

Do you know where your legionella source is coming from?

Legionella is a common bacterium found in water. It can exist in two forms, as free living, or planktonic, bacteria or hidden away inside amoeba, common single celled organisms found in biofilms. Inhalation of water droplets containing legionella bacteria can lead to legionnaires disease in humans. Guidance recommendations for legionella temperature control as recommended by the Health and Safety Executive are as follows:

- At 60 °C (140 °F) - *Legionella* dies
- At 55 °C (131 °F) - 95% die
- 50 to 55 °C (122 to 131 °F) - Can survive but do not multiply
- 35 to 46 °C (95 to 115 °F) - Ideal growth range
- 20 to 50 °C (68 to 122 °F) - Growth range
- Below 20 °C (68 °F) - Can survive but are dormant, even below freezing

Maintaining water temperatures in large water systems is difficult and problems can occur when hot water temperatures are cooled to a level ideal for growth of the bacterium. In an ideal world hot water would remain hot and cold water would remain cold but we do not live in an ideal world. Poor pipe design, deadlegs, long pipe runs and poor lagging can all result in hot water cooling and cold water warming up. By blending “treated” hot water with cold water, that could contain the bacterium, at a thermostatic mixing valve you result in water that contains bacterium in conditions optimal for growth. The question remains as to where are the sources of legionella and are you aware of them?

Four sites were sampled before installation of copper-silver ionisation systems and the results are summarized below

Hot tap		Cold tap	
Legionella count	Temperature	Legionella count	Temperature
4400	39	3600	18
3600	36	300	18
3600	41	800	18
1200	40	800	20
1500	39	8300	26
		3200	26

Table 1: Legionella counts (CFU/L) from hot and cold water taps from site 1. 13 points were sampled, 11 came back positive for legionella. 5 out of 6 hot taps and 6 out of 6 cold taps were positive

Hot tap		Cold tap	
Legionella count	Temperature	Legionella count	Temperature
2100	25	200	24
100	43	100	20
1700	40	100	22
100	39	1200	27
9800	42	200	20
7500	38	200	19
1600	34	3500	22

200	47	8200	28
4300	28		
1400	40		
1100	40		

Table 2: Legionella counts (CFU/L) from hot and cold water taps from site 2. 38 points were sampled, 20 came back positive for legionella. 12 out of 19 hot taps and 8 out of 19 cold taps were positive

Hot tap		Cold tap	
Legionella count	Temperature	Legionella count	Temperature
100	42	1700	19
600	52	1300	21
18900	46	700	20
300	54	1800	19
500	52	100	19
		100	20

Table 3: Legionella counts (CFU/L) from hot and cold water taps from site 3. 47 points were sampled, 11 came back positive for legionella. 5 out of 20 hot taps and 6 out of 27 cold taps were positive

Mixer tap		Hot tap		Cold tap	
Legionella count	Temperature	Legionella count	Temperature	Legionella count	Temperature
2200	40	100	38	1400	23
1700	36	1600	40	200	14
2000	34			800	20
4100	40				
2500	40				
400	38				
500	40				
800	40				
7200	41				

Table 4: Legionella counts (CFU/L) from hot and cold water taps from site 4. 54 points were sampled, 14 came back positive for legionella. 2 out of 16 hot taps, 3 out of 19 cold taps and 9 from 19 mixer taps were positive

The examples shown here clarify the problem. Large counts of legionella can be found both in cold water and hot water, and in blended water. Temperatures in cold water can fluctuate and the range seen in these examples were from 14 to 28°C, with 35% of sample temperatures above 20°C. Positive legionella counts were taken from hot water taps with temperatures above 50°C. By blending hot water with cold only exasperates the problem with high counts found in water of temperatures of 40 to 50°C. All four sites are now successfully controlling legionella levels in both hot and cold water systems using copper-silver ionisation whereas before installation all four sites had problems.

Relying on temperature to control legionella is riddled with problems and sites cannot be sure that control is effective without adequate monitoring and harsh contingency plans such as biocide

dosing or thermal flushing when temperature control fails. These have often been shown to be a short term solution with reoccurrence of the problem. Only by treating both the hot and cold water system, monitoring the biocide level and legionella counts can you be assured of control.