Introduction

This report is to show how dust, when caught in a dust filter will reduce the volume of air being pulled through it.

This report will demonstrate the method and the apparatus used to measure the air flow and the volume of dust caught by the filter.

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Test Objective

The objective of the dust filter test is to ascertain the effectiveness of a dust filter (AR4701) fitted to a NetShelter CX cabinet.
It is also to discover at what point the dust collected by the dust filter reduces the airflow enough to influence the thermal capacity of a NetShelter CX.

Test Apparatus

Description	Model No / Part No	QTY
Dust Filter Test Rig	See Appendix	1
Dust Filter	AR4701	1
Fan Tray	0M-10446	1
Air Flow Meter	Meterman TMA 10	1
Scales	CTS 30000	1

The Test

The dust filter test rig was placed at the bottom of a carpeted stairwell leading to a first floor office.

An air flow reading was taken from the test rig without a dust filter in place, a new filter was weighed and inserted into the test rig and an airflow reading was again taken.
The initial measurements were recorded in the Test Results Tables.

Every Tenth day of the test period, air flow reading was taken from the test rig and recorded in the Test Results Table.

At the end of the test period the filter was removed from the test rig and weighed.

The Results

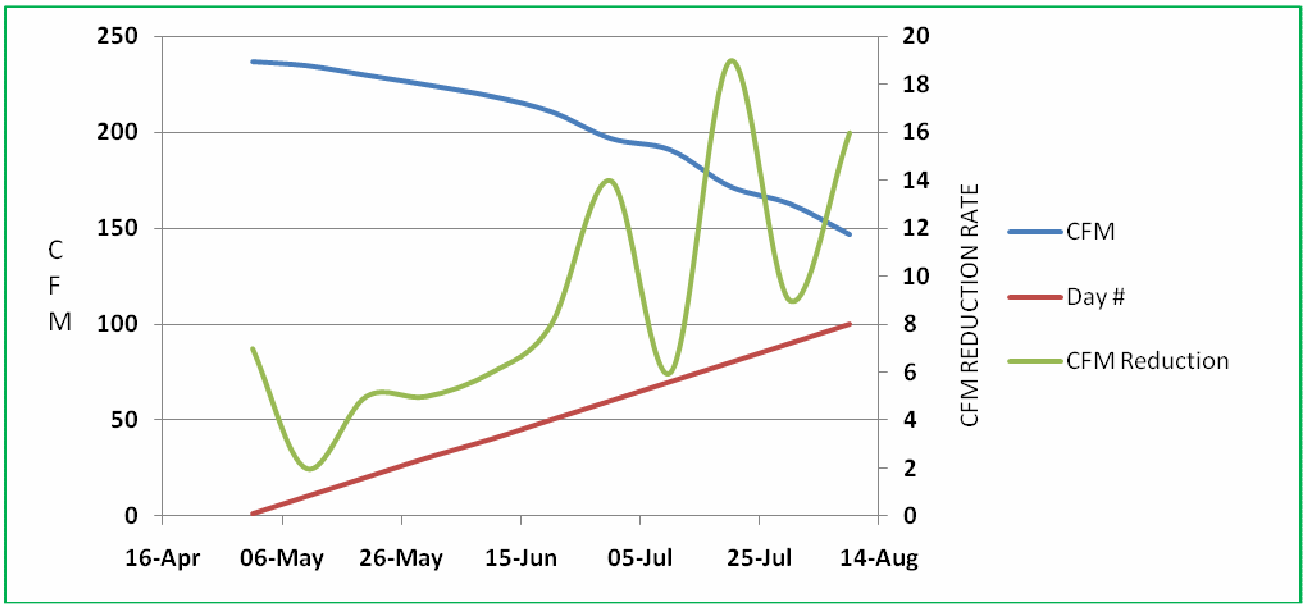
DATE	DAY #	CFM	CFM REDUCTION	TOTAL CFM REDUCTION	% REDUCTION
No Filter	1	245	0		
01/05/2013	1	237	7	7	3%
10/05/2013	10	235	2	9	4%
20/05/2013	20	230	5	14	6%
30/05/2013	30	225	5	19	8%
10/06/2013	40	219	6	25	10%
20/06/2013	50	211	8	33	13%
30/06/2013	60	197	14	47	19%
10/07/2013	70	191	6	53	22%
20/07/2013	80	172	19	72	29%
30/07/2013	90	163	9	81	33%
09/08/2013	100	147	16	97	40%

Test Results Table #1

Dust Filter Initial Weight	**5.6 g / 0.20oz**
Dust Filter Final Weight	**10.5 g / 0.38 oz**
Weight Increase	**4.9 g / 0.18 oz**
Increase %	**88 %**

Test Results Table #2

The graph below shows the decrease in CFM over the 100 day test period.



