The Esco Group of Companies

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Motor-Blower Performance Test for Labculture Class II Type A2 cabinets

Purpose of experiment:

To demonstrate that the motor/blower will operate at a static pressure sufficient to compensate an increase in pressure drop across the new filter. NSF 49:2002 requires that for a motor/blower performance test, when operating at the nominal set point velocities and without readjusting the fan speed control, a 50% increase in pressure drop across the new filter shall not decrease total air delivery more than 10%.

Experiment Method:

The apparatus used are as followed:

1. Shortridge Instruments Airdata meter without flow hood 2. With flow hood

- **Accuracy**: +/- 3 % of reading +/- 3 L/s
- **Model Number**: ADM-870C **Serial Number**: M03270 **Calibration date**: 9 Jun 04

3. TSI Incorporated Thermo-Anemometer

- **Accuracy**: +/- 3 % of reading or +/- 0.015m/s (whichever is greater)
- **Model Number**: 8385-M-GB **Serial Number**: 3080425 **Calibration date**: 26 Aug 03

Procedures:

The cabinet is set at the nominal set point at which the total airflow volume rate (m^3/s) is measured. The positive and negative pressure taps are then located, to which the airdata meter is connected and results are recorded.

The positive pressure reading is the initial static pressure reference point. The sum of the positive and negative readings without reference sign is the total cabinet static pressure.

The initial negative pressure reading is then increased by 50% or more of the initial positive pressure reading by restricting the cabinet's negative airflow. The total volume of airflow (m^3/s) delivered by the restricted cabinet is then measured.

Acceptance:

The total airflow volume rate (m^3/s) shall not decrease more than 10% of its original value.

Results:

The following table shows the result obtained during an incremental increase in pressure drop across the new filter of a **Labculture Class II Type A2** 4 feet cabinet performed at **115 Volts**. V_1 denotes the original (nominal) voltage settings from which all other points will be compared to. At that point, there is no increase in pressure drop. On the other hand, V_2, and V_3 denote the other points/conditions at which a 50 and 100% respectively increase in pressure drop are simulated. From there, the respective airflow is measured and compared with the original airflow to obtain the percentage decrease.

Note: “+ve” denotes “positive” “-ve” denotes "negative

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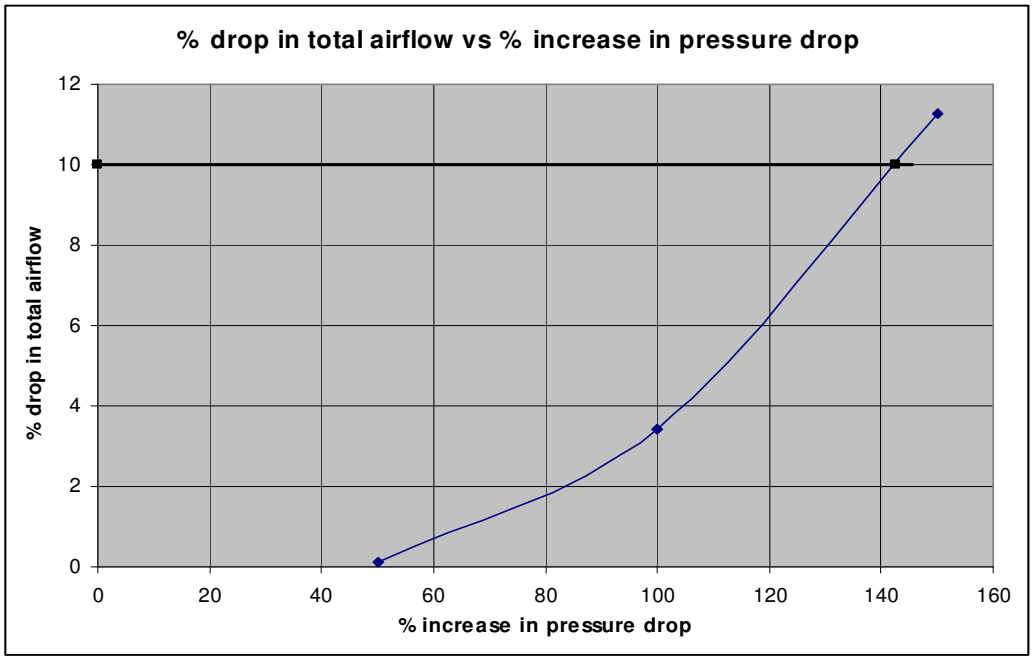
Voltage Settings:	V1	V2	V3
+ve Pressure Tap: P1 (Pa)	147.7		
-ve Pressure Tap: P2 (Pa)	71.1		
Increase in pressure drop: (%)	0	50	100
+ve Pressure Tap at that point: (Pa)		149.6	142.8
-ve Pressure Tap at that point: (Pa)		145.1	223.0
Achieved Total Pressure: (Pa)	218.9	294.7	365.8
Blower Voltage:	80.0 V	80.8 V	81.8 V
Corrected Inflow Values: (m3/h)	554.16	554.52	541.40
Corrected supply Air flow: (m3/h)	865.76	863.96	830.11
Total Air flow: (m3/h)	**1419.9**	**1418.5**	**1371.5**
Percentage Decrease: (%)	**0.1**		**3.4**

