

LOG OF MEETING

SUBJECT: Carbon Monoxide (CO) Detectors
 MEETING DATE: September 28, 1998
 LOCATION: CPSC, Room 714, East-West Towers
 Bethesda, Maryland
 MEETING OF: Newtron Products Company and CPSC staff
 LOG ENTRY SOURCE: Elizabeth W. Leland, EC *EWL*
 LOG ENTRY DATE: September 29, 1998

CPSA 6 (b)(1) Cleared
 10/30/98
 No Mfrs/PrvtLbrs
 Products Identified
 Excepted by
 Firms Notified,
 Comments Processed.

ATTENDEES:

CPSC

Sandra Inkster, EH
 Ron Jordan, ES
 Mohammed Khan, ES
 Elizabeth Leland, EC
 Richard Stern, CA
 Sharon White, ES

Non-CPSC

Richard Ali, Richard Ali & Associates (representing Newtron Products Company)
 Irwin H. Billick, WEC Consulting
 Alex Cohen, Consumer
 Michael Duty, Newtron Products Company
 Ric Erdheim, National Electrical Manufacturers Association
 Sandy Ruiter, Underwriters Laboratories Inc.
 Ted Williams, American Gas Association

CPSC/OFFICE OF
 THE SECRETARY
 1998 SEP 29 P 2:43

SUMMARY OF MEETING:

(NOTE: The Public Calendar notice for this meeting indicated that a portion of the meeting would be closed in order to discuss information proprietary to Newtron Products Company. Representatives for Newtron indicated at the meeting that it would not be necessary to close the meeting, and the entire meeting was open.)

Newtron Products Company is a manufacturer of residential furnace air filters. Approval by Underwriters Laboratories Inc. is imminent for a new product -- a "whole house" CO detector, which consists of a CO detector imbedded in a furnace air filter. When potentially life-threatening levels of carbon monoxide enter the duct system of the furnace, the CO detector sounds an alarm. Newtron Products Company indicated that the filter/alarm meets the UL standard 2034 for carbon monoxide detectors.

The CO detector imbedded in the filter uses a 9-volt battery, has a 5-year warranty, and uses a biomimetic sensor. The filter with alarm will be distributed primarily through heating, ventilating, and air conditioning (HVAC) contractors.



The cost will be \$170. Replacement CO detectors will cost \$30.
Information distributed by Newtron Products Company at the meeting is attached.

Newtron Products Company
September 27, 1990

<u>NAME</u>	<u>COMPANY / ORGANIZATION</u>	<u>PHONE</u>
Sandy Ruster	UL - WASHINGTON	202-296-7840
Ron Jordan	CPSC - Engineering	(301) 504-0508, x-1295
Mohammed KHAN	CPSC - Engineering	504.0508, x1302
TED WILLIAMS	AMERICAN GAN ASSOC.	703/841-8649
Sharon White	CPSC / HUMAN FACTORS	(301) 504-2468, ext. 2286
Sandy Inkster	CPSC Health Sciences	301 504 0994 x 1198
Richard Stern	CPSC Office of Compliance	301-504-0608 x1366
Richard AZI	CONSULTANT	703-560-7070
Michael Dutey	Newtron Products Co.	513 561 7313
Alex Cohen	Consumer	202 829 9723
Irwin A. Billick	WEC Consulting	301-299-5302
Elizabeth Leland	CPSC	301-504-0962, x.1324
Ric Edheim	NEMA	703-841-3249



Innovators in Air Filtration



Contractor's Choice

Remind-Air

You can't see it, smell it or taste it ...

Local news
Carbon monoxide poisons family
 A family of five was hospitalized after a carbon monoxide leak from a heater was discovered in their home.

