Eldon James

Forschungszentrum Weihenstephan für Brau- und Lebensmittelqualität
Alte Akademie 3
85354 Freising-Weihenstephan
http://blq-weihenstephan.de
TECHNISCHE UNIVERSITÄT MÜNCHEN

Analysis carried out by

Research Center Weihenstephan

for Brewing and Food Quality

Flexelene™ Silver Tubing

Denver, Colorado – November 29, 2012 – Eldon James Corporation – a leading, U.S. based manufacturer of plastic tubing and fittings – announced the successful results of long-term tests for their beverage line of tubing. The tests were intended to determine the antimicrobial activity of Flexelene™ Silver Tubing against beer spoiling microorganisms involved in the formation of biofilms in the brewing environment. While the news of these results are expected to have a significant impact on the beer and brewing industry, the positive results also have noteworthy implications on the food and beverage industry as a whole. The testing was conducted by the Research Center Weihenstephan for Brewing and Food Technology (Forschungszentrum Weihenstephan für Brau- und Lebensmittelqualität) Freising, Germany, one of the world's leading specialists for analysis and research on topics related to beer and food.

Eldon James contracted the Research Center Weihenstephan for Brewing and Food Technology (Forschungszentrum Weihenstephan für Brau- und Lebensmittelqualität) in Freising, Germany, to determine the antimicrobial activity of Flexelene™ Silver Tubing after 2,000 liters, after 10,000 liters and again without water flow. The antimicrobial activity was tested against 4 common germs that were either beer spoiling or involved in the formation of biofilms in the brewing and dispensing environment (Acetobacter lovaniensis, Wickerhamomyces anomalus, Lactobacillus brevis and Pseudomonas aeruginosa). Strains of the genera Acetobacter, Wickerhamomyces, Lactobacillus and Pseudomonas occur in other branches of the beverage industry (e.g. in the wine industry) as biofilm colonizers and potential spoilage germs, as well.

Without water flow the test with the Flexelene™ Silver Tubing can be consistently regarded as positive. Despite vast inoculation of bacterial cells well over real contamination cell counts, the silver coating of the tubes was able to reduce the cell count of the four selected microorganisms significantly. The test results confirm that Flexelene™ Silver Tubing could diminish the cell concentration of all the tested microorganism species up to 100.0 % in the 24 hours test period. In addition, the influence of rubber material to smell and taste was analyzed (acc. to MEBAK IV, 2nd edition, issue 1998, "4.6 influence of rubber materials to smell and taste"). It was concluded that there is no significant difference on taste between the "treated" and the blank sample.

After a circulation of 2,000 liters of water through the Flexelene™ Silver Tubing, a positive result could be obtained, as well. Considerable activity revealed through the tests against Lactobacillus brevis (the most frequently detected microorganism in beer), Acetobacter lovaniensis and Pseudomonas aeruginosa where the cell concentrations could be reduced up to 100.0 % in the 24 hours test period. The antimicrobial activity against the yeast

Wickerhamomyces anomalus was, in 2 of 3 tests, slightly weaker, but still showed a reduced concentrations.

Even after a water throughput of 10,000 liters, Flexelene™ Silver Tubing showed positive antimicrobial activity against the acetic acid bacterium Acetobacter lovaniensis. In test series with different substrate dilutions, diminished cell reduction activity and partly no reduction activity against the other three microorganism species was observable.

To address potential concerns of the silver leaching into the flow path, testing was conducted after 2,000 liters, 10,800 liters and 40,000 liters of water circulation. The analysis concluded that the flow directed through the Flexelene™ Silver Tubing had no detectable silver traces in the water (detection limit of the method: 0.01 mg/l).

Because of the potential increase in quality assurance and therefore improved consistency of product at dispensing, Eldon James' Flexelene™ Silver Tubing is now expected to have a significant impact on the food and beverage industry. For more information, visit www.eldonjames.com/beverage.

The Flexelene™ Silver Tubing is nonrestrictive effective against 3 of 4 germs involved in the biofilm formation after a water throughput of up to 2,000 liters. Long-term tests with regards to the effect of silver (Ag) ions in Flexelene™ Silver Tubing after a throughput of up to 10,000 liter beer are currently in preparation.