



# Microbiological analysis for the detection of the bacterial load

**ijen**  
by **SILAP**  
YOUR BREATH YOUR AIR OUR LIGHT

UVC radiation is characterized by a marked germicidal effect, with a peak of maximum effectiveness at the 254nm wavelength.

Germicidal UV is provided by a low pressure lamp that emits UV at the germicidal wavelength (254 nm). At this wavelength, the UV destroys the molecular bonds of the DNA or RNA of the microorganisms, rendering them harmless or preventing their growth and reproduction.

The degree of inactivation of microorganisms by means of ultraviolet radiation is directly proportional to the applied UVC dose.

Several scientific researches have studied the behavior of various common microorganisms (bacteria, viruses, fungi, molds ...) when irradiated with UVC light and have determined the UVC dose required for different levels of inactivation (microbiological abatement -%) by type of microorganisms pathogens.

The table below shows the indicative values of the UVC dose (mJ / cm ^ 2) by type of microorganism:

%Abbatt. Microbiol.	UV dose (mJ/cm2)			
	90%	99%	99,90%	99,99%
<b>Bacteria</b>	9	14	22	30
<b>Viruses</b>	60	111	171	222
<b>Spores</b>	52	93	140	140
<b>Protozoa</b>	45	75	91	125

TAB.1

A recent study by the state university of Milan (June 2020), analyzed the impact of UVC radiation on the new Sars-Cov-2 and noted that a dose of 3.7 mJ / is sufficient to inactivate and inhibit the reproduction of the virus. a factor of 1000, regardless of its concentration.

To detect the reduction of the bacterial and viral load detected on environments and surfaces before and after sanitizing with the iJen series products, Silap used the MBS EASY TEST microbiological analysis tool, a rapid colorimetric system, developed by MBS in collaboration with the University of Roma Tre.



The analysis method is based on the observation of the color change of the suspension formed in the test vial into which the sample to be analyzed is inserted: the suspension changes (changes color) if microorganisms are present; the greater the amount of microorganisms, the faster the color change.

The MBS method has been validated according to ISO 16140: 2003 "Microbiology of food and animal feeding stuff - Protocol for the validation of alternative methods".

For our analyzes we used the CBT-L01 reagent for the total bacterial count.

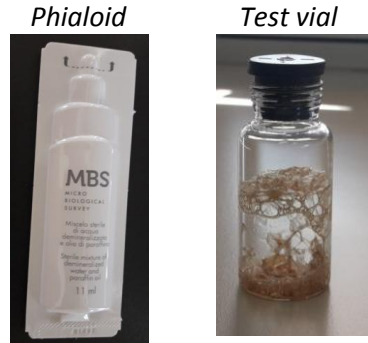
The analysis carried out can be summarized in 4 phases:

- Preparation of the analysis vial
- Inserting the sample
- Analysis and control of the outcome
- Sterilization

The operating procedure used differs for the type of sample to be analyzed: solid sample, liquid sample and superficial swab. For our analyzes we analyzed superficial swabs.

Preparation of the analysis vial

For the preparation of the test vial, we inserted the contents of the white vial (water and petroleum jelly) into the test vial (containing the reagent for total bacterial count, CBT-L01)



The final result of this operation is a blue-violet liquid on which a layer of vaseline is formed, as shown in the figure:



Sample Insertion: Surface Swab

For the insertion of the sample (surface swab) we used the white swab, see photo above, after having immersed it in saline solution (for contact lenses)

We rubbed the swab on the surface to be analyzed, covering an area of 100cm <sup>2</sup> (the photo shown below shows the sample taken from the steering wheel of a car)



We then inserted the swab into the previously prepared test vial, shaking it thoroughly.



Analysis and control of the outcome

We inserted the prepared vial into the MBS-MR device and started the MBS-MR software (via PC).



The MBS-MR device consists of 8 independent stations that allow the simultaneous execution of multiple tests. The analyzes are carried out using an optical thermostat reader which automatically detects the color change of the test vials and calculates the microbial concentration of the sample. Through the MBS-MR software, the test results are available and can be consulted within a database even during the execution of the test.

At the end of the test it is possible to obtain a report in which the color change time, the microbial concentration present in the analyzed sample and all the conditions of execution of the test are found.

Analysis Report Example

Below are the two reports of the analysis carried out on a table in a meeting room before sanitation (sample # 1) and after (sample # 2) with our product iJen MOVING BOX220 (2x15W UVC lamp power)

MBS <small>MICRO BIOLOGICAL SURVEY</small>		Report di Analisi		2020-06-10 07:52:52	
Azienda	Silap				
Persona di Riferimento	Dr.				
Data di Ricezione	2020-06-08				
Numero di Campione	01				
Quantità	1.0 100cm <sup>2</sup>				
Lotto	scrivania				
Prodotto	tampone				
Categoria	saletta riunioni				
Campionamento	ISO-TS 17728:2015 - Microbiology of Food Chain - Sampling Techniques				
Cmpione da Restituire	No				
Note Campione	tempo esposiz. UV 0 sec				
Il Report si riferisce al solo campione analizzato					
Data di Inizio Data di Fine	ID Analisi Metodo Analitico Matrice Criterio	Diluzione	Risultato	Limite	Note
2020-06-08 16:01:23 2020-06-09 06:32:57	28 - CBT-L01 Conta Batterica Totale - 37°C Micro Biological Survef® Altro Quantitativo	1:1	= 1.10E02 CFU/100cm <sup>2</sup>	-	



Report di Analisi

2020-06-10 07:56:06

Azienda	Silap
Persona di Riferimento	Dr.

Data di Ricezione

Numero di Campione	02
Quantità	1.0 100cm <sup>2</sup>
Lotto	scrivania
Prodotto	tampone
Categoria	saletta riunioni
Campionamento	ISO-TS 17728:2015 - Microbiology of Food Chain - Sampling Techniques
Cmpione da Restituire	No
Note Campione	tempo esposiz. UV 15min

Il Report si riferisce al solo campione analizzato

Data di Inizio Data di Fine	ID Analisi Metodo Analitico Matrice Criterio	Diluizione	Risultato	Limite	Note
2020-06-08 16:19:38 2020-06-09 12:19:40	29 - CBT-L01 Conta Batterica Totale - 37°C Micro Biological Survey® Altro Qualitative	1:1	< 5,00E0 CFU/100cm <sup>2</sup>	-	

From these reports, we can see that:

	Sample Type	UVC Exp. Time	Analysis duration	Result
<b>Sample #1</b>	Desk Swab	0 sec	12h30" circa	1,10*10 <sup>2</sup> CFU/100cm <sup>2</sup>
<b>Sample #2</b>	Desc Swab	15 min	20h circa	<5 CFU/100cm <sup>2</sup>
<b>% of sanitization</b>				<b>&gt; 95,5%</b>

Sterilization

At the end of the analysis, the liquid contained in the vial has turned yellow: we sterilized this content by firmly pressing the top cap and shaking the vial to allow the sterilizing substance to act (for 10 minutes).

This way the vial can be disposed of as hospital waste.