Heater leak poisons seven
 Carbon monoxide creeps through heater

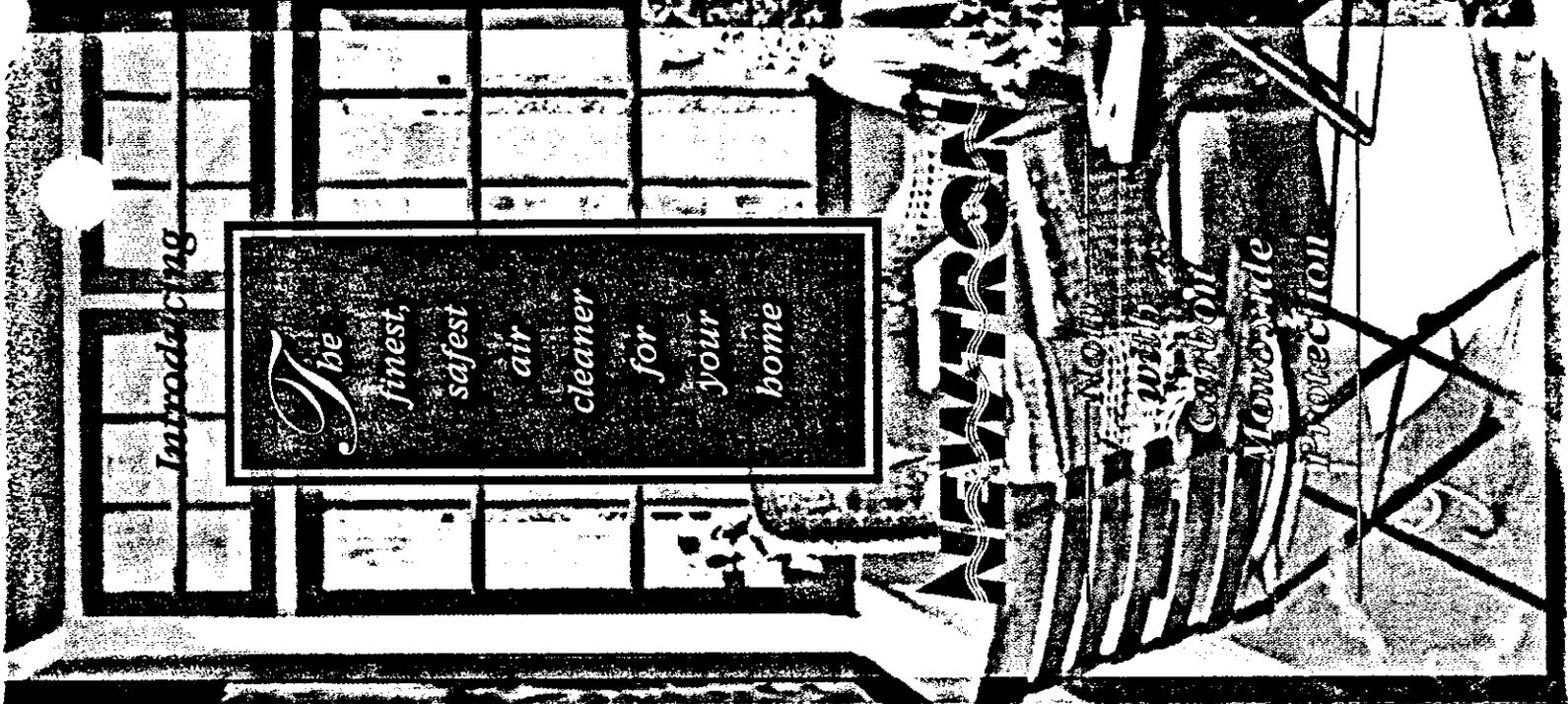
A KILLER
 Carbon monoxide is a silent killer that can be deadly.

Carbon Monoxide Injuries

Source	Injuries
Gas Stoves	15
Gas Heaters	10
Oil Boilers	5
Gas Furnaces	10
Automobiles	10
Charcoal Stoves	10
Wood-Burning Stoves	10
Gas Water Heaters	10
Gas Dryers	10

Source: U.S. Consumer Product Safety Commission / CPSC
 National Poison Data System (NPDS) 1998

... and the early warning signs could seem like ordinary flu-like symptoms ... but it can be deadly. Newtron is the only air cleaner that warns your family of dangerous levels of carbon monoxide.



NEWTRON
 Products Company

P.O. Box 27175
 Cincinnati, Ohio 45227
 1-800-543-9149
 Email: newtrons@aol.com
 Web: www.newtronproducts.com

It

or the discriminating homeowner who demands the very best in home air filtration, the Newtron Air Cleaner is the wise choice.

