

Dear;

**ELSON AIR TECHNOLOGIES
INDUSTRY INC.**

Date : 20.07.2020
Analysis No : MTA200705

MICROBIAL ACTIVITY ANALYSIS OF FROUMANN HEPA FILTER AIR CLEANER BRAND

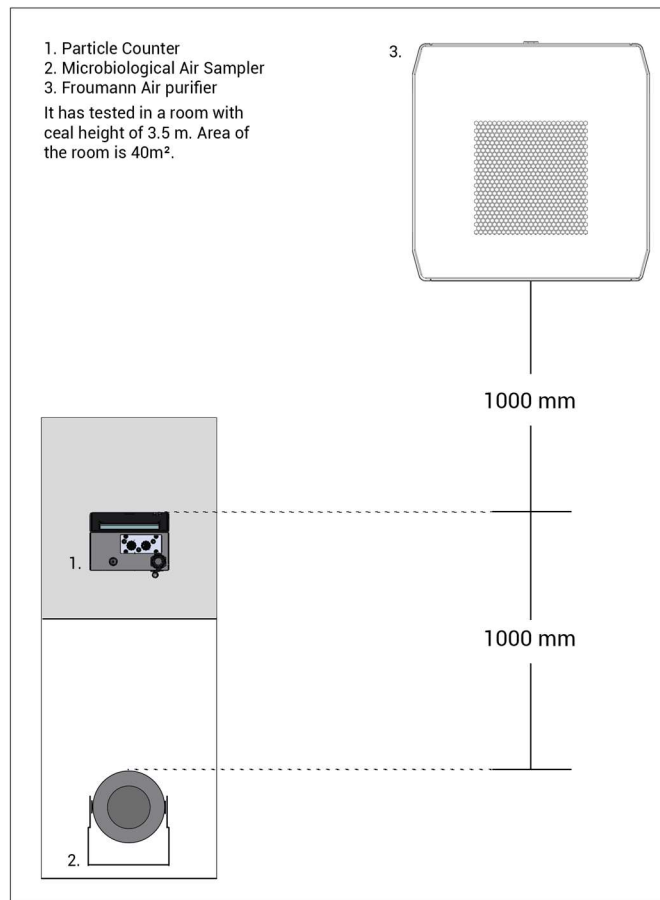


Figure 1. Froumann air purifier, particle measuring device and air sampler device locations in an area of 40 m²

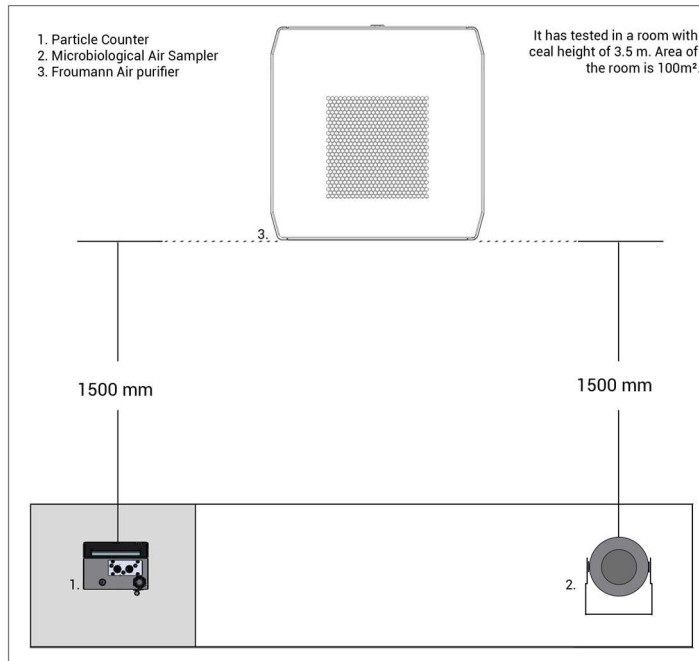


Figure 2. Froumann air purifier, particle measuring device and air sampler device locations in an area of 100 m²

