

# CONTROL OF LEGIONELLA FOR THE CAR WASH INDUSTRY



Legionella has become a focus for the car wash industry since the outbreak of Legionnaires' disease at a car wash in Hoppers Crossing, Victoria. Legionnaires' disease is a lung infection causing pneumonia and in severe cases can cause internal organs to shut down. People more susceptible to developing Legionnaires' disease include the elderly, smokers, those already ill or weak. Legionella bacteria are naturally occurring in the general water environment but must have the right temperature range of between 20C and 60C, stagnation time and nutrients in order to multiply, and then aerosols (very fine mists) to disperse them in a form in which they can be inhaled.

The bacteria colonise (find a home) in sediments and organic matter such as biofilm and dirt where they multiply and are shielded from disinfectants.

Legionella bacteria require a temperature range of 20C to 60C and suitable nutrients, such as found in dirty water storage tanks, to flourish and multiply. This document is designed for those car wash sites that use, or have used, hot or warm water systems and store the heated water in tanks or transit piping. If this is not the case for your wash then the risk of Legionella is extremely low. This document will deal with Hot Water Systems where the water temperature is over 60C and Warm Water Systems where the temperature is between 20C and 60C. Many regulations classify warm water systems as between 30C and 60C but Legionella can multiply in temperatures as low as 20C. A wash may have a combination where the Hot Water System supplies water to a Warm Water System for storage and distribution.

In addition to this document you should refer to Control of Legionella in the Car Wash Industry - Legislative Overview, also produced by the ACWA, to understand any legislative requirements in your State. Although Legislation may differ between States and Territories in relation to Legionella control, every car wash owner has a **duty of care** on health and safety. This document outlines a procedure for due diligence in pro-actively managing Legionella risks and will help protect the owner against litigation.

## DANGER AREAS

**First you need to identify any danger areas for the multiplication of Legionella bacteria on the car wash site. These would include:**

1. Any area where water between 20C and 60C is stored or where small pools can remain in the hoses after transmission.
2. Anywhere that is not scrupulously clean – Legionella bacteria need food from dirt or slime to survive.
3. Larger Hot Water Systems with storage where there may be cooler spots below 55°C.
4. Dead legs – any piping, however short, that leads nowhere or is rarely used but can be filled with warm water and contamination such as biofilm and dirt. Check that upgrades or changes have not led to such a dead leg.
5. Warm water piping that has become corroded in any way, including deposits of scale in hard water areas.
6. Rubber hoses are the most likely to be contaminated; poly tubing is much better, metal better still, and clean copper tubing the most resistant to contamination. Note also the danger from rubber seals and washers, not just the hoses.

## **ACTIONS TO BE TAKEN TO CONTROL LEGIONELLA RISK**

### **Site Audit**

1. Carry out a study of the Hot and Warm Water Systems at your site, with a simple flow diagram that shows input of water, heating units, hot and warm water storage units, on-flow to bays, outlets etc.
2. Clearly identify the danger areas and mark where warm water is stored or present. Details such as joins, valves, seals, washers and strainers only need to be shown for the danger areas.

### **Assessment and Review**

1. Prepare a Water Safety Plan and Risk Assessment. This could be quite a simple process if the site audit is done well. Refer to Appendix A for information on Water Safety Plans and Risk Assessment.
2. Where possible eliminate or contain danger areas.
3. The Water Safety Plan should specify remaining danger areas and detail actions to be taken to minimise the likelihood of Legionella infections, including the frequency for those actions. This document can form a part of the Water Safety Plan.

### **Maintenance Records**

1. A written, up to date, maintenance log should be maintained to confirm compliance and due care over time.
2. The log should include all modifications to the system design and general repairs and maintenance as well as the specific maintenance and monitoring required to control Legionella infections.
3. List details of inspections, cleaning, disinfecting, sampling, and care of the water system including out-of-use areas. Inspections should be signed and dated once recorded.

### **Minimise sources of warm water**

If warm water is not essential for your car wash process, eliminate the water heating or reduce it below 20C so as to reduce the likelihood of Legionella bacteria living in the car wash water system.

### **Operation of hot water systems**

If you decide to continue the heating of your car wash water then determine the temperature your hot water is currently heated to and raise it above 60C. Legionella bacteria cannot survive for very long above this temperature. Every car wash owner has a duty of care to avoid any danger of scalding from hot water. Scalding is defined as a partial thickness burn and occurs in 15 seconds at 55C and in only 5 seconds at 60C. Depending upon your system you may need to take precautions to prevent the scalding of staff and customers and this may involve the installation of temperature controlling devices where water can come into contact with employees or the public.

