

## **Transcript**

# **Huwa-San: A Practical Guide to Water Disinfection for Legionella Control**

### **Slide 1**

Good afternoon everyone and thank for taking the time to attend SafeSol's second webinar on the use of Huwa-San for legionella control in water systems.

This is the second in the series of webinars that we are running to help our customers understand more about the Huwa-San product and its specific uses. Our first webinar was an Introduction to Huwa-San, and it is available on our website to download at [www.safesol.co.uk/webinar-archive](http://www.safesol.co.uk/webinar-archive)

### **Slide 2**

SafeSol was set up in 2004 to supply Huwa-San to the water treatment industry. The directors of SafeSol realised that a more environmentally friendly, better and safer disinfectant than chlorine was required for legionella control. After working with all of the silver-stabilised hydrogen peroxides, they knew that Huwa-San was the most effective.

Since this time, SafeSol has worked with Huwa-San for water disinfection, initially carrying out disinfections ourselves and then latterly advising others on how to carry out successful disinfections.

At SafeSol, we are an efficient and effective team based in South Shields in the North East of England. We always answer technical or practical questions regarding Huwa-San. We have all Huwa-San concentrations available on a next working day basis and have wide variety of hydrogen peroxide testing equipment.

### **Slide 3**

During this presentation, I am going to cover the benefits of Huwa-San specifically for water treatment, look at when tank and mains fed water systems should be disinfected, talk about the exact Huwa-San dose rates for disinfection, how biofilm forms and the importance of removing it and finally why Huwa-San is better than chlorine for legionella control and disinfection work.

## Slide 4

As a starting point I am going to look at the benefits of Huwa-San for water treatment.

In the first webinar we looked at the unrivalled stability of Huwa-San in comparison to other silver-stabilised hydrogen peroxides. This is particularly important in water treatment as it prevents the breakdown of the hydrogen peroxide in Huwa-San to oxygen and water, allowing it to keep killing bacteria and remove biofilm.

All silver-stabilised hydrogen peroxides are stabilised differently. The way that the silver ion is protected in Huwa-San makes it the most efficient silver-stabilised hydrogen peroxide for water treatment.

Huwa-San is ideal for water disinfection as it will remove biofilm, where the majority of the bacteria will live. It has also been proven to kill Legionella Pneumophila Sero group1 and pseudomonas bacteria.

Roam Technology has registered Huwa-San under the Biocidal Product Regulation (BPR) for product type 1-5. The registration under product type 4 includes the disinfection of water storage systems and product type 5 includes disinfection of water for human and animal consumption.

Roam Technology has submitted individual dossiers to the Biocidal Product Regulation for water treatment, legionella control, spa and swimming pool disinfection.

Huwa-San is not corrosive at disinfection dose rates. Water disinfection usually gets carried out at 100-1000ppm peroxide (200-2000ppm Huwa-San TR50) and levels up to 3% peroxide will not corrode copper, stainless steel, or other metals.

Huwa-San is simple to use and apply. A single chemical can be used for disinfection. There is no requirement to neutralise Huwa-San as it will have a positive effect on the sewage system, breaking down to oxygen and water. Disinfection with Huwa-San can also save time and money as it will remove and kill legionella at the first time of asking.

One of our customers provided this testimonial regarding Huwa-San:

“We have found when we used Huwa-San sites where we had been obtaining high positive legionella counts were returning as not detected showing that our systems are cleaner and safer for our customers.”

## Slide 5

First, we are going to look at when a disinfection should be carried out.

### **As per inspection**

The HSE recommend that cold water storage tanks are inspected at least annually. This inspection should take place during the summer months when conditions are at their worst. Temperatures are warmer, therefore microbiological growth will be at its optimum. In HSG 274 Part 2 there are pictures comparing fouling and levels of sediment in tanks and recommending when they should be cleaned and disinfected, for example, where there is medium to heavy sediment and scale present.

**Another time to look at disinfecting your water system is when a positive legionella sample is obtained.**

Prior to disinfection, it is important to review your legionella risk assessment and look at carrying out remedial works required on the system. System deadlegs are difficult to disinfect as there is no flow through these areas and disinfectant will tend to lip around the top of a deadleg rather than penetrate it.

