How to keep water systems free from harmful bacteria

We asked industry experts whether it is essential to flush water systems as the main means to keep facilities free from harmful bacteria

Bacteria is present in every area and aspect of our lives and a constant factor that can be both highly beneficial and harmful, depending on the type and levels of concentration involved.

Regular testing of water systems is one of the many FM tasks regarded as an essential part of the highly detailed process involved in the management of facilities, allowing any anomalies to be identified at an early stage and dealt with before the issue becomes more serious.

This year has seen further emphasis emerge on the need for these systems to be maintained according to best practice recommendations, with many facilities closed for several months due to the impact of Covid-19 and efforts to contain it. Recommendations for increased vigilance have been shared throughout the FM industry as a result, to raise awareness of the potential for legionella and other pathogens to increase in systems that have not been used, flushed or treated for several weeks or, in some cases, months.

Water system design has been identified as an essential consideration to ensure that sufficient heat can be maintained with hot water systems – typically more than 60°C – while also making sure that cold water remains below the level of 20°C. Maintaining these temperature levels has been identified as an important means to avoid the conditions most favourable to allow harmful bacteria to multiply.

In order to gain more clarity on the considerations to include when designing and maintaining water systems, we asked industry experts to share their thoughts on whether it is always essential to flush water systems to prevent the build-up of harmful bacteria.

TÜV SÜD principal engineer Daniel Young says: “Typically, yes. Although UK water distribution systems are chlorinated at source, we must assume as part of their design and operation that small quantities of harmful bacteria exist within internal distribution systems. Flushing is a practice aimed at reducing stagnation, subsequently decreasing the risk of nutrient exchange, as well as temperature increase, which are known contributors to the growth and multiplication of bacteria.”

Decreasing contact time between the materials used in the distribution system and wholesome water helps prevent the exchange of nutrients and reduces the

risk of biofilm developing on the surface of pipework, both of which support microbial growth, he continues.

Similarly, bacteria, including legionella, multiply at water temperatures in excess of 20°C. In modern and well insulated buildings, which use a plethora of heat generating equipment (terminal devices, distribution systems etc), the risk of temperature creep to ≥20°C (on cold-water services) can be significant and needs to be effectively managed, typically through flushing.

"Whilst in today's setting flushing may be considered essential, the practice should not be viewed as the only solution as we are literally pouring one of our most precious resources down the drain, and if carried out excessively contravening Water Regulations in the process.

"Through good design practice, increasing awareness of the issues and product innovation, the requirement for flushing to prevent microbial growth should be minimised. This can be achieved through the introduction of packaged cold-water circulation and cooling systems, as well as adopting newly published guidance such as BS:8680, and the Water Safety Plans Code of Practice," says Mr Young.

Additional thoughts are shared on this topic by InnuScience co-founder and chief scientific advisor Steve Teasdale, who warns of the hazards of disinfectants ending up in the water system and says "Justified Disinfection" can play a leading role in ensuring water composition remains undisturbed.

"The variety of materials found in wastewater entering a local treatment plant ranges from residential and manufacturing waste to hospitality and medical waste," he says. "Most are biodegradable such as urine, faeces, food residues from dishwashing machines, and water from showers and toilets but there are substances that are slow to biodegrade or which are non-biodegradable."

These products may be altered in some fashion, he continues, but still end up in the natural water system - such as many antibiotics, disinfectants and chemicals.

"These substances can accumulate in the environment for years, trapped in sediments and sludge. Alternatively, they are mobilized and return into our drinking water system," Mr Teasdale continues.

"Naturally, they are within safe tolerances, but they're there, moving in our water systems and are not biodegradable. Hence, products used to safeguard human life may be doing us more harm than good as the use of disinfectant builds its concentration in the wastewater treatment plant.

"Any substance with high levels of aquatic toxicity can be harmful for the aquatic ecosystem and for water quality. Our aim is always to have the lowest level of aquatic toxicity.

"By definition a disinfectant is a biocidal solution and most have a high aquatic toxicity count. This is why we pay so much attention to this part of our product development and why we champion the message of Justified Disinfection.

"This, as a concept, argues that effective and thorough cleaning with high quality detergents across all non-critical touch surfaces is as effective, if not more so, than widespread use of disinfectants. The regular and widespread use of disinfectants does not provide a clean surface and can promote the development of resistant pathogens," Mr Pathogens.

Although the flushing of water systems can be effective in allowing harmful bacteria to build up, there are other options to consider to either work in harmony with the practice or replace it altogether. It is, of course, essential to ensure that the process employed places health and safety at the forefront of its aims, but it can also be seen that the careful application of alternative methods can result in lower levels of wastage and the raising of standards.

FMs and service partners are advised to follow the guidelines contained within the L8 approved code of practice that has been created to ensure that all water systems remain compliant and free from legionella bacteria to prevent instances of Legionnaires' Disease. ■