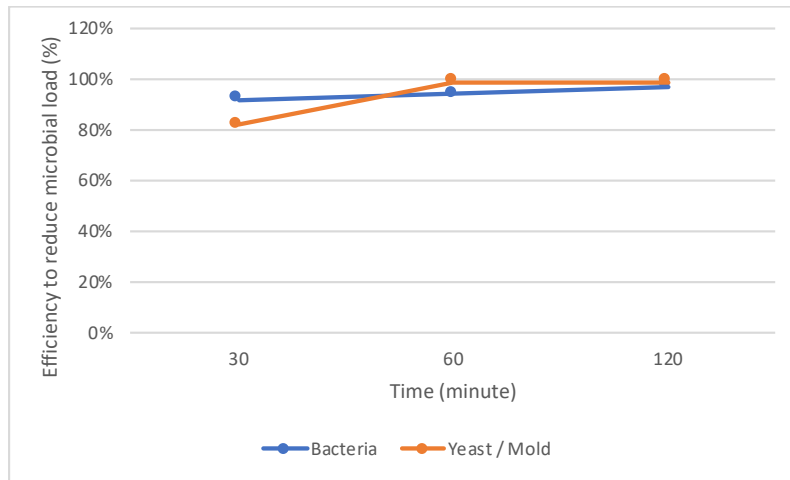


Figure 3. Microbial load reduction efficiency in an area of 40 m² after operating the device in the 3rd stage.

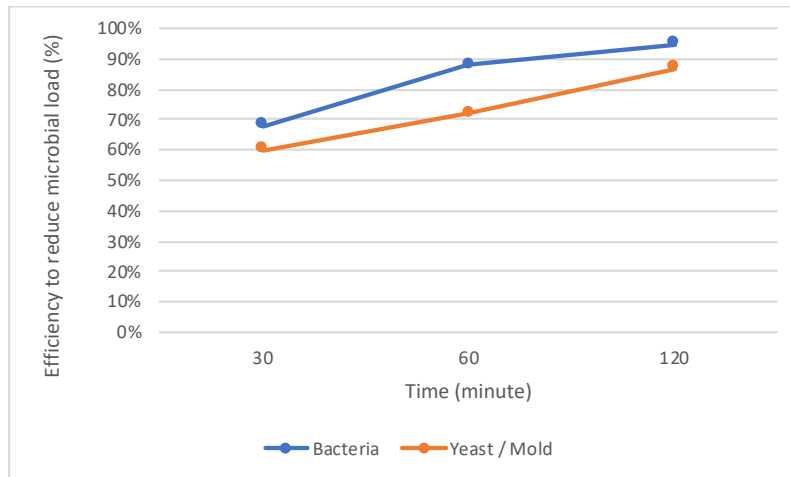


Figure 4. Microbial load reduction efficiency in an area of 40 m² after operating the device at stage 5.

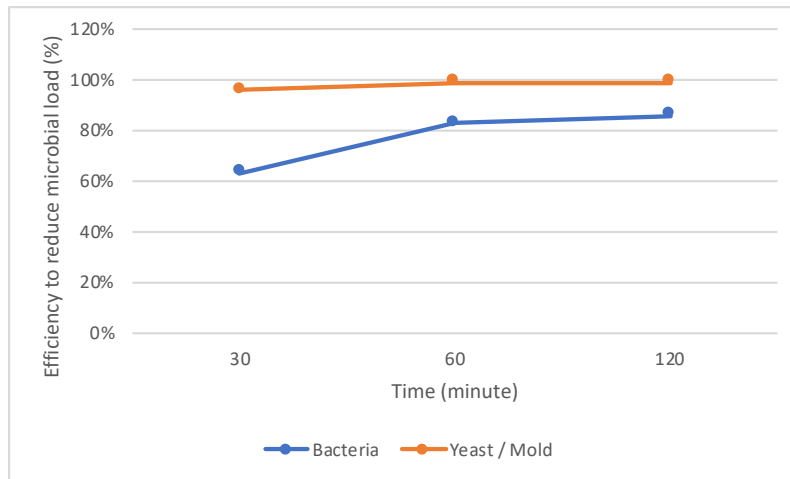


Figure 5. Microbial load reduction efficiency in an area of 100 m² after operating the device in stage 3.

