

# BTO Executive Summary

## Flow velocity not an influence on the distribution of microorganisms in biofilm and water

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Differences in hydraulic regimes do not lead to different compositions of bacterial populations in water and biofilm. This is the outcome of a study in which the KIVODIS pilot installation was used to analyse four different hydraulic regimes. Water and biofilm samples were taken to determine the ATP concentrations, KG25 numbers, specific qPCR gene copies and the bacterial population (using Next Generation Sequencing, or NGS). Information about the biofilm on the pipe wall in the distribution system is important for ensuring the microbial water quality at the tap, since the water quality is affected by the level of regrowth. Exchange between the water phase and biofilm was limited.



KIVODIS (KWR *in vitro* distributiesysteem) pilot installation at KWR.

**Interest:** increase understanding of the distribution of bacteria in biofilm and water, and the effects of hydraulics on the distribution

The extent to which the exchange of microorganisms between the water phase and the biofilm on the pipe wall in the distribution system influences the microbial water quality is unknown. The effect of the hydraulics is also unknown. For water utilities it is important to know whether opportunistic pathogens and legal regrowth parameters occur in the drinking water. The level of regrowth has a possible influence on the microbial water quality at the tap. This study provided greater insight into the exchange of microorganisms between water and biofilm under different hydraulic regimes.

**Approach:** analysis of four different hydraulic regimes in KIVODIS dynamic system

The KIVODIS pilot installation was used to analyse four different hydraulic regimes. Water and biofilm samples were taken to determine the ATP concentrations, as well as the KG25 numbers, specific qPCR gene copies (*Legionella* spp., *Mycobacterium* spp. and Fungi), and the composition of the bacterial population using NGS.

**Results:** different hydraulic regimes show similar microorganism composition

The different hydraulic regimes do not have any influence on the ATP concentration in the water. More biomass formation occurs at lower velocity than at higher velocity and with variable flows. The hydraulic regimes studied have no influence on KG25 numbers in the water and the biofilm. In percentage terms, the biofilm contains the highest numbers (*Legionella* spp., *Mycobacterium* spp. and Fungi 16S/18S rRNA gene copies). NGS showed that the same groups clustered together in the different



The results lead to the conclusion that the hydraulic regimes investigated in this study have a comparable influence on the microbial population.

**Implementation: hydraulics do not influence the distribution**

Different hydraulic regimes lead to similar density distributions of microorganisms between water and biofilm, and to similar microbial clusters. Exchange between the water phase and biofilm is limited.

**Report**

This research is described in the report *Invloed van hydraulica op de uitwisseling van bacteriën tussen biofilm en water* (BTO-2018.090).

Other relevant report:

- *Invloed van leidingmateriaal op de uitwisseling van bacteriën tussen biofilm en water* (BTO 2018.032).

**Meer informatie**

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