Dr. Mitsching - Laboratory for Hygiene & Microbiology

Examinations - Consulting - Expert Opinions

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Test report nr.:	**2017/19675**
Test sample:	cleankeys® TKR-103-TOUCH-KGEH-VESA-WHITE-USB-DE (item no. KR23210)
Description of test product:	splash-resistant computer keyboard, glass surface
Manufacturer:	GETT Gerätetechnik GmbH
Analyse request:	The keyboards are considered for use in fields with high hygienic requirements, therefore it was examined if they are practicable for disinfection after application of germs and high organic load.
Date of delivery:	2017-08-02
Storage of test product:	at room temperature as packed by the manufacturer
Start of testing:	2017-11-08
End of testing:Prüfzeitraum:	2017-11-12

Testing method:
The testing procedure was based on the germ carrier test for surface disinfection without mechanical action according to method nr 14.1 of the „*Requirements and Methods for VAH certification of Chemical Disinfection Procedures*“ (2015-04-02).
VAH = Verbund für Angewandte Hygiene (*Alliance for Applied Hygiene*, former *German Society for Hygiene and Microbiology)*

Procedure of testing:

1) Contamination of the keyboard with test germs

In each case contamination was carried out on a single keyboard button. A gram-positive and a gram-negative bacterial test strain as well as a yeast with clinical relevance were choosen for testing.

The following test strains were used:

- *Staphylococcus aureus*	DSM 799 = ATCC 6538 (= gram-positive bacterium)
- *Pseudomonas aeruginosa*	DSM 939 = ATCC 15442 (= gram-negative bacterium)
- *Candida albicans*	DSM 1386 = ATCC 10231 (= yeast)

Preparation of the germ suspensions:
The bacteria suspensions were adjusted to a germ content of 1.5 - 5.0 x 10^9 cfu / ml, whereas the suspension of Candida albicans was adjusted to 1.5 - 5.0 x 10^8 cfu / ml.

1 ml of the organic load solution (containing 3 % bovine serum albumine and 3 % sheep erythroctes) were added to 9 ml of each germ suspension. This means an organic load of 0.3 % bovine serum albumine and 0.3 % sheep erythroctes in the test suspension (= high organic load). For each test germ 0.05 ml of this test suspensions were applied on four keyboard buttons of the same size.

2) After surface drying of the test suspension the contaminated spots were covered with 0.1 ml of the particular disinfectant. In parallel one contaminated spot per germ was treated with water of standardised hardness (WSH = positive control).

3) After an exposure time of five minutes, the survival of germs on the tested area was examined. Therefore the test spots were wiped off with swabs. Each swab was transferred into 5 ml of a media containing disinfectant neutralising reagents (3 % Tween 80 + 0.3 % lecithine + 0.1 % histidine + 0.5 % sodium thiosulphate). The germ content in this solution was examined after a neutralisation time of five minutes.

The following three disinfectants based on different active ingredients were chosen:

Active ingredient	disinfectant	manufacturer	Application concentration of disinfectant
alcohol (37.0 % n-propanol + 24.0 % ethanol)	Destix MA61	Kleinmann GmbH	undiluted
quaternary ammonium compounds (10 % quats)	Wofasept FL	Kesla Hygiene AG	7.5 %
alkaline activated peracetic acid component A: 11 - 15 % peracetic acid component B: alkali	1+1 Wofasteril SC super	Kesla Hygiene AG	System of two components; 0.5 % of each component