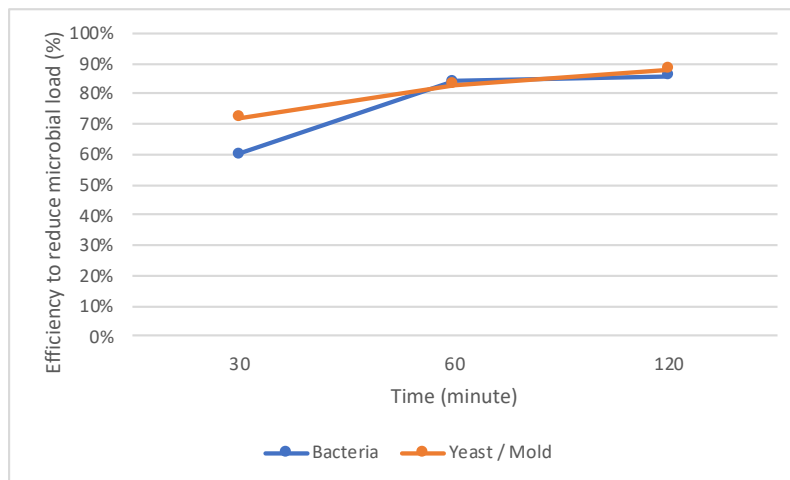


Figure 6. Microbial load reduction efficiency in an area of 100 m² after operating the device in stage 5.

Table 1. Microbial load reduction efficiency (%) in 40 m² area after operating the device in 3rd and 5th stages.

3rd Stage			
Duration	30 minutes	60 minutes	120 minutes
Bacteria	92%	94%	97%
Yeast / Mold	82%	99%	99%
5th Stage			
	30 minutes	60 minutes	120 minutes
Bacteria	60%	84%	86%
Yeast / Mold	72%	83%	88%

Table 2. Microbial load reduction efficiency (%) in 100 m² area after operating the device in the 3rd and 5th stages.

3rd Stage			
	30 minutes	60 minutes	120 minutes
Bacteria	63%	83%	86%
Yeast / Mold count	96%	99%	99%
5th Stage			
	30 minutes	60 minutes	120 minutes
Bacteria counts	60%	84%	86%
Yeast / Mold	72%	83%	88%

Table 3. Microbial load in an area of 40 m² before and after operating the device in the 3rd and 5th levels

3rd Stage	Duration			
	T₀	30 minutes	60 minutes	120 minutes
Bacteria count (cfu/m ³)	2995	240	175	85
Yeast/mold count (cfu/m ³)	3020	540	25	15
5th Stage	Süre			
	T₀	30 minutes	60 minutes	120 minutes
Bacteria count (cfu/m ³)	300	95	35	15
Yeast/mold count (cfu/m ³)	200	80	55	25

Table 4. Microbial load in an area of 100 m² before and after the device is operated in the 3rd and 5th levels.

3 rd Stage	Duration			
	to	30 minutes	60 minutes	120 minutes
Bacteria count (cfu/m ³)	330	120	55	45
Yeast/mold count (cfu/ m ³)	2995	100	30	15
5 th Stage	Duration			
	to	30 minutes	60 minutes	120 minutes
Bacteria count (cfu/m ³)	190	75	30	25
Yeast/mold count (cfu/ m ³)	90	25	15	10

