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DELTA Test Report

Validation of UV-C measurements done on JIMCO's Kitchen Pollution Control System (KPC)

Performed for JIMCO A/S

File no.: DELTA-117-323-144 rev.3

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DELTA

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Title
(KPC) Validation of UV-C measurements done on JIMCO's Kitchen Pollution Control System

Test item JIMCO's UV-C frame

Test site McDonalds
Nybrovej 2
2820 Gentofte

Report no. DELTA-117-323-144 rev.3

Date of test 17 October 2017


Client JIMBO A/S
Mjølbyvej 7
5900 Rudkøbing

Contact person Ivan Arnaut

Result Measurement was performed and no exceeding UV-C levels according to EN 16282-8:2017, UL Subject 710C was found with the given measurement meter, and the measured setup.

To make the light turn on while a filter was missing (wrong use of system), substantial force and workaround was used. This proves that safety mechanism are working as intended but can be bypassed if the user really wants to.

During this measurement 2 persons was needed to bypass the safety of the system, and the persons had internal knowledge about the safety mechanisms.

Project manager 
Hans Ole Hansen
DELTA

Task:

To perform measurement on UV-C radiation from JIMCO's Kitchen Pollution Control System (KPC)

System Description:

The KPC system is mounted above 4 vegetable oil baths for production of fried products like french fries. Greasy air and fried odor is sucked out through the ventilation. The user is shielded by stainless steel filters which are interlocking each other covering for direct light exposure.

For cleaning the filters are removed and cleaned separately. The system is seen in figure 1.

When a filter is removed the system automatically instantly turns off the light. When all filters are mounted correctly, the light will turn on after 10-30sec.

Measurement setup and equipment used:

Since the UV-C lamp used in the system have a dominant peak in UV-C area a handheld UV-C meter from "uv-technik meyer gmbh" model "HI 1", with sensor "SI 1" with art number "A002072" designed for wavelength 215 to 280nm. The sensors serial number is: X6 006.

The sensor and meter has been calibrated, with certificate from the manufacture.

The light has been measured perpendicular on the filters in a distance of 10cm and 40cm. The light has also been measured at an angled position from where an user under normal use would have his/hers eyes.

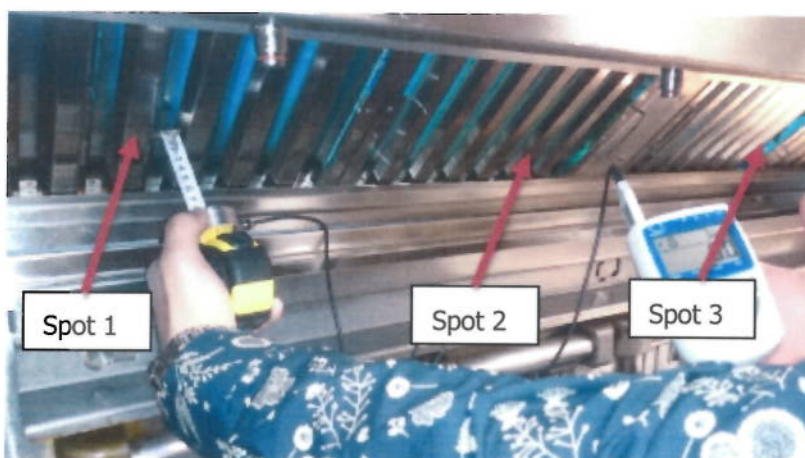
On the 10cm distance measurements, the spot was on the center of the filter. Since no sign of result at 10cm distance, for the 40cm and 60cm measurements the spots were in between 2 filters.

According to EN 16282-8:2017, A.6.2 the maximum dose is $0,5\text{mW}/\text{m}^2$ measured at 10cm.

According to UL Subject 710C, 12. The maximum level is $0,1\text{microWatt}/\text{cm}^2$ ($0,001\text{W}/\text{m}^2$ or $1\text{mW}/\text{m}^2$) measured at 0 cm.

Safety of laser products could be used as a guideline for maximum exposure. Which describes a maximum of $30\text{J}/\text{m}^2$ for a class 1 product in the UV-C range.

During the measurement the oil bath is covered to avoid contamination of the oil and damage to equipment +personnel.



Measurement:



Figure 1: Filter and light on, measurement at 10cm distance



Figure 2: Filter and light on, measurement at 10cm distance



Figure 3: Filter and light on, measurement at 40cm distance





Figure 4: Filter and light on, measurement at 60cm distance, with oil cover seen

Measurement	Distance 10cm with filter	Distance 40cm with filter
spot 1 Left UV-C	0 W/m ²	0 W/m ²
spot 2 Left UV-C	0 W/m ²	0 W/m ²
spot 3 Right UV-C	0 W/m ²	0 W/m ²
spot 4 Right UV-C	0 W/m ²	0 W/m ²

Measurement	Distance 60cm with filter in at correct working area	Distance 10cm with NO filter and forced light
spot 1 Left UV-C	0 W/m ²	28,4
spot 2 Left UV-C	0 W/m ²	Not measured
spot 3 Right UV-C	0 W/m ²	Not measured
spot 4 Right UV-C	0 W/m ²	Not measured