Since 1978 we have perfected our

filtration system to provide the ultimate in technology, leading the way for cleaner and safer air in your home.

The special ViBax™ Anti-bacterial agent is manufactured directly into the filter screens. It helps resist the growth of bacteria, mold and mildew on their surfaces.



"We want to tell you what a fantastic job your Newtron electrostatic air cleaners are doing for Baxter Healthcare..."

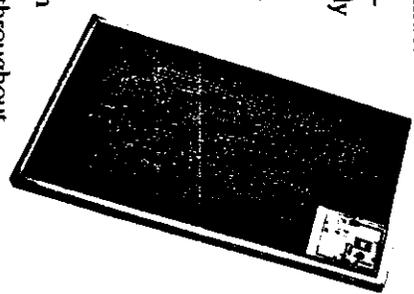
It's not every day that you come across a durable product that provides dramatic savings with minimal maintenance. You have a real winner in your Newtron air cleaner!"
David Jones, Facility Engineer

Easy Cleaning



Note these important features:

- **Superb air cleaning** – captures up to 96% of ASHRAE particles*
- **Carbon Monoxide Detection** – Only Newtron Products Company has the patented, exclusive carbon monoxide detector built directly into the air cleaner. It sends a warning when it detects dangerous levels of carbon monoxide.
- **Anti-bacterial agent** – is manufactured directly into the filter screens.
- **Cleaning reminder** – Exclusive built-in, electronic reminder signals necessary cleaning attention which helps provide:
 - ✓ Better air circulation
 - ✓ Even temperatures throughout your home
 - ✓ Faster heating and cooling
 - ✓ Lower utility energy costs
 - ✓ Decreased possibility of high pressure over loads or frozen air conditioning coils
 - ✓ Reduces the possibility of compressor or blower motor burn out
- **Lifetime warranty** – on air cleaning components



* Note: These ASHRAE tests were performed under laboratory conditions and the results may not be obtained by your heating and air conditioning equipment. The best use for these test results is for the purposes of comparison with the results achieved by other air -

The Air Filter
that protects
you and your family.



Only with
Contractor's Choice
by Newtron, do
you have the added
assurance that the moment a
harmful level of
carbon monoxide enters
your furnace system,
it will be detected and
sound the alarm immediately.

Rest Assured.

New...



Contractor's Choice

Air Filter



Now with
Carbon Monoxide Protection

NEWTRON
Products Company

P.O. Box 27175
Cincinnati, Ohio 45227
1-800-543-2142

Email: newtrons@apl.com

Web: www.newtronproducts.com

*"Because your family's
safety matters"*

Enjoy these important features:

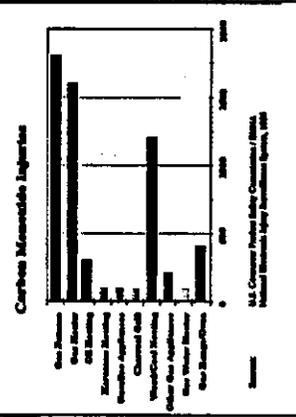
- Effective air cleaning – providing up to 84% dust arrestance*
- Carbon Monoxide Detection – Only Newtron Products Company has the patented, exclusive carbon monoxide detector built directly into the filter. It sends a warning at the first sign of carbon monoxide detection.
- Anti-bacterial agent – is manufactured directly into the filter screens. It helps resist the growth of bacteria, mold and mildew on their surfaces.
- The industry's lowest air-flow resistance – .08" w.g. resulting in:
 - ✓ Better air circulation
 - ✓ More even temperatures throughout your home
 - ✓ Faster heating and cooling
 - ✓ Lower operating costs
 - ✓ Decreased possibility of high pressure overloads or frozen air conditioning coils
 - ✓ Diminished possibility of compressor or blower motor burn out

*Note: These ASHRAE tests were performed under laboratory conditions and the results may not be obtained by your heating and air conditioning equipment. The best use for these test results is for the purposes of comparison with the results achieved by other air filters.

We have been responsible for some of the cleanest air in circulation...



and now for some of the safest.



You can't smell it, see it, or taste it, and the early warning signs could seem like ordinary flu-like symptoms, but it can be deadly.