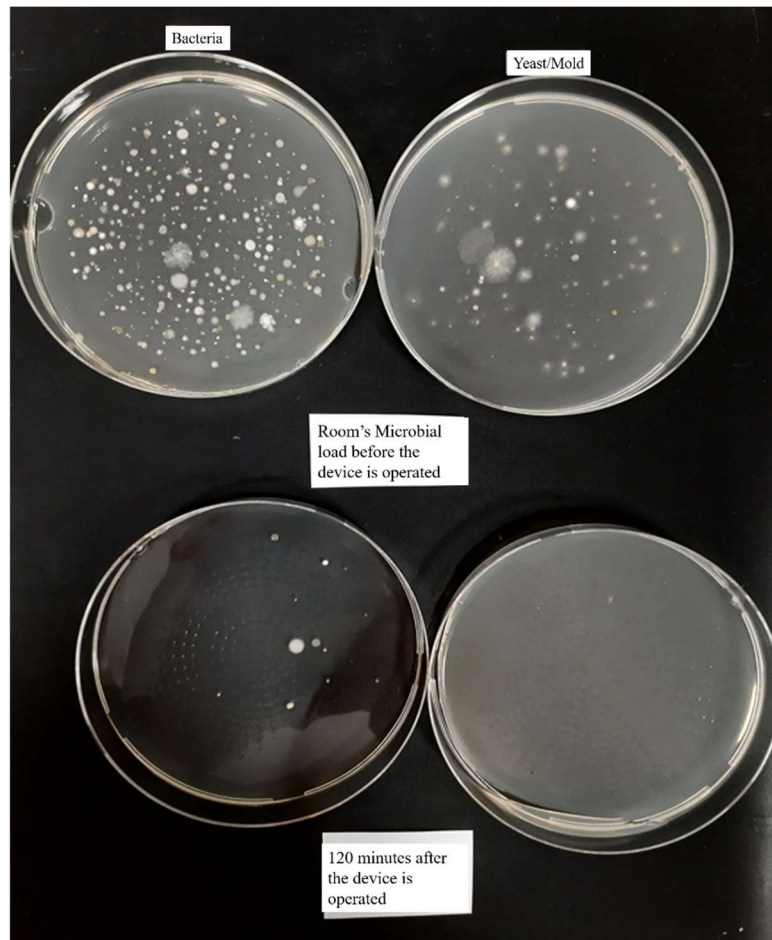


Figure 7. Microbial load in an area of 100 m² before and 120 minutes after the device is started in the 3rd stage.

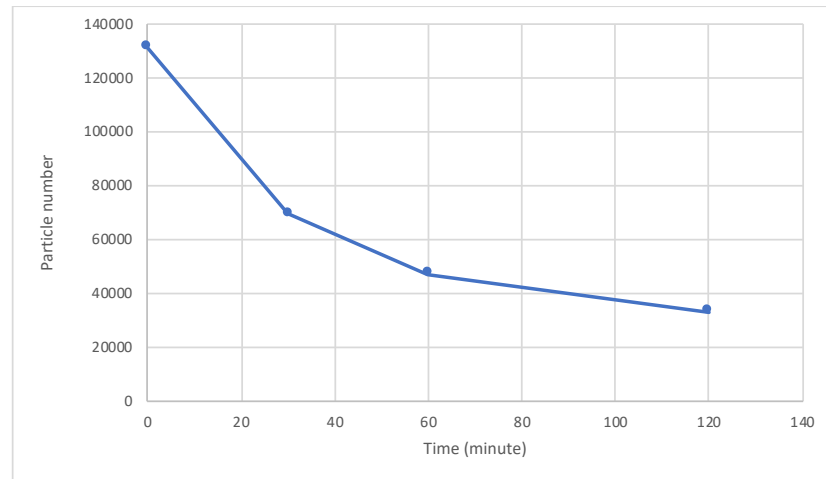


Figure 8. Number of particles with a diameter of 0.3 μm before and after operating the device in stage 3 (40 m^2 area)

