Fraunhofer Institut
Verfahrenstechnik
und Verpackung

Report:

Microbiological investigation of the decontamination of sport caps by a Claranor flash lamp

Accomplished for:
CLARANOR, Manosque, France

Executed by:
Fraunhofer-Institut
für Verfahrenstechnik und Verpackung
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Process Engineering and Packaging
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1 Aim of the investigation

By the following investigations the efficiency of a flash lamp was studied in relation to the decontamination of sport caps for bottles (see fig. 1).

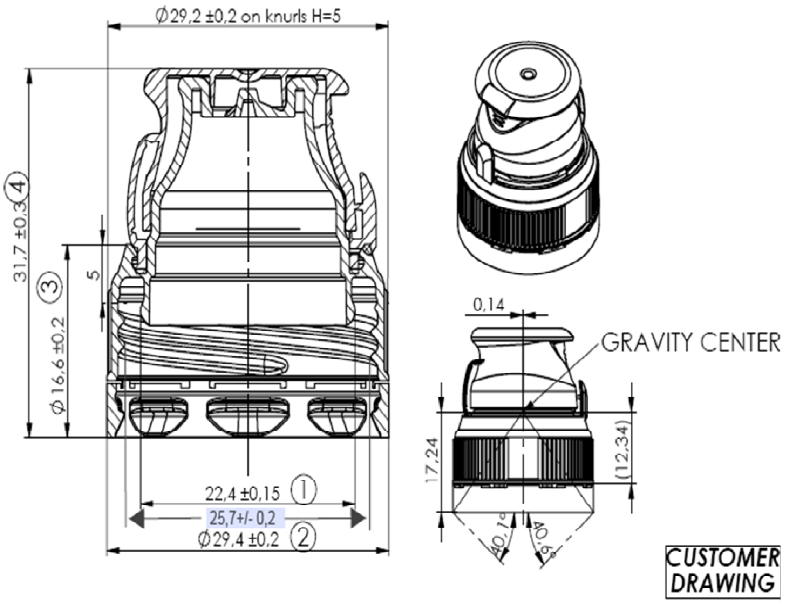


Figure 1 Drawing of the investigated sport caps.

The system (see fig. 2) uses very short (300 µsec) light flashes of high intensity, coming from two Xenon lamps, for the microbiological decontamination of surfaces.

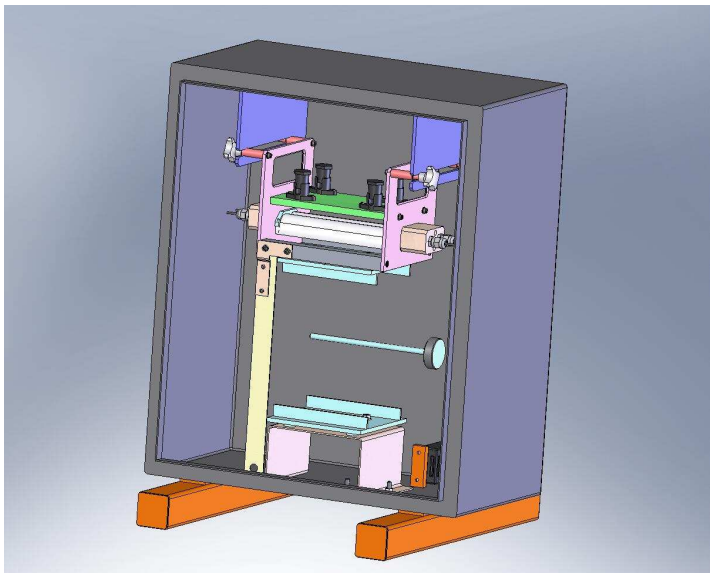


Figure 2 Schematic image of the CLARANOR flash lamp system

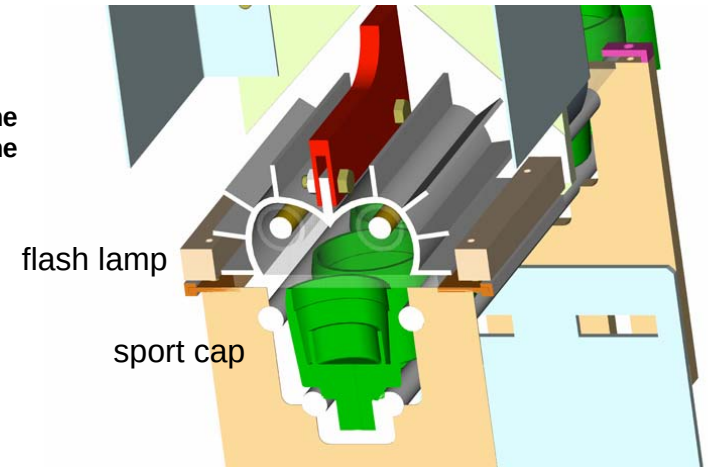
2 Test – microorganisms and microbiological methods

As test microorganisms conidiospores of *Aspergillus niger* (ATCC 16404 / DSM 1988) were used. This strain is known as one of the most resistant microorganisms against UV-radiation.

The inoculation of the sport caps was done by a spray-inoculation method. This method ensures a very even contamination, avoiding much cells lying in stacks or conglomerates. In this way the conidiospores were homogeneously distributed on the surfaces of the sport caps with product contact (without screw thread).

For the exposure, the inoculated sport caps were positioned directly underneath the flash lamp (see fig. 3).

Figure 3 – Position of the sport caps during the flash light treatment



After the treatment with the flash lamp, the sport caps were investigated for surviving cells. The microorganisms were recovered by washing the spores off the surfaces of the sport caps using ringer solution and investigating the washing fluid.

3 Principle of the Procedure

The decontamination tests of the sport caps were done according to method of VDMA: “Code of Practice: Testing the Effectiveness of Aseptic Plants Fitted with Packaging Sterilization Devices” (VDMA July 2002).
The investigation was performed as a challenge tests in form of the count-reduction-method.

Using the count-reduction-method, the preforms were contaminated with a very high amount of spores. So it can be ensured, that there are enough surviving cells after the decontamination process. The count of surviving cells is determined (see equation 1, “final count”).

The efficiency of the decontamination process in each single sport cap is expressed as the logarithmic count reduction of microorganisms (CR) and can be calculated as described in equation 1 (below).

$$CR = \log(\text{initial count}) - \log(\text{end count})$$

equation 1: calculation of the count reduction (CR)

To get the initial count, some references were investigated. These references are treated just as the normal samples but were not treated in the flash device.

4 Results

Untreated samples:

references	CFU / Cap	arithm. mean
Ref. 1	1,4 E+05	**2,2 E+05**
Ref. 2	1,3 E+05	
Ref. 3	2,8 E+05	
Ref. 4	2,9 E+05	
Ref. 5	2,7 E+05	

Treated samples:

voltage	flash number	log-reduction single values	mean log-reduction
2000V	1	3,9	**3,8**
		3,7	
		3,6	
		3,9	
		4,4	
	2	>5,3	**4,9**
		>5,3	
		>5,3	
		5,3	
		4,4	
2500 V	1	4,7	**5,1**
		5,3	
		>5,3	
		5,3	
		>5,3	
	2	>5,3	**>5,3**
		>5,3	
		>5,3	
		>5,3	
		>5,3	
3000 V	1	>5,3	**>5,3**
		5,3	
		>5,3	
		>5,3	
		>5,3	
	2	>5,3	**>5,3**
		>5,3	
		>5,3	
		>5,3	
		>5,3	

Using 2500 V minimum 2 flashes were enough to inactivate all conidiospores, it was not possible to detect one more germ in this case.

Signed P. Muranyi