**Water should also be disinfected when there is a new tank and pipework installation.**

In a new building, water systems should be disinfected prior to the building being commissioned. Using Huwa-San for disinfection at 100ppm peroxide (which equates to a dose of 200ml per 1000 litres Huwa-San TR-50) means that it can be left in the system without causing any corrosion. This will prevent bacteria growing in the system during the time between commissioning and handover. This would not be possible with chlorine.

**It is also important to disinfect when the water in the system has been out of use.** This could be carried out prior to shut down or before bringing people back to the building.

During the COVID pandemic, many offices have either been empty or had reduced staff capacity. This has led to water systems being under-used. It is important that flushing is carried out in buildings where there are some staff in place to mimic normal water use.

When it is known that a building is going to be shut down and kept empty, Huwa-San should be dosed into a water system at a level of 400ppm peroxide then pulled through to outlets and left in place for at least 6 weeks. The level of the Huwa-San in the system would have to be checked at the end of the 6-week period and if the level had dropped, topped up again.

This would be more cost-effective than flushing outlets weekly to move water through the system. It would protect against legionella and other bacteria, and save water.

**And finally, water systems should be disinfected when there has been a legionella outbreak.**

## Slide 6

Firstly, I am going to look at disinfection of a tank fed water system at 1000ppm peroxide which is 2000ppm Huwa-San product. **This disinfection would be carried out when the system is offline.** The peroxide levels in this case are too high for bathing and drinking.

This is the disinfection that would be most similar to traditional chlorine-based disinfection. A 1000ppm of Huwa-San is added to a cold-water storage tank and held at this level for at least an hour. The water system would then be flushed until the peroxide level dropped to 100ppm.

The starting point for a disinfection is always to drain down the cold-water storage tank and physically clean it using cloths or suitable scrubbers. Any water at the bottom of the tank should be removed using a wet vax. At this point the wetted parts of the cold-water tank should be sprayed with a 3% solution of Huwa-San and left for 15 minutes. This will completely disinfect the internal surface of the tank, and even if you have a galvanised tank it will not cause corrosion. The tank should then be refilled with fresh water and dosed to 1000ppm peroxide.

When dosing the tank, it is important to take into account the volume of the down services and the calorifier where these are also being disinfected. As a rule of thumb, I would recommend multiplying the tank volume by 1.1 when there are down services associated with the tank, or multiplying by 1.3 where there are down services and a calorifier to be disinfected.

Once you have worked out the system volume to be disinfected, then it is time to work out how much chemical to add to your cold-water storage tank. For every 1000 litres of water in the system, 2 litres of Huwa-San TR-50 should be added to give a 1000ppm peroxide.

Once the tank has been dosed, the water should be pulled through the systems. It is important to initially go to the far point of the hot and cold systems and run the taps. The water should be running until a chemical level of 1000ppm peroxide is obtained at each outlet. It will usually take longer to obtain peroxide in the hot side than the cold side, as the water is going through the calorifier. There can be some fall off in the peroxide level in the hot side of the system because of the high organic load of the calorifiers. Sediment and sludge tend to gather in the calorifier base as it is generally a low point in the system.

Once 1000ppm has been achieved at the far point of the system, work backwards from this point, running all the outlets, achieving 1000ppm peroxide at each outlet until you are back to the outlets nearest your tank and calorifier. Once the level of 1000ppm peroxide is achieved at all outlets, then it should be held for one hour. After an hour, the level should be checked. If there is drop off in the level, then further Huwa-San should be added to the system to once again achieve the 1000ppm peroxide at the tank and outlets. Or, alternatively, holding the peroxide level for longer at 500ppm peroxide with a 2-hour contact time will be satisfactory.

When the disinfection is complete, the system should be flushed to allow fresh water to dilute the Huwa-San down to 100ppm.

It is safe to discharge up to 1000ppm peroxide directly to the sewage system. The organic material will break down the Huwa-San to oxygen and water. Huwa-San, unlike chlorine, does not have to be neutralised with sodium thiosulphate.

However please note that Huwa-San should never be discharged directly to a river.