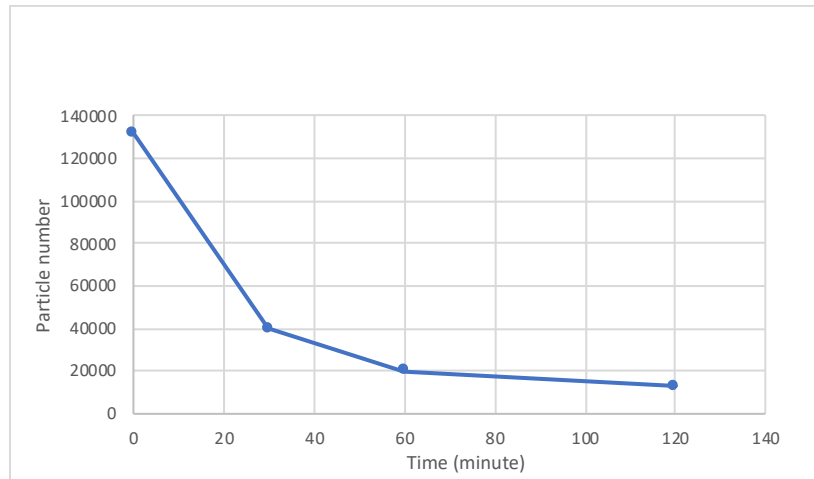


Figure 9. The number of particles with a diameter of 0.3 μm before and after operating the device in 5th stage (40 m^2 area)

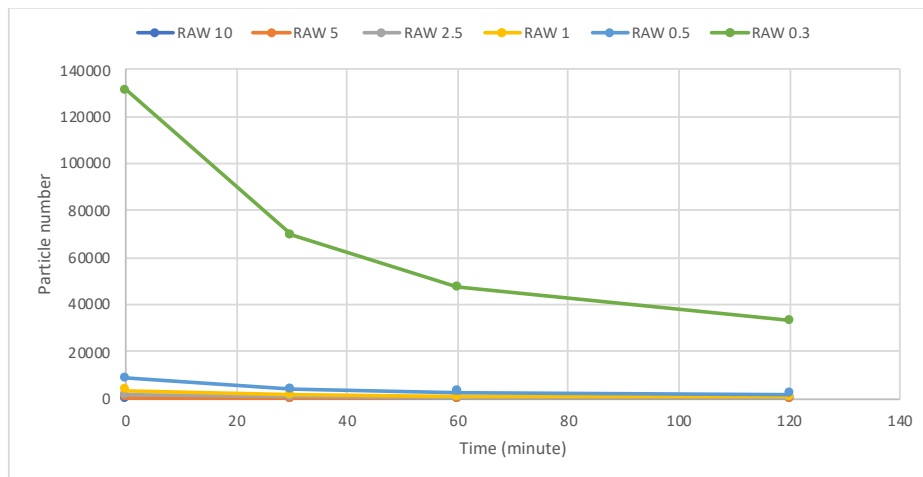


Figure 10. Number of particles of different sizes before and after operating the device in the 3rd stage (40 m² area)

