



FALCON
WATERFREE TECHNOLOGIES

SCIENTIFIC SAMPLER

Charles P. Gerba, Ph.D.

Professor of Environmental Microbiology
Consultant to the World Health Organization and the
United States Environmental Protection Agency
Department of Soil, Water and Environmental Science
Arizona University
"Sanitation and Public Health Issues of Flush Type Urinals vs. Waterfree Urinals"
2003

Scientific Testimonial:

"In my professional opinion, I believe that the use of Waterfree urinals would result in a significant improvement in public restroom hygiene. Flush type urinals are far more likely to be colonized by bacteria because of the greater presence of moisture, to serve as reservoirs for disease causing microorganisms, and to cause the widespread dissemination of microorganisms in a restroom because of the generation of aerosols during flushing."

"...The surfaces inside flush type urinals are kept moist by continual flushing. This moisture encourages the growth and survival of bacteria..."

"...The inside of a flush type urinal is not a sanitary environment. Flushing does not eliminate all of the microorganisms present in the urinal. Our studies in a flush toilet show that a certain residual of microorganisms always remains, even after many flushes, because of the attachment of the microorganisms to the surfaces of the inside of the bowl."

"In contrast to the flush type urinals, I believe that Waterfree urinals offer a major improvement in the sanitation of public restrooms. Flushing is eliminated, which greatly reduces the almost continuous production of microbial aerosols, and the surface and sides of the urinals are drier, which reduces the





survival of human disease causing microorganisms and prevents their growth. The flush handle is also eliminated which would prevent hand-to-flush transfer of pathogens from one individual to another during the use of the urinal."

"I also conclude that the liquid in the cartridge trap is more than adequate to prevent sewer gases and associated microorganisms from entering the restrooms. This serves as a physical barrier to the movement of air from the sewer and that is all that is needed."

"...the waterfree urinal cartridges are designed with a trapping depth (2 3/8") that is consistent with the requirements of current plumbing codes (2-4" trapping depth), and thus afford the same level of protection as the water traps contained in traditional flush type urinals."

"I would also conclude that there is no significant risk from infectious microorganisms that might be present in the cartridges after land disposal in landfills."

"In summary, I believe Waterfree urinals could greatly improve the hygiene of public restrooms and that there is no significant risk from infectious microorganisms by the disposal of spent cartridges from the Waterfree urinals in landfills."





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Michael R. Hoffman, Ph.D.

Dean of Graduate School, California Institute of Technology
James Irvine Professor of Environmental Science

"Falcon Waterfree Organic Barrier vs. Water for Sewer Gas Flux"
2003

Methodology:

"I have performed a detailed analysis of the relative efficiencies of a conventional water-based P-trap vs. the Falcon Waterfree barrier of a dual layer of urine covered by a long-chain branched aliphatic alcohol (i.e., the sealant) against the backward flux of sewer gases such as hydrogen sulfide (H₂S) and methane (CH₄) gases. I used fundamental data on the chemical composition of Pasadena tapwater (pH 8) and typical human urine (pH 4.5 to 8). In addition, I factored into account the effect of a lighter than water branched aliphatic alcohol such as 2-butyl-1-octanol ($R = 0.83 \text{ g cm}^{-3}$) covering a column of urine."

Conclusion:

"...the dual barrier systems provided in the Falcon Waterfree Technologies urinals are predicted to be 500 times more effective against the back migration of sewer gases as compared to conventional P-trap water barriers. The Falcon system, which uses a column of urine topped off by a layer of high molecular weight branched aliphatic alcohols, is a better barrier than tap water alone. Very similar reductions in water-to-air gas transfer rates have been documented in the scientific literature for oil coated water surfaces."





WRc-NSF Evaluation and Testing Center

Report No. 1620799 (issued on behalf of the British Government)
2000

7.8.1 Resistance to Stoppage

Urinal set up to manufacturer's specifications. Cigarette butts were added to the bowl along with water at a specified amount and the process was repeated until 20 cigarette butts were in.

Conclusion:

No evidence of urinal clogging. Cartridge to be found to comply with ANSI Z124.9-1994 standards.

7.8.2 Tightness Test of Removable Trap

Cartridge was removed 50 times with the included tool. Pressure was provided to the trapway. Test was repeated five times.

Conclusion:

After each test, there was no drop in pressure. Cartridge able to comply with ANSI Z124.9-1994 standards

7.8.3 Odor Evaluation Test

Conducted over a 5-week period from November 1999 to January 2000. Unit installed with manufacturer's instructions. Restroom had one entry door. Temperature was monitored via datalogging equipment. Testers recorded the odor levels before and after each use. Criteria from assessor on levels:

- 1) acceptable
- 2) barely acceptable
- 3) not acceptable.

Conclusion:

Throughout the entire test, the levels were assessed at "1", thus complying with ANSI Z124.9-1994 standards.





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WRc-NSF Evaluation and Testing Center

Replaceable Cartridge Test (Reference # 504974-01 issued on behalf of the British Government)
December 2001

Methodology:

Subjected cartridge to a number of rigorous physical tests.

Conclusion:

No cracks, no failures

Waterfree Urinal Study

University of California Los Angeles
Dept. of Civil and Environmental Engineering
September 2000

Methodology:

A waterfree urinal was installed in a men's restroom in a classroom building and was evaluated for six weeks for the following:

- a) measuring usage
- b) comparing bacterial growth rates and odors with traditional flush urinals
- c) performing lifecycle analysis

Conclusion:

"...that replacement of a standard water-flushing urinal with the waterfree urinal by Falcon Waterfree would yield a competitive rate of return and would not result in any increase in restroom odor or bacterial growth."





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William S. Comanor, Ph.D.

Professor of Economics

University of California, Santa Barbara

"Report on the Economic Value of Innovation in Water Free Technology"

2002

Methodology:

In a study that surveys the population of Los Angeles City (estimated at 1.8 million) and Los Angeles County men (estimated at 4.8 million), several scenarios were established with each one utilizing between 4 and six flushes per day, (2 gallons per flush) along with percentage of waterfree urinals installed from 10-20 percent.

Findings show that at the low end in the City of Los Angeles, four flushes per day with 10% urinals installed would save the city 394.3 million gallons per year.

At the extreme high end, taking into the county of Los Angeles, with 20% of waterfree urinals installed, 6 flushes per day (based on two gallons per flush), the number of gallons saved ratchets up to 3.02 billion.

Conclusion:

With these figures, saving just 500 million gallons annually would provide enough drinking water to satisfy Los Angeles residents' drinking requirements for two years.





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Edward L. Schnieder, M.D.

Executive Director
Andrus Gerontology Center
University of Southern California
(Professor of Medicine, Keck School)
May 6, 2003

Scientific Testimonial:

"It is my conclusion that waterless urinals do not represent any increased health risk when compared with conventional automatic flush urinals and are clearly superior to manual flush urinals. Furthermore, waterless urinals may reduce the risk of bacterial and viral exposure."

"They are clearly more economical to install and maintain and save considerable water and are therefore better for our environment."

Study conducted by Pacific Northwest National Laboratory for the United States Department of Energy:

"No discernable differences in ammonia concentrations were detected between non-water urinal, water urinal and toilets. Detectable levels (for non-water urinals) were well below the average person's threshold for detecting ammonia."