Test Results Chart

Summary

Summary Table

	CFM	%
Air flow Reduction	-97	-40%
Dust Filter Weight	+ 4.9 g / 0.18oz	+ 88%

The test results table show the air flow through the dust filter was reduced by 97 CFM (40%) over the 100 day test period.
It also show the dust filter caught 4.9grams of dust increasing its weight 88%

Conclusion

When a NetShelter CX is fitted with a set of dust filters, it is expected that the airflow will be reduced by 3%. This will have very little effect on the thermal capacity of the cabinet.

But if the amount of dust collected by a set of filters is greater than 0.8 grams on a AR4027IA /AR4018IA or 1.6 grams on a AR4038IA, then the thermal capacity will be reduced by at least 10 %.

To avoid this it is recommended dust filter cleaning is performed at regular intervals.

APPENDIX A

Apparatus Used

The Test Rig

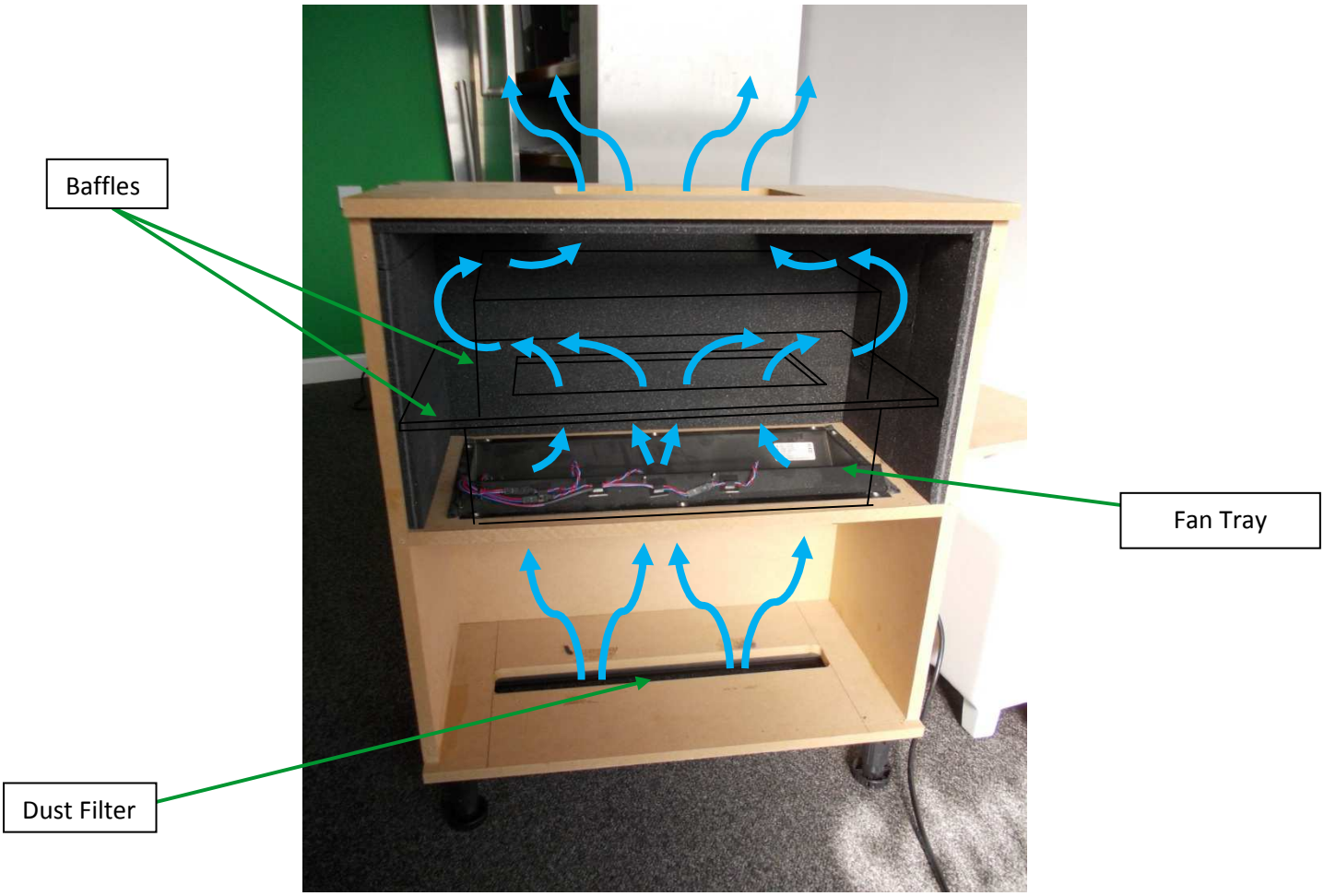


Photo #1

The test rig was constructed to mimic how the air is pulled through a dust filter and how dust will affect the airflow. Photo #1, shows the path the air took through the test rig.

APPENDIX A

Apparatus Used

Meterman TMA 10

Range: 125 to 4900 ft/min

Accuracy: +- 2% of full scale

Photo #2

Photo #2 shows the Meterman TMA 10 Anemometer. This was used to measure the air flow out off the test rig. It was placed on top of the test rig as shown in photo #8.

