TECHNICKÁ UNIVERZITA V LIBERCI
Fakulta mechatroniky, informatiky a mezioborových studií

Laboratoř Aplikované Fotokatalýzy

Protocol 01032022 - Testing of Microbiological Contamination in the Indoor Environment

Client: Advanced Materials - JTJ s.r.o.
Kamenné Žehrovice
IČO 26763842

Measurements made by: Technical University of Liberec
Faculty of Mechatronics, Informatics and Interdisciplinary Studies
Institute of New Technologies and Applied Informatics
Applied Photocatalysis Laboratory

Measurement date: February 16, 2022

Sampling time: 10:00 – 14:00

Measurement according to standard operating procedure:

Standard operating procedures for the examination of microorganisms in the air and for the evaluation of microbiological air pollution in the indoor environment. Acta hygienica, epidemiologica et microbiologica, no. 1/2002. SZÚ Praha ISSN 0862-5956

Type of measured object: Office (meeting room)

Type of examination of microorganisms in the air: Aeroscopic (aeroscope Sampl Air Lite), active air suction

Active room cleaning: Yes. FN NANO photocatalytic agent on the walls of the room with active UVA LED lighting on the coating to activate the surface and start the cleaning process.

Standards and regulations used: **ISO 4833, ISO 7954,** Regulation no. 6/2003 Sb., laying down the hygienic limits of chemical, physical and biological indicators for the indoor environment of the living rooms of certain buildings.

Cultivation time: Mixed bacterial population - cultivation for 48 hours at 37°C.

Mixed population of fungi - cultivation for 7 days at 25°C.

Methodology:

1. Ventilation of the meeting room for 20 minutes.
2. Setting the air in the room for 40 min and switching on the activation lights on the photocatalytic coating.
3. Taking samples in the inhalation zone at a height of 100 cm using active air suction with a Sampl Air Lite (air suction 100 l / minute).
4. Two sampling events were carried out in each case in order to determine the total concentration of the mixed population of bacteria and the mixed population of fungi.
5. Samples were stored for cultivation in a thermostat and cultivated according to ISO 7954 and EN ISO 4833.
6. Evaluation of results.

ASSESSMENT:

In accordance with § 13 of Act No. 258/2000 Sb., On the protection of public health, users of buildings of facilities for education and training, universities, outdoor schools, buildings for convalescence events, buildings of facilities for medical and preventive care, social care institutions , accommodation facilities, buildings for trade and for gatherings of large numbers of people are obliged to ensure that the indoor environment of living rooms in these buildings complies with the hygienic limits of chemical, physical and biological indicators, regulated by implementing legal provisions. One of the monitored biological indicators, stated in the draft decree to the above-mentioned law, are the concentrations of microorganisms, i.e. bacteria and fungi in the air.

Table 1 - Indoor air pollution category according to EUR 14988 - criterion of concentration of mixed population of bacteria and mixed population of fungi in the air of living rooms

Categories of pollution	Bacteria (CFU/1 m^3)	Fungi (CFU/1 m^3)
Very low	< 50	< 25
Low	< 100	< 100
Middle	< 500	< 500
High	< 2000	< 2000
Very high	> 2000	> 2000

RESULTS:

Tab. č. 2 - measured averaged values CFU/m3

Population measured	Number of CFU/1 m3 in the meeting room	Number of CFU/1 m3 outside, on the windowsill of the room
Bacteria	14	106
Fungi	55	116

According to Table 1, the number of CFU of the mixed bacterial population in the meeting room was classified as **very low pollution**, whereas the result of the CFU number of the mixed bacterial population taken from the outside windowsill showed a **low pollution** value. A relative pollution calculation (indoor CFU concentration / outdoor CFU concentration) was performed, by comparing the determined concentration in the indoor air with the concentration in the outdoor air. The measured value showed a coefficient of **0.13**, which proved low, almost negligible air pollution in the meeting room.

Summary of results for bacteria: **VERY LOW LEVEL OF POLLUTION**

According to Table 1, the number of CFU of the mixed population of fungi in the meeting room was classified as **low pollution**, whereas the result of the CFU number of the mixed fungi population taken from the outside windowsill showed a **medium pollution** value. A relative pollution calculation (indoor CFU concentration / outdoor CFU concentration) was performed, by comparing the determined concentration in the indoor air with the concentration in the outdoor air. The measured value showed a coefficient of **0.47**, which proved low air pollution in the meeting room.