Test results:

test strain: ***Staphylococcus aureus***

disinfectant (active ingredient)	exposure time	Reisolated germs		Germ reduction
		cfu/test spot	lg cfu/test spot	lg cfu
water of standardised hardness (positive control)	5 min	1.03 x 10^8	8.01	-
Destix MA61 (alcohol)	5 min	< 5	< 0.70	**> 7.31**
Wofasept FL (quats)	5 min	< 5	< 0.70	**> 7.31**
1+1 Wofasteril SC super (peracetic acid)	5 min	< 5	< 0.70	**> 7.31**

cfu = colony forming units

test strain: ***Pseudomonas aeruginosa***

disinfectant (active ingredient)	exposure time	Reisolated germs		Germ reduction
		cfu/test spot	lg cfu/test spot	lg cfu
water of standardised hardness (positive control)	5 min	1.85×10^7	7.27	-
Destix MA61 (alcohol)	5 min	< 5	< 0.70	**> 6.57**
Wofasept FL (quats)	5 min	4.54×10^4	4.16	2.73
1+1 Wofasteril SC super (peracetic acid)	5 min	< 5	< 0.70	**> 6.57**

test strain: ***Candida albicans***

disinfectant (active ingredient)	exposure time	Reisolated germs		Germ reduction
		cfu/test spot	lg cfu/test spot	lg cfu
water of standardised hardness (positive control)	5 min	2.20×10^6	6.34	- -
Destix MA61 (alcohol)	5 min	< 5	< 0.70	**> 5.64**
Wofasept FL (quats)	5 min	5	0.70	**5.64**
1+1 Wofasteril SC super (peracetic acid)	5 min	< 5	< 0.70	**> 5.64**

cfu = colony forming units

Evaluation of test results:

According to the guidelines for germ carrier tests under practical conditions of the VAH a disinfectant is considered sufficiently effective if it yields to a 5-lg reduction for bacteria and a 4-lg reduction for *Candida albicans*.

Normally tests with spray desinfectants (surface disinfection without mechanical action) are performed with plain metal germ carriers. This test had to be slightly modified for the examination of the keyboard.

The required germ reduction for bacteria and yeast could be fulfilled with the disinfectants based on alcohol and peracetic acid for all three test strains within an exposure time of five minutes.
The testing with the disinfectant *Wofasept FL* (based on quaternary ammonium compounds) did not succeed into the required reduction of *Pseudomonas aeruginosa* within an exposure time of five minutes.

Summary of test results:

The *cleankeys*® keyboard TKR-103-TOUCH-KGEH-VESA-WHITE-USB-DE (item no. KR2321) is seald with Gorilla® glass which is very practicable for cleaning and disinfection.

The intention of the testing was to examine how well the glass surface can be decontaminated by common active ingredients in disinfectants under practical conditions.
Therefore the surface of the keyboard was contaminated with a suspension of the different test strains and organic load consisting of bovine serum albumine and sheep erythrocytes.
Without previous cleaning the buttons with the surface dried suspensions were covered with a layer of the chosen test disinfectants.
After an exposure time of five minutes the survival of germs on the tested area was examined and calculated in relation to the control surfaces treated with water of standardised hardness (WSH).

All three tested desinfectants achieved an obvious germ reduction compared to the positive control with WSH.
Taking the VAH‘s required germ reduction rates as basis, all conducted tests led to an adequate disinfection within five minutes exposure time with only one exception:
With the disinfectant based on quats a sufficient reduction of the test strain *Pseudomonas aeruginosa* coult not be achieved under the tested conditions. This insufficient effect could be explained by the already known relatively high resistance of *Pseudomonas aeruginosa* against quaternary ammonium compounds (quats). Maybe the requested germ reduction rate can be achieved by an extension of exposure time. This has to be highly considered due to the fact that quats are often used as disinfectants in medical practice and hospitals.

Disinfectants based on alcohol or peracetic acid are highly recommended for this keyboard. With these disinfectants not only the required germ reduction rates were achieved but also a complete germ redcution. However, disinfectants listed by VAH should be used. An audition of the testing procedure under practical conditions (e. g. efficiency control with contact plates) is recommended.

In summary a very good practicability for disinfection can be attested to the examined *cleankeys*® keyboard. A disinfection can easily be achieved by spraying the disinfectant onto the surface of the keyboard. Due to the plain surface the disinfection can also be achieved by wiping with disinfectants. Hence, the keyboard ist very suitable for use in hygienically sensible areas (e. g. medical, pharmaceutical and food industry).

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