

Discussion

The results of our test series admit the following conclusions: The Eilfix rinsing machine is a device that shows some advantages in comparison to the "two-sink-technology". Thus, for example, a collection of residues in the sink is not possible with this open system, a pollution of the cleaning suspension will therefore be prevented. Each glass is sprinkled with cleaning solution on its exterior side and rinsed again with fresh water. In order to avoid a collection of cleaning solution in the exterior brush ring, we recommend to rinse the glasses again for approximately 3 seconds.

In the test series on cleaning effects in case of different impingements (lipstick, butter...), the limits of the rinsing machine were obvious. While the rinsing result of the glasses, which had been impinged with butter and tinned milk, was still good, a pre- or after-treatment of the glasses, applied with lipstick, is unavoidable. Beer and head residues were quantitatively removed by means of the Eilfix rinsing machine. Even after a drying time of 24 hours, the rinsing result was unobjectionable.

In case of the experiments with extreme germ contents, a very good and almost complete precipitation of the micro-organisms could be determined.

Since one year, two machines are applied in practice in our research institute and have proved well. The brushes should be removed and subsequently cleaned or disinfected once a week.

Summary

The Eilfix rinsing machine was tested and judged under practice conditions in view of process technology and hygien. Apart from the experiment series with lipstick and strongly fatty pollutions (butter, tinned milk), all rinsing results were unobjectionable. In such cases, an intensive cleaning or a pre-treatment will be necessary. However, all other manual glass rinsing methods show this problem. On the exterior, the glasses are shortly treated with cleaning solution, and immediately thereafter they are rinsed again with clear water. After less than a second, no residues of cleaning liquid could no more be proved. The pre- and after-rinsing process can therefore be regarded as separate procedures.

Considering the time for rinsing the glasses again as well as the intervals for cleaning respectively disinfection of the brushes, the cleaning system "Eilfix rinsing machine" meets all demands, which are made on such a system.

(Unterschrift)

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Concerns: Expert opinion on the Eilfix rinsing machine

Ref.: Order of 10.02.1992 by Mr. Wrede

Dear Mr. Wrede,

by your letter of 10.02.1992, you gave us the order to
check and judge the Eilfix rinsing machine under field
conditions in view of process technology and hygien.

Conception of the device

Contrary to the double sink, the Eilfix rinsing machine is an open system, in which no residues and no remains of cleaning liquids can gather after the end of the washing procedure. The device is to be fixed on the bottom of the sink by means of four plastic suction cups. The supply of water is provided by a rapid-action coupling (Gardena-system), which is laterally fastened at the bottom. The essential characteristic of the Eilfix rinsing machine is a separate water supply for an outer and inner rinsing canal. If, during the interior rinsing process, a glass is further pressed to the bottom, a canal at the bottom of the device, filled with cleaning liquid, empties by means of tap water. Hence, the cleaning solution will only be pressed into the outer rinsing canal. This construction guarantees a subsequent fresh-water rinsing at the exterior side of the glass, whereas, in the interior, the glass is exclusively rinsed by tap water. The glass rinsing cartridges can be replaced by opening the lateral sealing plug in the bottom. A mechanical cleaning during the up- and down-movement is provided by an exterior ring brush as well as a special brush for the interior part of the glass. A simultaneous turning of the exterior brush will be prevented by a locking device. Both brush systems can be quickly removed or replaced for cleaning or disinfection purposes.

Execution of experiments

The experiments went in two directions:

- I. Residues of impinged pollutions, micro-organisms as well as dried beer head.
- II. Control of the fresh-water rinsing after the dosage of the cleaning liquid.

Different beer glasses of a filling volume of 0,2 until 0,5 litres were used in the different experiments. Water pressure and water temperature had been kept stable during the whole time. The rinsing movement of the single glasses were made five times, while in case of the last rinsing procedure the glasses were rinsed again for five seconds.

- I.a) During the first series of experiments, 10 beer glasses were filled respectively and emptied in several steps and rinsed after a time of exposure of 10, 20, 40, 60, 120, 240 minutes and one day.
- I.b) During the second text series, lipstick was applied on the glass brims.
- I.c) During the third series of experiments, the glasses were sprinkled with tinned milk and smeared with butter.
- I.d) During the fourth series of experiments, it had been examined, to what extent an applied germ suspension will be reduced by the rinsing procedure.

- II. In the fifth test, it had been examined, after what time the cleaning solution had passed the outer rinsing canal and will be rinsed again with clear water.

Results

- I.a) After none of the rinsing procedures, no dried head or beer residues could be found on or in the glass. The rinsing result was also unobjectionable after an exposure time of the glasses of one day.
- I.b) Here it was shown that, after the residues had begun to dry for 15 minutes, the rinsing result was worse, as expected. In the case of 30% of the glasses, residues of lipstick could still be found.
- I.c) The results were better than in the case of the second test series with the lipsick. Only one glass of the different glass types still showed residues.
- I.d) *Serratia marcescens* served as test germ. The glasses were dipped into the respective germ suspension and then cleaned with the rinsing machine. After the interior and exterior sides of the glasses had been rinsed respectively washed off with 100 ml sterile water, the determination of the germ content of the rinsing water by membrane filtration and subsequent incubation of the filters on standard-I-Agar took place. The concentration of the test solutions showed 10^3 and 10^5 germs/ml. The analysis of the specimens showed that, in case of a germ load of 10^3 germs/ml, the rinsing procedure guaranteed a complete washing-off of the germs at the outer and the inner side of the glass. As far as the extreme load of 10^5 germs/ml is concerned, germs could indeed be found in the rinsing water. In no case, however, more than 10 germs/ml were found.
- II. On a special model of the rinsing device, where the complete liquid of the outer rinsing canal could be collected, soda lye was filled into the canal that normally contains the cleaning solution. Therefore soda lye got into the outer canal during the rinsing procedure. The existence of soda lye was tested by phenolphthaleine. As early as after one second of rinsing time, no discoloration could be observed during any of the tests. Consequently, each glass in the rinsing machine is rinsed on the outer side first with cleaning solution and immediately thereafter with untreated water. An examination of the water coming from the inner canal showed that this canal is exclusively charged with tap water.