



Chemische und mikrobiologische  
Untersuchungen

- Trinkwasser, Badewasser
  - Brunnen, Oberflächenwasser
  - Abwasser, Klärschlamm und Abfall
  - Boden, Deponien und Altlasten
  - Außenluft, Innenraumluft
  - Arbeitsplatzmessungen (MAK / TRK)
- Steinstraße 10  
35457 Lollar

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**Test Report:** G 60-1309.doc of Nov. 23, 2006

**Client:**

**Tested Appliance:** REDOzone Sterilisator RZ380MG

**Test of the Effectiveness of "REDOzone™ Sterilisator RZ380MG" in regard to bacteria**

## Introduction

The tests of the effectiveness of "REDOzone™ Sterilisator RZ380MG" in regard to bacteria was carried out with the following strains of bacteria:

*ESCHERICHIA COLI*

*ENTEROCOCCUS FAECALIS*

*SALMONELLA ENTERITIS*

*STAPHYLOCOCCUS AUREUS*

These four different bacteria were initially bred in a culture medium.

After initial enrichment they were cultivated separately in a highly concentrated solution of sterilized sodium chloride.

To now test the effectiveness of the "REDOzone™ Sterilisator RZ380MG" unit we added one Litre (1 L) of regular water from the public local city water supply system (City of Lollar) to the highly concentrated solution.

The initial bacteria density in the different solutions varied from  $4,5 \times 10^6$  up to  $1,6 \times 10^7$  KBE per Litre

We now treated the solutions with the "REDOzone™ Sterilisator RZ380MG".

After treating the different solutions in different lengths of time we took samples of the solutions and tested these samples in regard to their contamination with bacteria of the said kind.

Parallel to these tests we also measured the respective ozone levels while treating the solutions in different length of time.

The results of these tests are shown and explained on the following pages.

**TEST GERM: ESCHERICHIA COLI****Results of ozone – measurement**

Duration of Treatment	Ozone Concentration	Measured in mg / litre
1 Minute	<0.05	mg / l
15 Minutes	0.29	mg / l
30 Minutes	0.33	mg / l

Testing Method according to DIN 38408 G3

**Concentration of *ESCHERICHIA COLI* bacteria in relation to the treatment with "REDOzone™ Sterilisator RZ380MG"**

Reaction time with REDOzone	Result	Measured in KBE / per ml
0 minute	$\sim 8.8 \times 10^8$	KBE / ml
15 minutes	0	KBE / ml
30 minutes	0	KBE / ml

KBE = Colony Forming Unit

ml = 1 : 1000 of a litre

Initial concentration of *ESCHERICHIA COLI* bacteria of solution:

$\sim 8.8 \times 10^8$  KBE / Litre =  $8.8 \times 10^3$  KBE / ml

After a 15 minutes treatment with "REDOzone™ Sterilisator RZ380MG" a complete eradication of *ESCHERICHIA COLI* bacteria can be confirmed.

**TEST GERM: ENTEROCOCCUS FAECALIS****Results of ozone – measurement**

Duration of Treatment	Ozone Concentration	Measured in mg / litre
1 Minute	0.05	mg / l
15 Minutes	0.30	mg / l
30 Minutes	0.32	mg / l

Testing Method according to DIN 38408 G3

**Concentration of *ENTEROCOCCUS FAECALIS* bacteria in relation to the treatment with "REDOzone™ Sterilisator RZ380MG"**

Reaction time with REDOzone	Result	Measured in KBE / per ml
0 minute	$\sim 1.0 \times 10^6$	KBE / ml
15 minutes	0	KBE / ml
30 minutes	0	KBE / ml

KBE = Colony Forming Unit

ml = 1 : 1000 of a litre

Initial concentration of *ENTEROCOCCUS FAECALIS* bacteria of solution:

$\sim 1.0 \times 10^7$  KBE / Litre =  $\sim 1.0 \times 10^6$  KBE / ml

After a 15 minutes treatment with "REDOzone™ Sterilisator RZ380MG" a complete eradication of *ENTEROCOCCUS FAECALIS* bacteria can be confirmed.