Summary of results for fungi: **LOW LEVEL OF POLLUTION**

Annex:

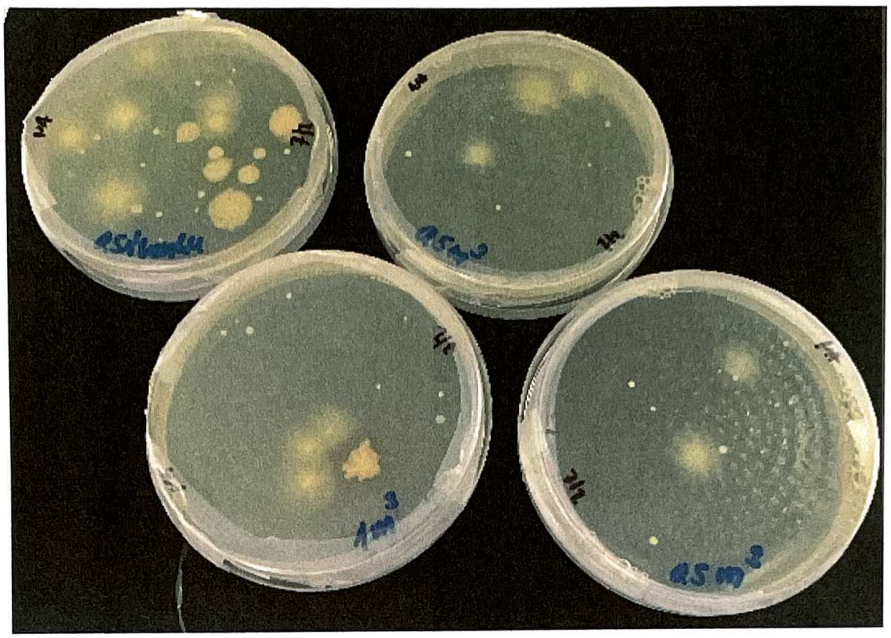

Figure 1 – Image of a Petri dish with cultivation of a mixed bacterial population.

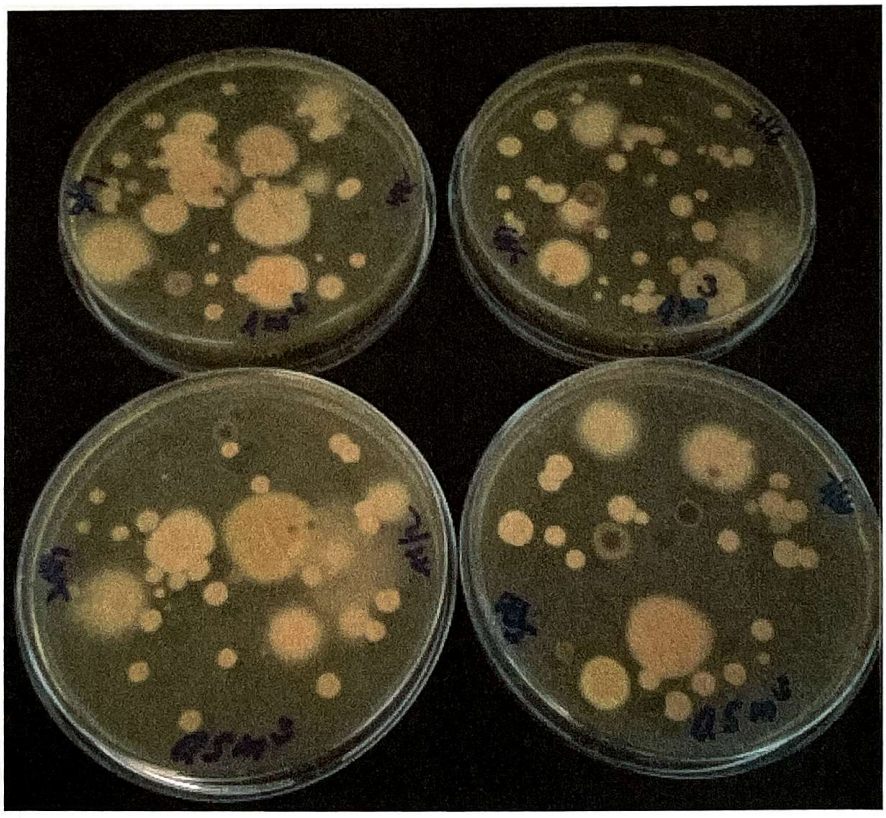

Figure 2 – Image of a Petri dish with cultivation of a mixed bacterial and yeast population.

Figure 3 – Meeting room that was measured has the floor area of 44.95 m^2. UV exposure intensity at the sampling site was 12 $\mu W/cm^2$.

Figure 4 – Simulation of outdoor sampling.

Prepared by:
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