As discussed previously, the concentration of Huwa-San and the contact time are related. Therefore, a lower dose rate can be used over a longer time period.

## Slide 7

### **Disinfection of mains supply in a building.**

The dose rates for mains systems are the same as the high level Huwa-San shock disinfection that has just been described. Obviously, a mains system has to be taken offline to be disinfected. Disinfection of the mains water supply would be carried out at a dose rate of 1000ppm peroxide, which is 2 litres of Huwa-San TR50 per 1000 litres of water. Again, the contact time would be an hour.

As the volume of mains pipework is generally much smaller than a tank-fed system, the Huwa-San should be introduced to the system as a 3% solution of Huwa-San to ensure that overdosing doesn't occur and there is good chemical mixing.

The 3% solution of Huwa-San would be dosed either manually via a pressure sprayer or using a dosing pump. Often customers set up a pump with a reservoir of 3% Huwa-San so that when the outlets are opened, they don't flush away their reserve of chemical.

The volume of mains pipework is worked out based on the formula for a cylinder:

**volume equals Pi x radius squared x the length.**

SafeSol has a table available that shows the amount of Huwa-San to be added to a system depending on Huwa-San concentration, pipework diameter and length.

I am now going to play a short video that shows a Huwa-San disinfection being carried out at 1000ppm peroxide in a hospital. Prior to disinfection positive legionella results had been obtained. The Huwa-San was injected into the mains water system and pulled through the outlets. The water starts off crystal clear, but as the Huwa-San starts to remove biofilm and bacteria it becomes extremely contaminated.

## Slide 8

Click here to watch the video: <https://vimeo.com/514340328>

## Slide 9

### **On-Line disinfection 100ppm peroxide**

The next type of disinfection I am going to discuss uses Huwa-San at 100ppm peroxide with a contact time of 24 hours. This is an on-line disinfection. This is more controversial. I recently read a statement on the Water Management Society website saying that this level of disinfection is too low to be effective. We have plenty evidence that disinfections carried out at this level have been effective.

However, there are some important things to note when carrying out an online disinfection.

**A.** It is important to carry out a risk assessment on the system prior to disinfection to work out exactly what the tank-fed water is supplying. Ideally tank water shouldn't supply drinking water taps, however it often does. However, if someone did drink water at this level it would not cause harm.

**B.** Huwa-San, like all oxidising chemicals, should never come into contact with a dialysis machine.

**C.** Huwa-San should never come into contact with laboratories as it can affect test results.

**D.** Where positive legionella samples are obtained, it is better to take the system offline and disinfect at 1000ppm peroxide as the Huwa-San will remove and disrupt the biofilm which could then enter the water system.

The method used is very similar to disinfecting at 1000ppm, so I won't go through that in such detail. However, the amount of chemical required is significantly reduced in this type of online disinfection.

During this disinfection the system can remain online and the water will be suitable for bathing and drinking. The National Sanitisation Foundation has carried a study on Huwa-San and shown that the no observed adverse effect level for hydrogen peroxide in drinking water is 728ppm peroxide.

Therefore, disinfecting at dose levels of 100ppm peroxide is well below this level.

200ml of Huwa-San TR50 are required for every 1000 litres of system water. In this case the tank would be dosed, and the water pulled through all the outlets to give 100ppm peroxide. Again, the level should be checked after an hour to ensure that it has not depleted. This method has proved successful for many years.

The level of 100ppm peroxide, 200ml Huwa-San takes into account that the system may be in use, but providing the tank has 24 hours resident time this level of Huwa-San will kill Legionella Pneumophila.

The Huwa-San in this disinfection will be removed through normal usage of the system.

**Please note that all disinfection dose rates provided are only provided for Huwa-San as we have the test results and evidence to back them up.** When the BPR is finalised, disinfection companies will only be able to use registered products and disinfection claims must be based on what has been published in the dossiers.

## Slide 10

### Disinfection of tank only

In some cases, people only wish to disinfect the cold-water storage tank and not the down services. In this case the best option is spray disinfection. The water tank should be cleaned as normal and then sprayed with a 3% solution of Huwa-San. The 3% solution should be sprayed on all the wetted surfaces and left for 15 minutes, then cleaned off. The tank can then be refilled, and the water would not contain any silver or hydrogen peroxide.

