

## Final Laboratory Report: Staphylococcus

<b>Customer Name</b>	AIR, Alpine Innovative Research
<b>Customer Address</b>	3855 64th Ave SE, Calgary, Alberta T2C 2V5, Canada
<b>Test Requested</b>	<i>Staphylococcus epidermidis</i> Removal
<b>Number of Samples</b>	3
<b>Date of Receipt</b>	18 August 2016
<b>ASC Code</b>	ASC003339
<b>Report Number</b>	ASCR092187
<b>Report Date</b>	09 January 2017



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## 1. Purpose

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The purpose of this study is to determine the performance of the Air Sniper air cleaner in removing airborne *Staphylococcus epidermidis* from a 28.5 m<sup>3</sup> environmental testing chamber.

## 2. Background

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Following discussions between Alpine Innovative Research (AIR) and airmid healthgroup it was agreed that testing would be performed on the Air Sniper Pro air cleaner to study the effect of the air cleaner on *S. epidermidis*. Testing was performed in airmid healthgroup's environmental test chambers.

## 3. Abbreviations Used In this report

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A/C: air cleaner

CFU/m<sup>3</sup>: colony forming units per cubic meter (in this report, the level of airborne bacteria)

CFU: colony forming units

N/A: Not applicable

## 4. Test Item Description

Three Air Sniper Pro air cleaners were received in airmid healthgroup on August 18<sup>th</sup> 2016 for testing in the environmental testing chamber.



**Figure 4.1.** Air Sniper Pro air cleaner photographed at airmid healthgroup

## 5. Materials and Methods

### 5.1. Environmental Testing Chamber

The ATSM Environmental Testing Chamber maintains selected temperature and humidity levels over a range of 0.38 to 30.0 air changes per hour. It is constructed from stainless steel with all materials complying with low VOC (Volatile Organic Compounds) emission requirements.



**Figure 5.1.** Environmental Testing Chamber

### 5.2. *Staphylococcus epidermidis*

*Staphylococcus epidermidis* is a gram-positive bacterium, which is part of our natural flora. *S. epidermidis* is an opportunistic pathogen and is one of the leading causes of nosocomial infections.

## 6. Protocol

The environmental chamber was preconditioned to a temperature of 21 °C and a relative humidity of 50 %. The chamber was then shut down to allow for no air changes to occur during testing.

*S. epidermidis* was nebulised into the chamber and allowed to mix over a 20-minute period. Airborne samples were taken immediately after nebulisation to determine the initial concentration. For the test runs, the air cleaner was operated at the highest fan speed for a 65-minute period at T = 0, with airborne sampling occurring at T = 15 – 20, T = 30 – 35, T = 45 – 55, T = 60 – 65. For the control runs the same sampling time points were used except in the absence of the Air Sniper Pro. At the end of each run, the samples were incubated at 36.5 °C for 48 hours. The environmental chamber was vented with HEPA filtered air and sterilised with a UV-C lamp, and washed with a disinfectant before the next run.

After 48 hours, the samples were removed from the incubator and analysed to determine number of CFU/m<sup>3</sup>.

The test and control runs were performed in triplicate.

## 7. Results

Three air samples were taken during each of the sampling time points. The test and controls were performed in triplicate runs. Table 7.1 below is the average results of the triplicate samples taken at each time point and the triplicate test and control runs.

<b>Table 7.1</b> Quantification of <i>S. epidermidis</i> colony forming units from air samples taken in the presence (Test) and absence (Control) of the Air Sniper Pro				
#	Time (t=n)	Control CFU/m <sup>3</sup>	Test CFU/m <sup>3</sup>	Percentage Reduction (%)
	t= -21	Introduction/Mixing		
1	t= -1-0	19724	13797	N/A
	t= 0	No A/C	A/C on	
2	t= 15-20	14114	983	93.0
3	t= 30-35	7371	181	97.5
4	t= 45-50	4765	43	99.1
5	t= 60-65	3614	3	99.9

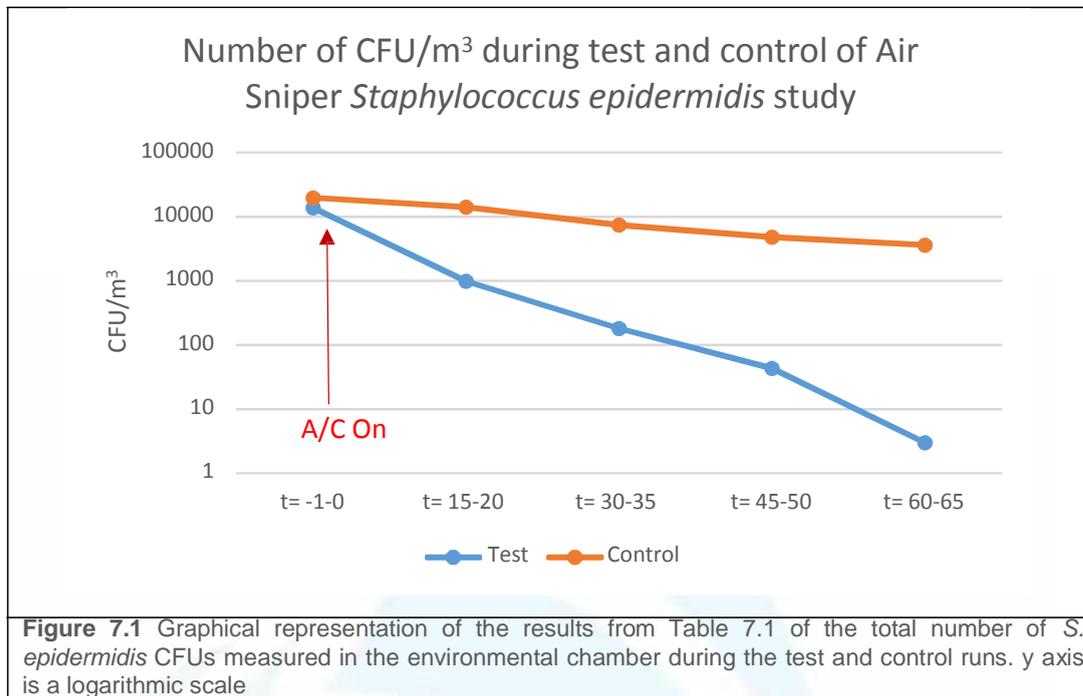


Table 7.1 and figure 7.1 represent the average number of *S. epidermidis* CFUs per cubic meter of air during the triplicate test and control runs. During the last sampling point (T = 60 – 65) of the control runs, the average concentration of *S. epidermidis* was 3614 cfu/m<sup>3</sup> compared to an average concentration of 3 cfu/m<sup>3</sup> in the test runs. This results in an average reduction of 99.9 % when the air cleaner is operating.

## 8. Discussion

The results presented in this report demonstrate that the Air Sniper Pro operating at the highest fan speed can remove 99.9 % of *Staphylococcus Epidermidis* from an environmental testing chamber within 60 – 65 minutes.



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**\*\*\*End of Report\*\*\***