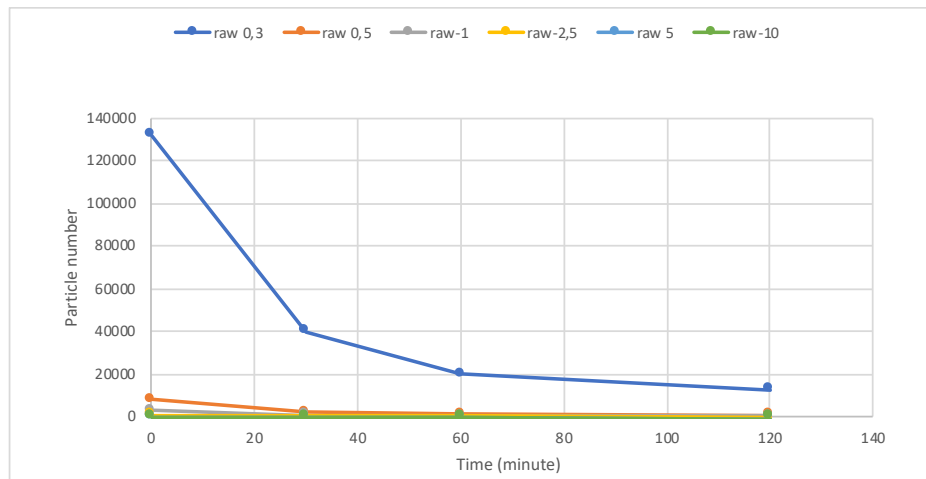


Figure 11. Number of particles of different sizes before and after the device is operated in the 5th stage (40 m² area)

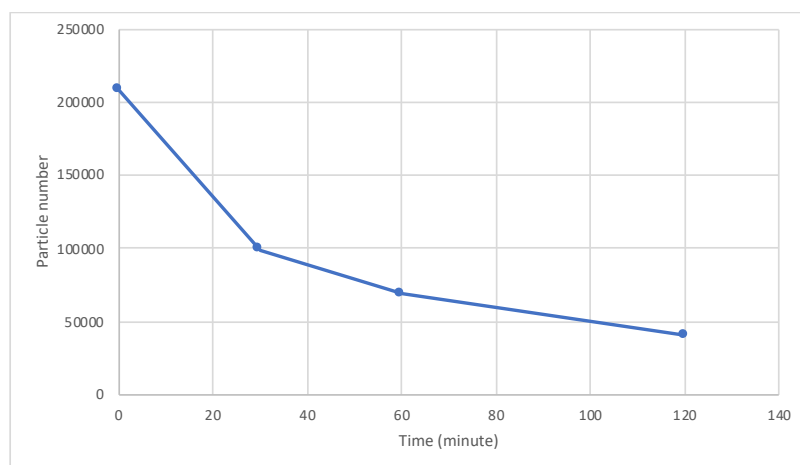


Figure 12. Number of 0.3 um diameter particles (100 m² area) before and after the device is operated in the 3rd stage.

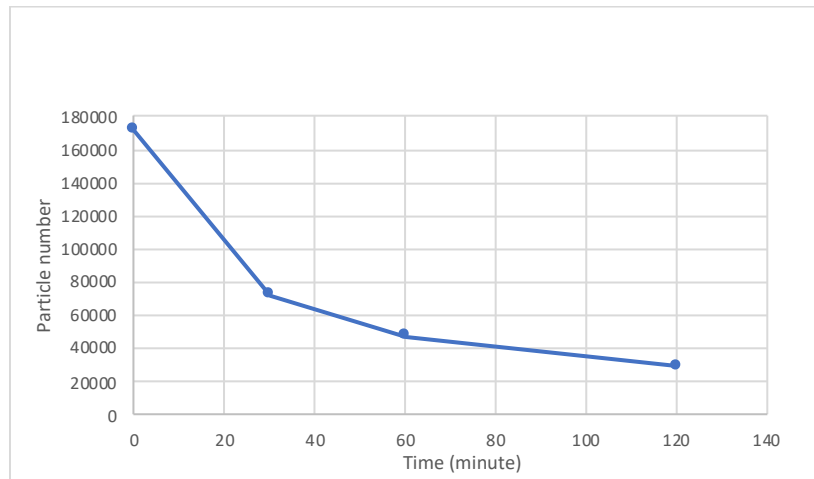


Figure 13. Number of 0.3 µm diameter particles (100 m² area) before and after operating the device in the 5th stage