### **Inspect and keep the system visibly clean**

Ensure all wetted surfaces such as the inside of warm water and soap tanks and hoses and pipes are visibly clean and free of any foreign materials. This is the first line of defence against multiplication of pathogenic bacteria. If this task is completed weekly the likelihood of any problems evolving are slight. This can be done by a visual inspection. Look for slime, biofilm, dirt, algae, fungi, rust, scale, soap scum, sludge, sediment or discolouration of the wetted surfaces or floating material of any kind. You may also wipe a finger over wetted surfaces feeling for slimy biofilm.

If the inspection shows that wetted surfaces are not visibly clean the tank should be emptied and cleaned in accordance with Cleaning of a Warm Water System described below. If the system does not remain visibly clean on a continuing basis after the above process then the system should be Disinfected as described below.

## **Remove or activate all deadlegs**

Over time modifications are made to the plumbing in the car wash. As these modifications are made, it is essential to remove any plumbing work that is no longer used but remains connected to the system. These can be breeding grounds not only for Legionella but other pathogens which could invade your car wash water.

## **Cleaning of a Hot Water System**

To be safe the Hot Water System must operate at greater than 60C or it may be termed a Warm Water System. The Hot Water System must be cleaned on at least a 6 monthly basis to ensure no problems develop due to lower temperature pockets. This can be done with a hot water flushing procedure or chemical disinfection described below for cleaning Warm Water Systems. For hot water flushing, the entire hot water storage system should be raised to a temperature of 70C. Flush each outlet of the system to a minimum of 60C for a period of 2 minutes beginning with the most distant outlet and working back. Water at this temperature should not pass through pumps or hoses to the bays. This method is only to be used for hot water systems and stainless steel tanks.

## **Cleaning a Warm Water System**

In addition to weekly inspections a six monthly cleaning of warm water systems must take place. The following procedure applies:

### **Step 1: before chemical cleaning**

- Provide protective equipment to workers who perform the cleaning, to prevent their exposure to chemicals used for disinfection, aerosolised water and biofilm that may contain Legionella bacteria.
- As with any task at the car wash a risk assessment of the task should be undertaken. Because of the risks involved consider protective equipment of boots, long sleeved shirt and long trousers, chemical impervious gloves, goggles, and a full or half-face respirator. See footnote<sup>1</sup> below
- It is important that other people in the vicinity are not exposed to water spray or debris.

### **Step 2: mechanical cleaning**

- Isolate any incoming water to tanks
- Add chlorine sufficient to obtain 10mg/L of free residual chlorine (FRC) and leave for 10 minutes. This is equivalent to 10 parts per million. With normal 5% chlorine it is 0.2 ml per litre of water. If necessary adjust the pH of the water (using pool acid) so that it is between 7.0 and 7.5.
- Drain the system to waste in accordance with the local water authority.
- Inspect all water contact areas for sediment, sludge and scale.
- Clean all of the water contact areas including tanks, using brushes or sponges (do not use pressure spraying for cleaning as this will create aerosols that may be contaminated with bacteria).
- Ensure all loose deposits are removed from the system.

### **Step 3 chlorination**

- Fill tanks with town water at ambient temperature add chlorine solution to obtain 10mg/L FRC and maintain for 30 minutes.
- Drain to sewer in accordance with local authority requirements
- Rinse with town water to remove all traces of chlorine residual

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<sup>1</sup> The respirator should combine a high efficiency particulate air filter of at least a P2 class (for filtering of aerosols) and a chemical cartridge filter of type B Aus or B1 (for filtering of disinfection chemicals) [for more information see *Australian/New Zealand Standard 1715 – Selection, Use and Maintenance of Respiratory Protective Devices*]. The person wearing the respirator should be clean shaven to maximise the seal between the respirator and face, and should be fit tested for the respirator and trained to fit check the respirator prior to each use.

- Refill the tanks with clean water and any chemical product that is normally put into the tanks
- Record the type and quantity of all chemicals used for disinfection and the time of the results of measurements of FRC and pH.

**If the system is shut down for more than a few days it should be drained and dried to ensure no growth of pathogens.**

### **Periodic Testing**

Periodic testing of any Warm Water System should be carried out to make sure no risk exists. After commissioning of a new system or when you first become aware of these control procedures, it would be prudent to clean the system as described above and then perform a Legionella test. The Legionella test should be performed 3 days after the cleaning so as to ensure any residual chlorine does not contaminate the water sample. After the first test an annual test would be prudent.

Ecowise Environmental has provided a special arrangement for testing car washes at a very reasonable rate. It is better for a professional to perform the test to ensure it is done properly; Ecowise can provide you with sterile sample bottles and instructions if you live in a remote area. If a Legionella test returns a positive result at any level perform the Disinfection procedure described below.