Conclusion:

The percentage decrease in total air delivery is 0.1 and 3.4% after a 50 and 100% increase respectively in pressure drop across the new filter. This is still way below the maximum 10% decrease allowed in total air delivery according to the Motor/Blower performance test from NSF49:2002 standard even with an incredible 100% increase in pressure drop across the new filter. This was automatically compensated by the blower with an increment of around 2 volts. On the other hand, it has also been shown through the extension of the performance test that our cabinet barely fails the motor blower performance test at a 150% increase in pressure drop, as at that point an 11.3% drop in total airflow was obtained.

Through an extrapolation of all the results obtained from the tests performed and assuming that the values correlate and do not deviate throughout the whole range of increase in pressure drop, a graph (see below) of Percentage drop in total airflow volume versus Percentage increase in pressure drop was obtained.



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From the graph, it can clearly be seen that at a maximum of 10% drop in total airflow, the corresponding percentage increase in pressure drop is more than 140%, therefore it is safe to assume that at 140% increase in pressure drop, our cabinet definitely will pass the test.

Even though there is a high competition present on the market nowadays, it can be clearly shown that Esco's cabinets pass all the tests with flying colors and come out as a clear winner ahead of all its competitors. To demonstrate this, Esco's top of line **Labculture Class II Type A2** cabinet is compared to its next best competitor; the **SterilGARD® III Advance** from Baker.

It is stated through Baker's website ([1]) that: "*SterilGARD® III Advance° is capable of automatically handling a 60% increase in pressure drop across the filter without reducing total air delivery more than 10%"*

On comparison, it can be seen from the table that the **Labculture** cabinet is able to withstand an amazing 100% increase in pressure drop across the filter and automatically compensate for filter loading. This is way above the 50% required from the NSF49:2002 standards and above the 60% advertised by Baker's cabinets. On top of that, the table shows that the cabinet will definitely be able to withstand much higher pressure drop than the 100% tested, and as extrapolated through the graph, an amazing 140%. This means that our cabinet can withstand more than double the amount of increase in pressure drop that our closest competitor can withstand through their simulated tests.

Therefore, Esco's **Labculture** cabinets have an optimum blower/motor performance and are able to automatically provide a constant laminar and safe airflow despite significant increase in airflow resistance due to filter loading. It can thus be shown through simulated filter loading, that the safety and performance aspects of the cabinet are not affected by filter loading, meaning that the filter even though loaded can, not only still be used but, also be used for a longer period of time. This also shows that the long-term expenditure due to replacement of filter and decontamination processes of the cabinet, is also reduced. This ultimately proves that **Labculture** cabinets exhibit the longest filter lifespan amongst all its competitors while also offering the safest working conditions.

Disclaimer: The results obtained at 115V are not atypical to results obtained at 230V and thus, may not be similar to each other.

[1] : *http://bakerco.com/products/sterilgard3/*