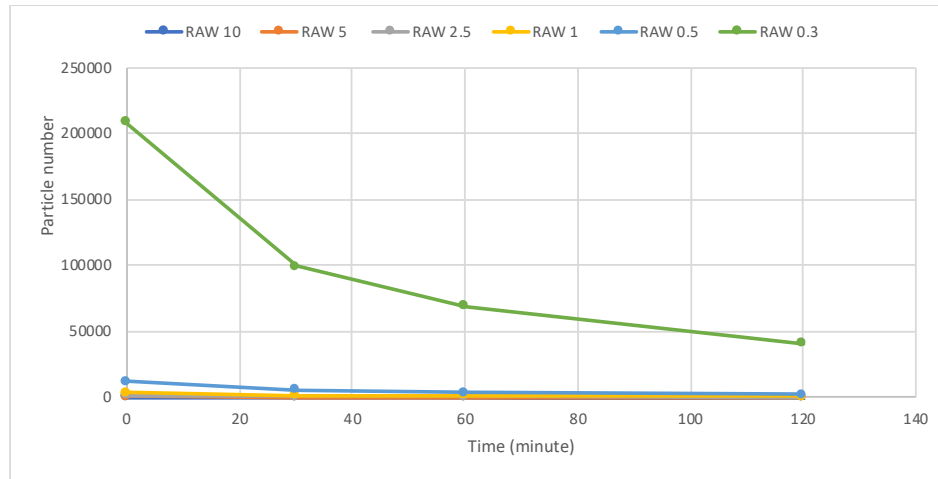


Figure 14. Number of particles of different sizes before and after operating the device in the 3rd stage (100 m2 area)

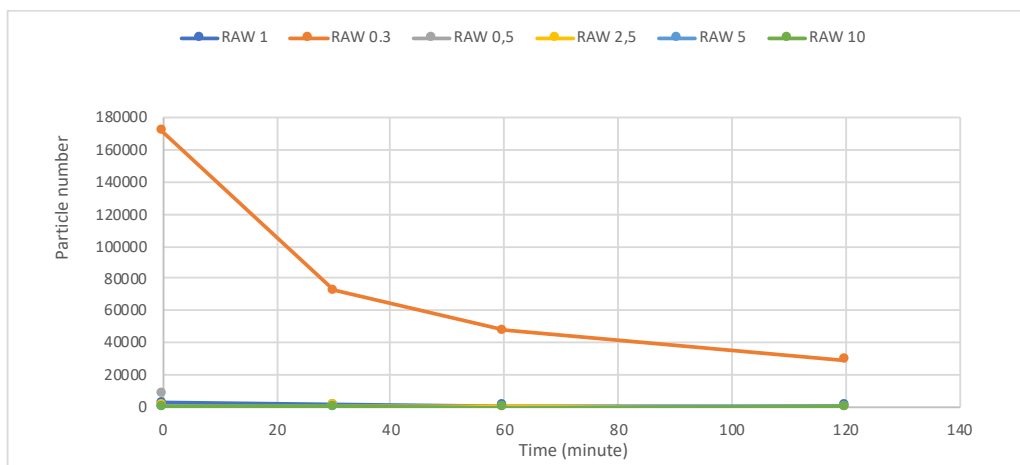


Figure 15. Number of particles of different sizes before and after operating the device in 5th stage (area of 100 m2)

MICROBIAL ACTIVITY ANALYSIS REPORT OF FROUMANN HEPA FILTER AIR CLEANER BRAND

Microbiota personnel carried out this work in 40 m² and 100 m² completely closed areas without any air circulation with Froumann N90 air cleaning device. Analyzes were performed for both areas at 30, 60 and 120 minutes before and after the device was operated using a particle measuring device (Particles Plus 7302) and an air sampler (Mas-100 ECO). The measurements were taken by placing the test equipment 1.5-2 m away from the air cleaner (figure 1,2). Tests for both sampling areas were carried out by operating the device in the 3rd and 5th stages. According to the results obtained, the microbial load of the environment was increased in the area and time determined and the device operation was repeated in the 100 m² closed area for 120 minutes in the third stage. At the same time, after 120 minutes, a swap sample was taken from the filter of the device and the total number of bacteria and yeast / mold were determined.

