

## **L8 Equipment Implications – Issue date; September 2004**

The opinions and views expressed in the following text are the opinions and views of Water Treatment Products Limited and - as such have no official weight or authority.

Thus we can not accept any responsibility for actions taken in response to those views and comments.

The official L8 document is available from the offices of the Health & safety Commission (HSC) and is reference ISBN 0-7176-1772-6.

### ***What is L8?***

L8 is the reference for the Approved Code of Practice & Guidance for Legionnaires' Disease issued by the HSC. It deals with the control of Legionella bacteria in water systems.

### ***What is the significance of L8?***

It is an extremely important document for the Water Treatment Industry in general and affects - to a greater or lesser extent – everyone, in any environment such as work, education, health etc.

Although not a legal document itself, it has legal implications. If you are prosecuted for breach of health and safety law, and it is proved that you did not follow the relevant provisions of the Code, you will need to show that you have complied with the law in some other way or a court will find you at fault.

### ***Introduction***

Legionnaires' Disease is a potentially fatal form of pneumonia which can affect anybody.

The first confirmed outbreak was at an American Legion Convention in Philadelphia in 1976.

Following a number of significant outbreaks in subsequent years in the UK, two important documents issued by the Health and Safety Executive (HSE) formed the basis of legislative reaction to force commerce and industry to take suitable precautions to prevent the proliferation of the disease.

These were

1. Technical Guidance Note HSG70
2. The 1995 Approved Code of Practice

L8 replaces these two separate documents which, in some areas, were somewhat contradictory and incomplete.

The intention was to make L8 easier to read and hence understand the duties under the law.

The HSE and others have funded research to assess the efficacy of new and alternative control strategies. This new document incorporates the findings of that research and explains how such strategies can be used safely and effectively.

L8 also benefits from much more input from many areas of the Water treatment Industry itself.

In the early days, the greatest threat of Legionnaires' Disease was perceived to be from cooling towers. This resulted in many organisations deciding to remove towers altogether.

However, it soon became apparent that other water sources, particularly hot and cold domestic water systems, were the cause of many more outbreaks than cooling towers.

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This led to the birth - and exceptional growth - of the water hygiene industry which targeted such systems in virtually every establishment.

Latterly, as knowledge, expertise and experience increased, it was realised that, used and maintained effectively, cooling towers were often the most effective and efficient form of cooling available and it is with this in mind that the focus of water treatment technology changed from one of preventing scale and corrosion to one of minimising the risk of disease.

Today, an effective water treatment programme will combine chemicals to combat scale, corrosion, suspended solids and bacteriological contamination along with a modern and effective package of dosage and control equipment.

The implications subsequently discussed below endeavour to match the recommendations of L8 with regard to cooling systems with the best equipment offered by Water Treatment Products Limited.

### ***So what does L8 specify?***

Well, as is very often the case with documents of this nature, L8 makes *general* recommendations rather than *specific*, so the following pages list extracts from the document with particular regard to the ***Equipment*** aspect of water treatment and is therefore an interpretation using the opinions and views of Water Treatment Products Limited.

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L8 Page N° & Reference	Extract	WTP Interpretation	WTP Recommendations Relating to Dosage & Control Equipment
22 (f)	<p><i>Make-up water may not necessarily be mains-supplied (or from another treated water supply) - it may come from rivers, lakes, bore holes and other sources. It may therefore need pre-treatment to be of equivalent quality to the mains supply. If it does not come from a treated water supply, then the quality of water entering the make-up system may show considerable variation in both chemical composition and microbial activity. This may contribute to potential risk and a strategy is required to overcome any identified problems.</i></p>	<p>In certain instances, pre-treatment to the make up water may be necessary. This pre-treatment may take the form of filtration, base exchange softening, demineralisation or a combination of such systems.</p>	<p>Install pre-treatment equipment.</p> <p>WTP do not offer pre-treatment equipment at present but are happy to comment and advice on selection and/or sources of supply.</p>
22 (f)	<p><i>Inclusion of a water meter in the tower supply pipeline both for the measurement of make-up rates and for the proportional dosage of treatment chemicals is recommend.</i></p>	<p>A water meter should always be installed in the make up line to a cooling tower. The meter should give a read out of the volume of water passing through and may also be capable of sending impulses to dosage equipment to provide proportional dosing capability.</p>	<p>Install an integrating/impulse water meter.</p> <p>WTP offer a full range of integrating and impulse emitting water meters.</p>
22 (g)	<p><i>A full water treatment programme should be integrated into the system design, with provision made for sample, injection, bleed and drain points and for the incorporation of dosing and bleed equipment; ideally it should be automated.</i></p>	<p>An automatic Dosage and Control System should always be incorporated into the design of a comprehensive treatment package for any cooling tower.</p>	<p>Install a comprehensive water treatment dosage and control system.</p> <p>WTP offer the PULSAtron and PULSAtron Plus range of dosing pumps and the PULSAtrol range of Controllers along with ancillary equipment such as dosing tanks, water meters and valves. This range offers a vast array of options to suit any cooling tower treatment application.</p>