With the Contractor's Choice air filter you get the cleaner, safer air your family needs.



Easy Cleaning
The exclusive built-in cleaning signal will keep your filter performing like new.

Lifetime Warranty
On air cleaning components. It's the last air filter you will ever buy!



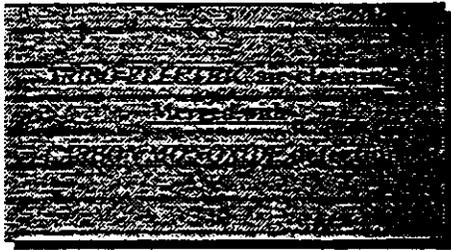
The Newtron Products Company
Commitment To Excellence
To lead the industry with the newest technology and highest quality of air filtration for your home.

There's Something New
on the Horizon...

in ELECTROSTATIC
Air filtration



Air cleaners that detect "CO"
Everything Else Is History!



Tri-bo-e-lectric-i-ty

tri-bo-e-lectric-i-ty

-An electrical charge produced by friction between two objects.

tri-bo-e-lectric adjective

-Greek tribos, a rubbing, from tribain, to rub + electricity.]

The American Heritage® Dictionary

*The Next Dimension In
Air Cleaning*

- Not found in... *Retail outlets!*
- WHOLE-HOUSE "CO detection"
- WHOLE-HOUSE "air cleaning"
- The "cutting edge" in CO monitoring
- The *ultimate* in tribo-electric filtration
- Electronic cleaning reminder
- A *dream* product for HVAC contractors

Carbon Monoxide
"The Silent Killer"

- HVAC contractors can help save lives
- "CO" deaths are one of the most preventable
- Carbon monoxide poisoning is the leading cause of death by poisoning in the U.S.A.
- The U.S. Consumer Product Safety Commission recommends that every home have at least one CO detector
- Newtron's central "Pre Active" monitoring increases detection probability!

Bio-mimetic

mi-met-ic (mī-mēt'ik, mī-) adjective

1. Relating to, characteristic of, or exhibiting mimicry.
2. a. Relating to an imitation.
b. Using imitative means of representation.

The American Heritage® Dictionary

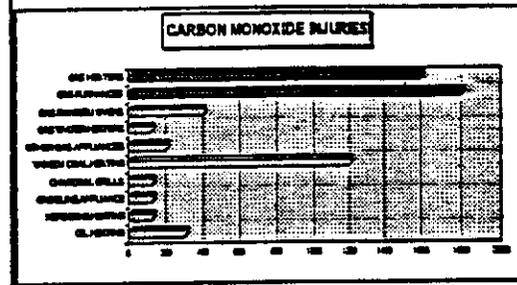
BIO-MIMETIC SENSORY TECHNOLOGY

- The only CO sensor that reacts to CO similar to the way hemoglobin in the human blood reacts. (a mimetic action)
- The Bio-Mimetic sensor is designed with a specific threshold or "sensing window". If the CO concentration is below that level it will not alarm.
- Possibilities of false alarms are minimal.

Infant Market

- \$ The CO market penetration is only 10% of homes in the United States
- \$ Smoke detector are 85%
- \$ Current CO sales are 6 to 8 million units per year
- \$ Projected annual sales to reach 15 million- plus units

Carbon Monoxide Injuries



The Evolution of "CO" Protection

- The Yellow Canary... area detector
- The pad that changed colors... area detector
- The plug in wall... area detector
- The digital plug in wall... area detector
- The battery operated... area detector
- NEWTRON'S... Whole House detector
 - "This changes everything!"

HVAC'S Role

- Carbon Monoxide is a deadly poison.
- HVAC Contractors can be proactive by using CO checks as good will marketing.
- HVAC Contractors have more contact with CO producing equipment than anyone else.
- HVAC personnel are in the best position to discover and correct CO problems.
- HVAC personnel can help save lives.

One School of Thought

- Place the CO detector in the hallway outside the bedrooms.
- **Problem:** Family members and pets not in the bedroom area are exposed to lethal amounts of the spreading CO. This sleeping quarters strategy does not provide adequate detection for the rest of the home during the day or night.