For the tests with the following germs:

*SALMONELLA ENTERITIS*

*STAPHYLOCOCCUS AUREUS*

We decided on a finer tuned treatment time period to test how quickly the ozone levels increase and from what time onwards a complete eradication of these bacteria can be confirmed.

**TEST GERM: SALMONELLA ENTERITIS****Results of ozone – measurement**

Duration of Treatment	Ozone Concentration	Measured in mg / litre
1 Minute	0.08	mg / l
2 Minutes	0.11	mg / l
5 Minutes	0.21	mg / l
10 Minutes	0.26	mg / l
15 Minutes	0.32	mg / l
30 Minutes	0.32	mg / l

Testing Method according to DIN 38408 G3

**Concentration of *SALMONELLA ENTERITIS* bacteria in relation to the treatment with "REDOzone™ Sterilisator RZ380MG"**

Reaction time with REDOzone	Result	Measured in KBE / per ml
0 minute	$\sim 1.6 \times 10^4$	KBE / ml
1 minute	2	KBE / ml
5 minutes	0	KBE / ml
10 minutes	0	KBE / ml
15 minutes	0	KBE / ml
30 minutes	0	KBE / ml

KBE = Colony Forming Unit  
ml = 1 : 1000 of a litre

Initial concentration of *SALMONELLA ENTERITIS* bacteria of solution:  
 $\sim 1.6 \times 10^7$  KBE / Litre =  $\sim 1.6 \times 10^4$  KBE / ml

After a 5 minutes treatment with "REDOzone™ Sterilisator RZ380MG" a complete eradication of *SALMONELLA ENTERITIS* can be confirmed.

**TEST GERM: STAPHYLOCOCCUS AUREUS****Results of ozone – measurement**

Duration of Treatment	Ozone Concentration	Measured in mg / litre
1 Minute	0.06	mg / l
2 Minutes	0.10	mg / l
5 Minutes	0.22	mg / l
10 Minutes	0.27	mg / l
15 Minutes	0.30	mg / l
30 Minutes	0.33	mg / l

Testing Method according to DIN 38408 G3

**Concentration of STAPHYLOCOCCUS AUREUS bacteria in relation to the treatment with "REDOzone™ Sterilisator RZ380MG"**

Reaction time with REDOzone	Result	Measured in KBE / per ml
0 minute	$\sim 4.5 \times 10^3$	KBE / ml
1 minute	$\sim 2000$	KBE / ml
5 minutes	0	KBE / ml
10 minutes	0	KBE / ml
15 minutes	0	KBE / ml
30 minutes	0	KBE / ml

KBE = Colony Forming Unit  
ml = 1 : 1000 of a litre

Initial concentration of **STAPHYLOCOCCUS AUREUS** bacteria of solution:  
 $\sim 4.5 \times 10^6$  KBE / Litre =  $\sim 4.5 \times 10^3$  KBE / ml

After a 5 minutes treatment with "REDOzone™ Sterilisator RZ380MG" a complete eradication of **STAPHYLOCOCCUS AUREUS** can be confirmed.

## SUMMARISING COMMENTS

The tests have shown that the four tested groups of bacteria

*ESCHERIA COLI*

*ENTEROCOCCUS FAECALIS*

*SALMONELLA ENTERITIS*

and *STAPHYLOCOCCUS AUREUS*

can be completely eradicated with the "REDOzone™ Sterilisator RZ380MG" within 15 minutes.

The initial concentrations of the different bacteria in the different initial solution were ~  $4,5 \times 10^6$  up to ~  $1,6 \times 10^7$  KBE / litre.

When we tested the effectiveness of "REDOzone™ Sterilisator RZ380MG" in regard to eliminating

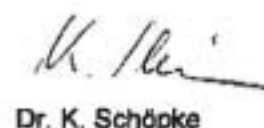
*SALMONELLA ENTERITIS*

*STAPHYLOCOCCUS AUREUS*

We choose a finer time frame and we can confirm that EVEN AFTER A TREATMENT OF ONLY 5 MINUTES THESE BACTERIA COULD BE COMPLETELY ELIMINATED.



Dr. J. Prucha



Dr. K. Schöpke