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23 Operation 85	<i>Cooling systems and towers should be kept in regular use wherever possible. Where a system is used intermittently or is required at short notice, it should be run once a week and, at the same time, be dosed with water treatment chemicals and water quality monitored. The whole system should be run for long enough to thoroughly distribute treated water. If a system is out of use for a week or longer (up to a month), in addition to the above, the water should be treated with biocide immediately on reuse.</i>	Attention must be paid to accommodating automatic dosage and control of stand by systems as well as systems that are in continuous operation.	Install an automatic water treatment controller.  The PULSAtrol 9000 series of cooling water controllers have extensive capabilities in built as standard to accommodate a wide range of treatment capabilities such as weekly or monthly dosing.  In certain instances, they can also be used to interface with external controls to activate system circulation.
23 Operation 86	<i>If it is out of use for longer than a month and there are continued management/monitoring arrangements in place, the system should be kept full of treated water which should be checked (for biocide levels and water quality) and circulated once a week.</i>		
23 Operation 86	<i>The manuals should include equipment as fitted and represent the system as currently in operation, and include (also as fitted) system drawings and/or schematics, manufacturers' instructions for operation and system parameters such as capabilities, throughputs and design temperatures. The total volume of the entire water circuit, i.e. tower pond, recirculation pipework and heat exchange equipment, should be known and recorded.</i>	Very often, it is necessary to include a schematic of the dosage and control equipment installation.	Provide suitable schematics.  WTP offers a full range of literature – either in hard copy or downloadable from the website – which include detailed schematics. All literature is designed to be printed onto the suppliers stationary. We can also provide non standard schematics if required and we are happy to quote for this service.

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24 Operation 89 & 90	<p><i>Specific information on the water treatment programme in use should be included. Where automatic dosing equipment is used, there should be a method of confirming that treatment is being applied. Irrespective of the dosing method, both the quantity and frequency of chemical application should be recorded.</i></p> <p><i>Such records should be expanded to:</i></p> <p><i>(a) include the results of system monitoring; and</i></p> <p><i>(b) show any action required and confirmation that this has been carried out.</i></p>	<p>It is essential to be able to demonstrate that dosing and control equipment is actually performing its intended tasks.</p>	<p>Install a monitoring software package.</p> <p>The PULSAworks software package used in conjunction with compatible PULSATrol controllers is specifically designed for this purpose. It has an extensive capability to record and display all parameters connected with the water treatment programme.</p>
24 Operation 92	<p><i>Where automatic controls are employed, either for chemical addition or to allow system bleed-off, they should be checked over their full operating ranges. In the specific case of conductivity controlled bleed-off, regular calibration of the conductivity cell should be carried out.</i></p>	<p>The ability to undertake regular checks of system parameters is essential.</p>	<p>Undertake regular service visits.</p> <p>The installation of PULSAworks allows remote access to the real time system situation anytime, anywhere, thus saving time and money by visiting site.</p> <p>We are not suggesting site visits are not necessary or important, but PULSAworks can highlight discrepancies to ensure that a site visit is required and worthwhile.</p>
24 Operation 93 & 94	<p><i>Standby equipment, such as towers and recirculating pumps, should operate on a rota basis e.g. daily on/off, or otherwise isolated and held dry. If there are standby cooling towers, specific procedures will need to be adopted to bring them into operation safely.</i></p> <p><i>When a biocide is added to a water system, all standby equipment pipework should be brought into circulation so that the biocide is d throughout the entire system.</i></p>	<p>Attention must be paid to accommodating automatic dosage and control of stand by systems as well as systems that are in continuous operation.</p>	<p>Install an automatic water treatment controller.</p> <p>The PULSATrol 9000 series of cooling water controllers have extensive capabilities in built as standard to accommodate a wide range of treatment capabilities such as weekly or monthly dosing.</p> <p>In certain instances, they can also be used to interface with external controls to activate system circulation.</p>