The second "School of thought"

- Placing monitors in proximity to combustion appliances, since that is where the CO will likely originate.
- **Problem:** The potential sources are located in totally different areas of the home. Garage auto exhaust, family room & living room fireplaces, kitchen gas range & oven, basement or attic furnace, utility room water heater etc...

"Pro Active" Monitoring School of thought

- Monitor for CO where the family sleeps.
- Monitor all CO producing appliances.
- Monitor return air ducts for dangerous CO levels.
- Monitor the whole house for CO.
- Monitor every fifteen minutes.
- Monitor at the heart of the ventilation system.
- Actively and "Pro Actively" monitor the area of the worst offender... the furnace.

Is "CO" lighter than air?

- Yes, by 3%. And due to that fact, carbon monoxide mixes readily with the air being re-circulated in your home by the heating and air conditioning system. Even slight increases in the air temperature will equalize their specific gravity's.

Area Detector ...*Problem!*

- When the furnace fan is operating, carbon monoxide from most sources will be picked up by the return air duct system and delivered to all rooms, via the supply air ducts. If doors are closed, especially bedroom doors, CO detectors located in the hallways (as recommended by the manufacturers), may be impaired in timely detecting the presents of CO.

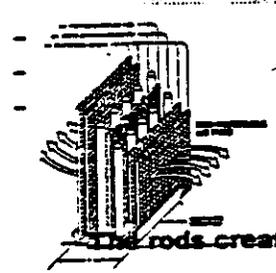
The pros of "Pro Active" Whole House "CO" Monitoring

- Provides a greater degree of safety day and night. With the fan in the "on position" the total volume of air in an average home will be electrostatically cleaned and analyzed for dangerous levels of carbon monoxide every fifteen minutes.
- It can monitor at a rate up to 600 FPM.

Compare Newtron's Air Cleaning Performance ...96.3%

- Removes up to **96.3%** of ASHRAE dust composed of particulate from **0 to 80 microns**
- A **91.7%** peak air cleaning performance was achieved by capturing a composition of particles ranging in size from **0 to 5 microns**
- A **95%** peak air cleaning performance was achieved by capturing a composition of ASHRAE dust and actual **ragweed pollen**.

Design Patent ...# 4115082



Patented Rod Assembly

The rods create an intensified magnetic field

Electronic Cleaning Reminder promotes maximum air flow

- Reminds the homeowner **every 45 days**
- Clean Filters Promote:**
 - Better air circulation
 - Even temperatures throughout the home
 - Faster heating and cooling
 - Lower operating cost
 - Decreased possibilities of frozen a/c coils
 - Diminished possibilities of compressor failure

ViBax™ Anti Bacterial

- Helps control bacteria on the filter screens
- Inhibits the growth of odor causing germs
- Resist the growth of mold and mildew
- Uniformly distributed within the structure of the polypropylene strands
- Does not wash off
- Viable for ten years or more

Contractor's Choice air filter



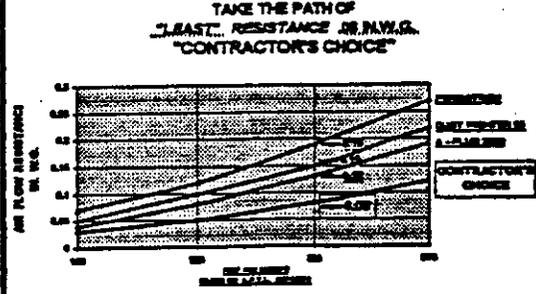
08 in. x 19 in.

•Big Sales Point!

Contractor's Choice air filter

The path of least resistance

TAKE THE PATH OF LEAST RESISTANCE OR PAY FOR "CONTRACTOR'S CHOICE"



Air Velocity (ft./min.)	Standard	Easy-to-Install	Contractor's Choice
100	0.15	0.10	0.08
200	0.30	0.20	0.15
300	0.45	0.30	0.22
400	0.60	0.40	0.30
500	0.75	0.50	0.38

Contractor's Choice

air cleaning performance

- Excellent air filtration combined with the industry's lowest air flow resistance.
- Initial resistance Peak arresstance
- **08 in.w.g.** **84%**
- Compare our combined airflow resistance and arresstance test results with the results achieved by any other air filters.