### **Disinfecting a Warm Water System**

In the event of a positive test for Legionella all tanks, hoses, pipes, wash guns and other wetted surfaces should be disinfected as per the following disinfecting procedure:

#### **Step 1: before chemical cleaning**

- Provide protective equipment to workers who perform the cleaning, to prevent their exposure to chemicals used for disinfection, aerosolised water and biofilm that may contain Legionella bacteria.
- As with any task at the car wash a risk assessment of the task should be undertaken. Because of the risks involved consider protective equipment of boots, long sleeved shirt and long trousers, chemical impervious gloves, goggles, and a full or half-face respirator. See footnote on previous page.
- It is important that other people in the vicinity are not exposed to water spray or debris.

#### **Step 2: mechanical cleaning**

- Isolate any incoming water to tanks.
- Add chlorine sufficient to obtain 10mg/L of free residual chlorine (FRC) and leave for 10 minutes. This is equivalent to 10 parts per million. With normal 5% chlorine it is 0.2 ml per litre of water. If necessary adjust the pH of the water (using pool acid) so that it is between 7.0 and 7.5.
- Drain the system to waste in accordance with the local water authority.
- Inspect all water contact areas for sediment, sludge and scale.
- Clean all of the water contact areas including tanks, using brushes or sponges (do not use pressure spraying for cleaning as this will create aerosols that may be contaminated with bacteria).
- Ensure all loose deposits are removed from the system.

#### **Step 3: chemical disinfection**

- Fill tanks with town water at ambient temperature, add chlorine solution to obtain 10mg/L FRC. Circulate the water throughout the system if it is a circulating system and maintain the FRC at not less than 10 mg/L continuously for a period of one hour, maintaining the pH of the water between 7.0 and 7.6.
- During the hour activate the guns in the bays with coins or tokens as you would normally and pull trigger until chlorine solution is apparent in the bay and then release the triggers

so the chlorine solution runs at a slow rate into bays. Avoid high pressure if possible to minimise aerosol risk. Rotate through all functions which use warm water for 1 minute each on a continuous rotation and check that FCR is not less than 2mg/L in the bays. You will need to refill the tanks with chlorine solution from time to time. Measure and record the FRC and pH at 15-minute intervals on cleaning report. Check the free chlorine level with a DPD Test Kit or similar test kit.

- Flush all dead legs.
- Record the type and quantity of all chemicals used for disinfection and the time of the results of measurements of FRC and pH.

#### **Step 4: after mechanical cleaning and disinfecting**

- Reassemble any components disassembled during the above process and flush the system with clean water sufficiently to ensure there is no residual chlorine that could damage cars.
- Refill the tanks with clean water and any chemical product that normally is put into the tanks.

## **ACKNOWLEDGEMENTS**

This document has been produced by the Australian Car Wash Association (ACWA) for the exclusive use of members of the association to minimise the risk of Legionella contamination in their car washes. A number of experts in the area of Legionella risk assessment and control have given their time and advice in the development of this document.

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### **Disclaimer:**

Whilst every care has been taken to ensure the accuracy of the information contained in this advice, ACWA does NOT hold itself out as an expert and will not bear any responsibility or liability for any action taken by any person based on this information. Therefore, as this information is provided by way of a service to members, members should obtain their own independent advice from an appropriately qualified expert where necessary.

# Appendix A: Water Safety Plan and Risk Assessment

The Water Safety Plan is a document that sets out your plan to control Legionella. It should be made up of the following elements

- A system flow diagram of any hot or warm water portions of your plumbing systems. The flow diagram should be a graphic representation of your system identifying heating units, pipes, tanks, fittings and connections, hoses, items of equipment, isolation valves and expected temperature at different points in the system.
- The system flow diagram should identify areas at risk of the development of Legionella using this document and the table below as a basis for that assessment.
- The Water Safety Plan should detail control measures for the identified risks. Again the information in this document can be used to establish those control measures.
- The Water Safety Plan should contain a monitoring program similar to Appendix B for monitoring the Legionella risk and recording changes to the water system that may take place and recording of any cleaning and disinfecting that may take place for Legionella control.

## 1. Identify the Hazard

Description of Hazard \_\_\_\_\_

Location of Hazard \_\_\_\_\_

## 2. Assess the Risk

a) Most probable outcome \_\_\_\_\_

b) The likelihood of occurrence \_\_\_\_\_

### RISK ANALYSIS MATRIX

Likelihood	Consequences				
	Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
A (almost certain)	S	S	H	H	H
B (likely)	M	S	S	H	H
C (moderate)	L	M	S	H	H
D (unlikely)	L	L	M	S	H
E (rare)	L	L	M	S	S

**Legend:** H = high risk      S = significant risk      M = moderate risk      L = low risk

Risk Assessment Outcome: \_\_\_\_\_

## 3. Recommended Control Measures:

Short Term Control Measure Implemented \_\_\_\_\_

Recommended Long Term Control Measure \_\_\_\_\_

Assessed by: \_\_\_\_\_ Date: \_\_\_\_\_