The results obtained from the tests carried out by operating the Hepa filter air purifier in the 40 m² closed area at the 3rd stage are given in Figure 3. According to the results obtained, the bacterial load in the environment decreased by 92% at the end of the 30th minute, 94% in the 60th minute and 97% in the 120th minute. In the yeast / mold count of the same medium, a decrease of 82% at the end of the 30th minute, and a 99% decrease in the 60th and 120th minutes was observed. When the device was operated at level 5, it was observed that the bacterial load was decreased by 68% at the end of 30 minutes, 88% at 60 minutes and 95% at 120 minutes (Figure 4). In the yeast / mold determination analysis for the same environment, a decrease of 60% in the 30th minute, 72% in the 60th minute and 87% in the 120th minute was observed.

When the air purifier is operated at the 3rd and 5th levels, the decrease in the microbial load and the number of particles was observed to be close. In the swap samples taken from hepa filter at the end of 120 minutes, 120 cfu / ml total mesophilic bacteria were counted and the total yeast / mold was determined as 180 colonies. With this test, it has been verified that the device successfully holds the microbial load in the environment with its filters. In the studies carried out simultaneously with the particle measuring device, a reduction of 0.3% in the number of particles with a diameter of 0.3 µm was 73% after the air purifier was operated in the 3rd stage for 120 minutes, and an 80% decrease in the 5th stage (Figure 8,9). Particle number analysis and microbial load determination parallels with each other.

The results obtained from the tests carried out in the third stage of 100 m² closed area are given in Figure 5. According to the results obtained, the bacterial load in the environment decreased by 63% at the end of the 30th minute, 83% in the 60th minute, and 86% in the 120th minute. In the yeast / mold count of the same medium, a decrease of 96% at the end of the 30th minute, and a 99% decrease in the 60th and 120th minutes were

determined. When the device was operated at level 5, it was determined that the bacterial load decreased by 60% at the end of 30 minutes, 84% at 60 minutes and 86% at 120 minutes (Figure 6). In the yeast / mold determination analysis for the same environment, a decrease of 72% in the 30th minute, 83% in the 60th minute and 88% in the 120th minute was observed. In the analyses performed simultaneously with the particle measuring device, a reduction of approximately 80% in the number of particles with a diameter of 0.3 μm was found when the air purifier was operated for 120 minutes in the 3rd stage and 82% when it was operated in the 5th stage (Figure 12, 13).

By increasing the microbial load of the 100 m² closed area, the device was operated in the 3rd stage for 120 minutes and bacterial and yeast / mold loads were determined with the air sampling device. According to the results obtained, a 99% reduction in bacterial and yeast / mold load in the area was determined. In the simultaneous particle measurement analysis, a decrease of 84% was observed after 120 minutes. While operating the Froumann N90 model air purifier, bacterial and yeast / mold loads were determined with the air sampler from the outlet point of the air passing through the filters and a 99% reduction was detected.

As a result, Froumann N90 model air cleaning device was determined to be effective in controlling and effectively reducing the microbial load in the environment. When the air purifier is operated at the 3rd and 5th levels, the decrease in the microbial load and the number of particles is determined to be close. In addition, with the Froumann N90 model air purification device, it was determined that both the microbial load of an environment in normal conditions and the microbial load in the environment when increased can effectively clean the microorganisms in the air. In studies conducted simultaneously with the particle measuring device, a correlation was found between the number of particle sizes of 0.3 μm diameter and the microbial load, and the results of both tests are complementary. Due to the COVID-19 epidemic, which includes the world and our country, the criteria such as increasing the air quality and cleaning the ambient air have increased especially in the public living areas. In our daily life, the use of medical masks has been made compulsory and these masks are expected to prevent 98% microbial passage according to the relevant standards. Controlling the microbial load of the ambient air is just as important as the masks. The analysis done with the Froumann N90 model air cleaning device showed that the microbial load in the ambient air was kept clean by the device at a value between 85-99%.

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Founder, Chairman



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