsed and is clean of fertilizer.
- Direct contact between Hydrogen Peroxide and some of the fertilizers containing
  ammonia causes rapid heating and may sometimes cause the tanks to explode. This is a lethal hazard for anyone in the vicinity.