Humidity Proof

...relative humidity has no effect

EFFECT OF HUMIDITY ON NEWTRONS PERFORMANCE

Y-axis: PEAK ARRESSTANCE
X-axis: RELATIVE HUMIDITY (%)

The Disciplines...

- CO detector built under ISO 9000 QC
- Air cleaner built under ISO 9000 certified facility
- UL Listed 2034 includes latest revised requirements
- UL Listed 2035 includes special induct requirements
- Tested under ASHRAE Protocol
- Protected under Patent #5451542
- Made in USA

"New Prices".... NEWTRONS

- NEWTRON "CO"
- Less than 400 SQ. IN. (standard)...\$ 100.00
- 400 SQ. IN. or more (standard).....\$ 105.00
- NEWTRON CLASSICS
- Less than 400 SQ. IN. (standards)...\$ 70.00
- 400 SQ. IN. or more (standard).....\$ 75.00
- Custom charge on NEWTRONS...\$ 15.00

"New Prices".... Contractor's Choice

- Contractor's Choice "CO"
- Less than 400 SQ. IN. (standard)....\$ 70.00
- 400 SQ. IN. or more (standard).....\$ 75.00
- Contractor's Choice
- Less than 400 SQ. IN. (standard)....\$ 27.50
- \$400 SQ. IN. or more (standard)....\$ 29.50
- Custom Charge.....\$ 10.00

* Indicates "standard sizes" that were moved to a different sq. in. price category

• Less than 400 sq. in.	• 400 sq. in. or more
• 1212	• 1430*
• 1224	• 1625* 1628*
• 1228	• 1824*
• 1414	• 2020* 2025 2028 2030
• 1420	• 2424
• 1424	• 2328
• 1425	• 2630
• 1620	• 2830

Policy Changes

- **"NEW" Freight Policies**
- Free freight on orders of \$1500.00 or more.
- Freight will be charged on all other orders.
- Freight will be charged on custom units
- All freight charges are F.O.B. Memphis, TN.

Suggested retail price

- Contractor's Choice "CO" ...\$ 185.00
- Newtron "CO".....\$ 260.00

**Join *Pro Active* "CO"
monitoring... or be left behind**

**\$ Once again, there is money
in air cleaners!**



Compare Newtron's Air Cleaning Performance...96.3%

- Removes up to **96.3%** of ASHRAE dust composed of particulate from 0 to 80 microns
- A **91.7%** peak air cleaning performance was achieved by capturing a composition of particles ranging in size from 0 to 5 microns
- A **95%** peak air cleaning performance was achieved by capturing a composition of ASHRAE dust and actual ragweed pollen

1. It is the only electrostatic air cleaner that contains an aerodynamically designed pro-active CO detector providing for the first time: whole house protection, a 45-day cleaning alert, and low battery chirp.

	Particle Size Range	0.5 in w.g. Peak		1.0 in w.g. Peak*
AFTL Report #6625	0-80 microns	91.9 %	up to	96.3%
AFTL Report #6862	0-5 microns	90%	up to	91.9%
AFTL Report #6972	Pollen-Ragweed	93%	up to	95%

3. It is the only electrostatic air cleaner that offers ASHRAE Reports demonstrating its ability to trap particles predominately ranging in size from 0-5 microns.

4. It is the only electrostatic air cleaner that provides an ASHRAE Report (AFTL #6714) demonstrating it washes clean and does not clog up. This same test also demonstrates that both the air resistance and efficiencies remain relatively constant.

5. It is the only electrostatic air cleaner to demonstrate its ability to remove actual ragweed pollen.

6. Lifetime Warranty:

Quality construction, materials, and performance are enjoyed and appreciated year after year

*These tests were performed under laboratory conditions and the results may not be obtained by your heating and air conditioning equipment. The best use for these test results is for the purposes of comparison with the results achieved by other air filters.

AFTL is the Air Filter Testing Laboratories, Inc., located in Crestwood, Kentucky

3874 Virginia Avenue
 P.O. Box 27175
 Cincinnati, Ohio 45227

T 513 561 7373
 F 513 561 3673
 1 800 543 9149

STANDARD ASHRAE TEST USING 0 - 80 MICRONS DUST



AIR FILTER TESTING LABORATORIES, INC.