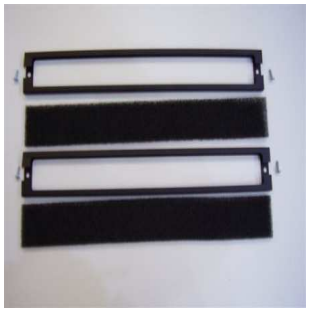
CTS 3000 Precision scales

Range: 0.5g to 30,000g

Accuracy: +- 0.5g

Photo #3

Photo #3 shows the CTS precision scales. These scales were used to weigh the dust filter before and after the test period.



Dust Filter AR4701.

Filtration Grade FT-T20ppi

Photo #4

Photo #4 shows a set of NetShelter CX dust filters. Only 1 dust filter was used on the test rig, but 2 filters are fitted to the NetShelter CX.

APPENDIX A

Apparatus Used

The Fan tray 0M-10446

Photo #5

Photo #5 shows the Fan tray which was fitted to the test rig. This fan tray is the standard Fan tray which is fitted to a NetShelter CX.

APPENDIX B

Test Setup

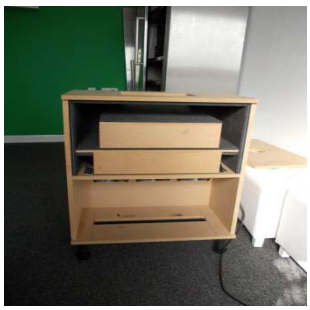


Photo #4

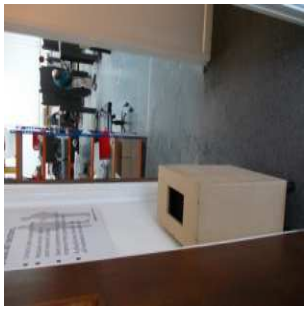
Photo #5

Photo's #4 shows the test rig fitted with sound baffles. This was to reduce the amount of noise emitted by the test rig so it would not interfere with the offices located at the top of the stair well.

Photo #5 shows the dust filter fitted to the air intake of the test rig. The height of the test rig was set to the same as the bottom of the NetShelter CX (110mm).

APPENDIX B

Test Setup



Photo#6 Photo #7 Photo #8

Photo's 6, 7 and 8 shows the location of the test rig. This location was chosen because the bottom of the stair well is the busiest for foot traffic in the NetShelter CX factory.

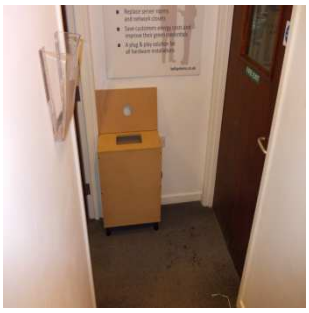



Photo #9 Photo #10

Photo #9 shows the board which was placed over the test rig exhaust so the anemometer could be fitted. Photo #10 shows the anemometer fitted to the test rig, this was repeated every morning for the 10 day test period and the anemometer readings recorded.

APPENDIX C

Test Results Photo’s

Photo #11

Photo #12

Photo’s 11 and 12 shows the dust filter before the test and after the test. You can see in photo 12 the dust collected on the dust filter after the 100 day test period.

Photo #13

Photo #14

Photo’s 13 and 14 show the weight readings of the dust filter after the test, from the CTS 3000 precision scales.

APPENDIX D

AVERAGE 10 DAY WEATHER READINGS										
	01/05–10/05	**10/05–20/05**	**20/05–30/05**	**30/05–10/06**	**10/06–20/06**	**20/06–30/06**	**30/06–10/07**	**10/07–20/07**	**20/07–30/07**	**30/07–09/08**
Max Temp	15°C	13°C	13°c	17°C	16°C	17°C	21°C	26°C	23°C	21°C
Mean Temp	10°C	9°C	10°C	13°C	13°C	14°	16°C	20°C	19°C	17°C
Min Temp	6°C	6°C	7°C	8°C	10°C	11°C	12°C	14°C	14°C	13°C
Heating Degree Days Avg	5	22	15	10	10	8	4	0	1	3
Cooling Degree Days Avg	0	0	0	0	0	0	0	4	1	1
Dew Point Avg	6°C	6°c	6°C	8°C	10°C	11°C	12°C	2°C	14°C	13°C
Wind	45km/h	19km/h	15km/h	18km/h	18km/h	18km/h	16km/h	13km/h	14km/h	29km/h
Gust Wind Avg	61km/h	51km/h	48km/h	46km/h	50km/h	50km/h	40km/h	42km/h	45km/h	40km/h
Sea Pressure Level Avg	1016 hPa	1007 hPa	1013 hPa	1022 hPa	1012 hPa	1020 hPa	1023 hPa	1025 hPa	1013 hPa	1014 hPa

Average Weather Readings Supplied by WunderGround.com