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25 Operation 98	<i>It is important to ensure that water treatment programmes have sufficient range of adjustment to cope with any potential variations in make-up water supply quality. This enables control to be maintained. Failure to take account of variations in quality may lead to the rapid development of uncontrolled microbiological conditions within the cooling system.</i>	It is important to be able to accommodate any changes in system or operating conditions that may affect treatment requirements.	Install a system that can cope with change. The PULSAtron and PULSAtrol ranges of equipment are designed to cover a wide range of treatment requirements.
25 Operation 100	<i>All components of the treatment programme should be preferably be dosed by pump or eductor (sometimes referred to as an ejector) systems or by a suitable halogen dosing system such as a brominator. This will minimise health and safety risks to operators and ensure that frequencies and rates of application are maintained as recommended.</i>	Always use dosage equipment rather than manual methods. This is important from a health and safety point of view as well as the treatment perspective.	Install effective and reliable dosage equipment. The PULSAtrol and PULSAtron ranges offer solutions for all treatment requirements.
26 Operation 106	<i>There are a number of other methods of scale control including:</i> (a) <i>limiting the cycles of concentration by bleed-off/blow-down;</i>	Control of the concentration factor in a cooling tower system is essential.	Install an automatic bleed system. Dependant on the size and complexity of the cooling tower system to be treated. PULSAtron Plus dosage pumps have in built bleed control capabilities. PULSAtrol controllers incorporate bleed capability into more complex control combinations.
26 Operation 106	(b) <i>conversion of calcium and magnesium hardness into more soluble salts - generally achieved by the controlled addition of a mineral acid to the cooling water, a method more applicable to large industrial systems</i>	Acid dosing is sometimes employed, usually in very large industrial cooling towers.	Install an effective, safe and reliable acid dosing system. A PULSAtrol pH control system in conjunction with a suitable PULSAtron pump will meet the requirement.

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26 Operation 106	<i>(c) prevention of scale formation by removing the calcium and magnesium hardness salts by ion-exchange softening; this is dependent on water quality and system characteristics. The use of a blend of untreated and softened water may be appropriate in some instances.</i>	In certain instances, pre-treatment by base exchange softening may be necessary to provide a suitable quality make up water.	Install a base exchange water softener.  WTP do not offer pre-treatment equipment at present but are happy to comment and advice on selection and/or sources of supply.
26 Operation 109	<i>In systems using make-up water, which has a high concentration of suspended solids, pre-clarification may be necessary. Where this is not feasible, side-stream filtration can be used to remove particulate debris introduced into the cooling tower.</i>	In certain instances, filtration to the make up water or side stream filtration on the circulating water system may be necessary.	Install filtration equipment.  WTP do not offer filtration equipment at present but are happy to comment and advice on selection and/or sources of supply.
28 Box 3: Biocides	<i>It is, in any case, preferable to apply oxidising biocides on a continuous basis but if they are applied as a shot dose, the effective concentration should be present for at least 4 out of every 24 hours. In large industrial systems, the dosage is based on water recirculation rate. This has to be sustained for a period of time, ranging from a few minutes to several hours, or even continuously, dependent on the operating characteristics of the cooling system.</i>  <i>For small systems, such as air-conditioning installations, halogen addition would normally be based on system volume. The system and its water chemistry will influence the choice of the best method of addition to obtain effective microbiological control. Once halogenation is stopped, the free halogen reserve is quickly lost, leaving the system open to re-infection and re-population by micro-organisms.</i>	When oxidising biocides are used for microbial control, the dosing and control regime is vital to ensure under or over dosing does not occur.	Install a halogen dosing and control system.  A PULSAtrol Redox control system in conjunction with a suitable PULSAtron pump for liquid biocide dosage or a solenoid valve and dispenser for solid biocide dosage will meet the requirement.
28 Box 3: Biocides	<i>A non-oxidising biocide programme should use two biocides on an alternating basis.</i>	It is important to use two non-oxidising biocides to ensure resistant strains do not occur.	Install a dual biocide dosing system.  There is a wide range of dual biocide dosing options provided by PULSAtrol controllers.

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<p>Various sections throughout the document</p>	<p><i>Corrosion inhibitors are commonly applied at a point of good mixing such as the suction side of the recirculating pump.</i></p> <p><i>It is common practice to apply scale inhibitors to a point of good mixing such as the suction side of the recirculating pump.</i></p> <p><i>Biocides- are routinely applied at the tower sump or the suction side of the recirculating water pump but should be dosed so that the biocide will circulate throughout the cooling system. However, in air-conditioning systems where the tower can be bypassed, the biocide needs to be added to the suction side of the recirculating pump.</i></p>	<p>Dosage of chemicals should be to the suction side of the circulating pump.</p>	<p>Consider the dosage pump manufacturer's recommendations.</p> <p>This is one area where we disagree with the L8 stance.</p> <p>Generally we would not recommend installing dosage pump injection points on the suction side of a circulating pump.</p> <p>This is because the suction generated by the circulating pump can cause chemical to be sucked at an excessive rate through the dosage pump leading to over dosage and use of chemicals. Such excessive dosage of chemicals may lead to detrimental treated water conditions developing.</p> <p>Thus our recommendation would be to dose to the delivery side of the circulating pump.</p> <p>Provided the dosage pump is capable of dealing with the pressure on the delivery side of the circulating pump, in our experience, this will provide a more reliable result.</p> <p>However, if dosage must be to the suction side of a circulating pump, you should always employ an anti-siphon valve between the dosage pump and the injection point.</p>