4632 Old LaGrange Road • Crestwood, Kentucky 40014

ASHRAE AIR FILTER TEST STANDARD 52-76
STATICALLY TESTED DEVICES

DEVICE TESTED

TEST REQUESTED BY NEUTRON PRODUCTS COMPANY
 MANUFACTURER NEUTRON PRODUCTS COMPANY
 PRODUCT NAME ELECTROSTATIC PANEL
 HOW LABORATORY PROCURED TEST SAMPLE FURNISHED BY MANUFACTURER
 MODEL NO. 1-2424 DIMENSIONS 24 IN. H 24 IN. W 1 IN. D

REPORT NO. 6625
 TEST NO. 1A
 SHEET NO. 1

RATED PERFORMANCE DATA FROM MANUFACTURERS CATALOG NO.	DATED
AIR FLOW CAPACITY	→
INITIAL RESISTANCE	→
FINAL RESISTANCE	
INITIAL ATMOSPHERIC DUST SPOT EFFICIENCY	
AVERAGE ATMOSPHERIC DUST SPOT EFFICIENCY	
AVERAGE SYNTHETIC DUST WEIGHT ARRESTANCE	
ASHRAE DUST HOLDING CAPACITY	

TEST RESULTS

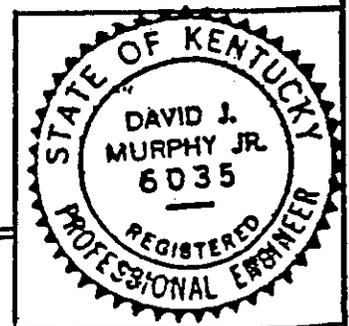
TEST AIR FLOW RATE	<u>1200 CFM</u>	<u>300</u>	→	<u>FPM</u>
INITIAL RESISTANCE	<u>0.15</u>		→	<u>IN.W.G.</u>
FINAL RESISTANCE				<u>0.50</u> <u>IN.W.G.</u>
INITIAL ATMOSPHERIC DUST SPOT EFFICIENCY				<u>12.2</u> <u>%</u>
AVERAGE ATMOSPHERIC DUST SPOT EFFICIENCY				<u>13</u> <u>%</u>
AVERAGE SYNTHETIC DUST WEIGHT ARRESTANCE	<u>PEAK</u>	<u>91.9</u>		<u>89</u> <u>%</u>
ASHRAE DUST HOLDING CAPACITY				<u>80</u> <u>Gm.</u>

TEST SECTION DUCT SIZE 24 IN. X 24 IN. DUST FEEDING RATE 2.0 Gm / 1000 CF
 SEE BACK SIDE (PAGE 1A) FOR PERFORMANCE CURVES

PHYSICAL DESCRIPTION

FACE DIMENSIONS 24 IN. X 24 IN. Nom
 DEPTH 1 IN. Nom.
 MEDIA AREA 3.36 Ft.²
 TYPE MEDIA WOVEN SYNTHETIC & FORM
 TYPE & AMOUNT ADHESIVE NONE

DATE 2-14-1992 TEST SUPERVISOR J.P.S. ENGINEERING APPROVAL David J. Murphy





AIR FILTER TESTING LABORATORIES, INC.

4632 Old LaGrange Road • Crestwood, Kentucky 40014

ASHRAE AIR FILTER TEST STANDARD 52-76
STATICALLY TESTED DEVICES

DEVICE TESTED

TEST REQUESTED BY NEUTRON PRODUCTS COMPANY
MANUFACTURER NEUTRON PRODUCTS COMPANY
PRODUCT NAME ELECTROSTATIC PANEL

REPORT NO. 6625
TEST NO. 1
SHEET NO. 1

HOW LABORATORY PROCURED TEST SAMPLE FURNISHED BY MANUFACTURER
MODEL NO. 1-2424 DIMENSIONS 24 IN. H 24 IN. W 1 IN. D

RATED PERFORMANCE DATA FROM MANUFACTURERS CATALOG NO.		DATED	
AIR FLOW CAPACITY			→
INITIAL RESISTANCE			→
FINAL RESISTANCE			
INITIAL ATMOSPHERIC DUST SPOT EFFICIENCY			
AVERAGE ATMOSPHERIC DUST SPOT EFFICIENCY			
AVERAGE SYNTHETIC DUST WEIGHT ARRESTANCE			
ASHRAE DUST HOLDING CAPACITY			

