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Expert opinion on the Villeroy & Boch TwistFlush toilet

Dear Ladies and Gentlemen,

Please find below our statement on your new TwistFlush toilet from a hygiene point of view.

Background: the importance of toilet hygiene

Fecal bacteria are a normal part of the human gastrointestinal tract. They include the genera Citrobacter, Enterobacter, Escherichia and Klebsiella. Enterococci are further bacteria typically found in the intestines of humans. Fecal bacteria are excreted with bowel movements. They can be found in varying concentrations on the surfaces of toilets, and in particular in stagnant waste water. When the toilet is flushed with the lid open, they may also be expelled from the toilet within aerosols and may settle outside it or contaminate persons in the vicinity.

The fecal bacterium Escherichia coli (E. coli) is the most common pathogenic cause of urinary tract infections, owing merely to the proximity of the genitals to the anus. However, fecal bacteria are also common causes of infection in other parts of the body, and of nosocomial (hospital-acquired) infections.



For these reasons, toilets should be easy to clean: this reduces to a minimum the quantity of fecal bacteria able to accumulate in them, and likewise the quantity of aerosols projected from toilets into the environment during flushing.

Multidrug-resistant bacteria, many of which are also fecal bacteria, such as vancomycin-resistant enterococci (VRE) or multidrug-resistant gram-negative (MRGN) bacteria, pose a particular risk. The latter include, for example, *Escherichia coli* (E. coli), *Klebsiella pneumoniae*, *Proteus* spp., *Pseudomonas aeruginosa* and *Acinetobacter baumannii*. Surveys of groups in Germany, each comprising several thousand people, show 5%–10% of the population to be intestinal carriers of **MRGN** bacteria.

Carriers of **MRSA** number less than 1% of the population; of these however, approximately 20% also excrete the bacterium in their stool. Toxin-forming **Clostridioides difficile** (C. diff., previously termed *Clostridium difficile*) is found in 0.5%–5% of adults and 5%–30% of retirement home residents. Colonization with **VRE** (vancomycin-resistant enterococci) is also in the percentage range. It should be considered that viruses, such as noroviruses, can also be transmitted on toilets.

The German Commission for Hospital Hygiene and Infection Prevention (KRINKO, 2020) now recommends that only rimless toilet bowls should be used in new and renovated buildings. KRINKO also recommends that the toilet lid should be closed during the flushing process. This may not always be feasible in practice, because modern toilet lids are slow to close, and many users like to check the cleanliness of the toilet after use.

Hygiene and ease of cleaning should be essential criteria for the selection of toilet ceramics, whether public or domestic. Modern toilet concepts are now called for that ensure cleanliness and the lowest possible distribution of aerosols. Against this background, a hygiene evaluation was performed of the TwistFlush toilet.

The results can be **summarized** as follows:

- TwistFlush reduces the spread of bacteria in aerosols during flushing, whilst also reducing the water consumption. The reduction in the spread of bacteria reduces the risk of the surrounding area or persons present being contaminated.
- Flushing of the waste water and rinsing of the surfaces is excellent. The potential residual contamination in the TwistFlush toilet is thus reduced to a minimum.
- With AntiBac, this effect is reinforced by the antibacterial action of the ceramic, which reduces the formation of biofilm and actively kills off bacteria.
- Together with the effective surface rinsing, this facilitates cleaning of the toilet.

Altogether, the Villeroy & Boch TwistFlush toilet is thus perfectly suited to:

- Hospitals, doctors' surgeries and other healthcare facilities
- Retirement and nursing homes

It can equally be recommended for private households.



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