It is important to ensure that a suitable mask and filter are worn due to the creation of a spray in a confined space.

## Slide 11

### Biofilm

One of the most important things about Huwa-San is its ability to remove biofilm. Therefore, I thought it was important to describe biofilm and the impact that it can have on water systems.

Biofilm is a complex matrix of bacteria, including legionella which are protected by a sticky substance, which makes the bacteria difficult to remove. They form in aqueous environments, for example on stones in stagnant water, on the internal surfaces of a pipe and on your teeth

This is how a biofilm is created.

Bacteria enter the system from the mains and land on the surface of the pipe and multiply. The bacteria build up in columns from the pipework. The bacteria produce thin, extracellular fibres called pili which are used for attachment to the pipe wall and each other. The bacteria then secrete a slimy extracellular matrix of proteins, polysaccharides, and nucleic acids. This cements the bacteria together, providing support and protection from disinfectants. Then parts of the biofilm slough off and move to a new part of the pipe, where they will form a new biofilm. It is a continual process.

## Slide 12

I would just like to introduce a case study for the use of Huwa-San at 100ppm peroxide.

Several years ago, SafeSol was called into a care home in Glasgow where they had an ongoing legionella problem. Chlorination of the whole water system had been carried out twice and there was still legionella persisting in the system. The care home was paying over £2000 a week for sampling. They were looking for an alternative to chlorine disinfection.

The system in this case was dosed to 100ppm peroxide and the dosed water pulled through to all outlets. It was ensured at all areas; especially little-used outlets were disinfected. There was a huge job ensuring that the chemical reached all outlets, the care home staff and resident nuns were running water and testing outlets to ensure there was peroxide through the system. The water was held at this level for 24 hours. This disinfection cleared the legionella bacteria from the system.

## Slide 13

In conclusion I am going to look at why Huwa-San is a much better and safer disinfectant than chlorine.

### **The Benefits of Huwa-San**

#### **It is easy to work with.**

Water disinfections carried out using chlorine require neutralisation with sodium thiosulphate prior to putting chlorine to drain. Huwa-San does not need to be neutralised at levels up to 1000ppm peroxide. I have spoken to many operatives who would much rather use Huwa-San as it is a single chemical disinfection, and they find it easier to calculate the amount of chemical required.

#### **It saves money.**

Multiple disinfections are not usually required as Huwa-San will kill legionella Pneumophila first time round when applied at the correct dose rates. We have several examples of customers using Huwa-San when chlorine has failed. This also has a knock-on effect of reducing sampling costs.

Labour costs are reduced as neutralisation is not carried out. This removes a step from the process, reducing costs.

#### **It will save time.**

It is a single-step disinfection, neutralisation is not required which reduces time.



**It removes biofilm.**

As previously discussed, Huwa-San will remove biofilm whereas chlorine has been shown to remove fresh biofilm or top layer of a biofilm.

**Its break down products are not harmful.**

Huwa-San breaks down to oxygen and water which are both safe for the environment, whereas chlorine will form hazardous by-products.

In research carried out by the CDC (Centre for Disease Control and Prevention), over 600 by-products have been identified in chlorinated tap water, including halo acetic acids and tri halo methanes, which can cause cancer.

People are exposed to disinfection by-products when chlorinated water comes into contact with their skin, when they drink it or through inhalation. In populations taking hot showers or baths, inhalation and dermal absorption in the shower accounts for more exposure to tri halo methanes than drinking water.

Huwa-San is not pH dependant. It has been shown to work across a wide pH range. In water, sodium hypochlorite (liquid bleach) forms hypochlorous acid, which is the biocide that disinfects water. It is most effective when the pH is 7.2-7.6. However, at a pH of 8 it is only 10% effective which means it is important to monitor the pH during a disinfection.

**Slide 14**

Thank you for taking the time to listen to this presentation of the practical applications of Huwa-San for water disinfection and legionella control. In the future we are going to run other webinars, including Huwa-San for constant dosing, Huwa-San for spa and swimming pool disinfection and Huwa-San for fogging.

**Slide 15**

Any questions?