TEST RESULTS

TEST AIR FLOW RATE	<u>1200 CFM</u>	<u>300</u>		→	<u>FPM</u>
INITIAL RESISTANCE		<u>0.15</u>		→	<u>IN.W.G.</u>
FINAL RESISTANCE					<u>1.00 IN.W.G.</u>
INITIAL ATMOSPHERIC DUST SPOT EFFICIENCY					<u>12.2 %</u>
AVERAGE ATMOSPHERIC DUST SPOT EFFICIENCY					<u>12 %</u>
AVERAGE SYNTHETIC DUST WEIGHT ARRESTANCE	PEAK	<u>96.3</u>			<u>91 %</u>
ASHRAE DUST HOLDING CAPACITY					<u>140 Gm.</u>

TEST SECTION DUCT SIZE 24 IN. x 24 IN. DUST FEEDING RATE 2.0 Gm/1000 CF
SEE BACK SIDE (PAGE 1A) FOR PERFORMANCE CURVES

PHYSICAL DESCRIPTION

FACE DIMENSIONS 24 IN. x 24 IN. Nom

DEPTH 1 IN. Nom.

MEDIA AREA 3.36 Ft.²

TYPE MEDIA WOVEN SYNTHETIC & FORM

TYPE & AMOUNT ADHESIVE NONE



DATE

2-14-1992

TEST SUPERVISOR

J.P.S.

ENGINEERING APPROVAL

David J. Murphy Jr.

STANDARD ASHRAE TEST USING 0 - 80 MICRONS TEST



AIR FILTER TESTING LABORATORIES, INC.

4632 Old LaGrange Road • Crestwood, Kentucky 40014

ASHRAE STANDARD 52-76 AIR FILTER PERFORMANCE CURVES

STATICALLY TESTED DEVICES

REPORT NO. 6625

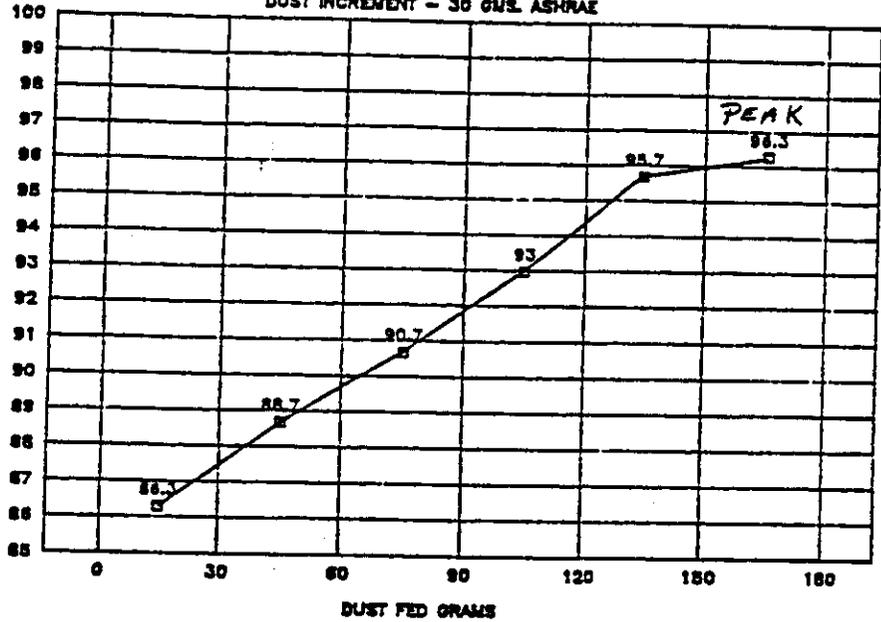
TEST NO. 1

SHEET NO. 3

DUST FED VS. ARRESTANCE

DUST INCREMENT - 30 GMS. ASHRAE

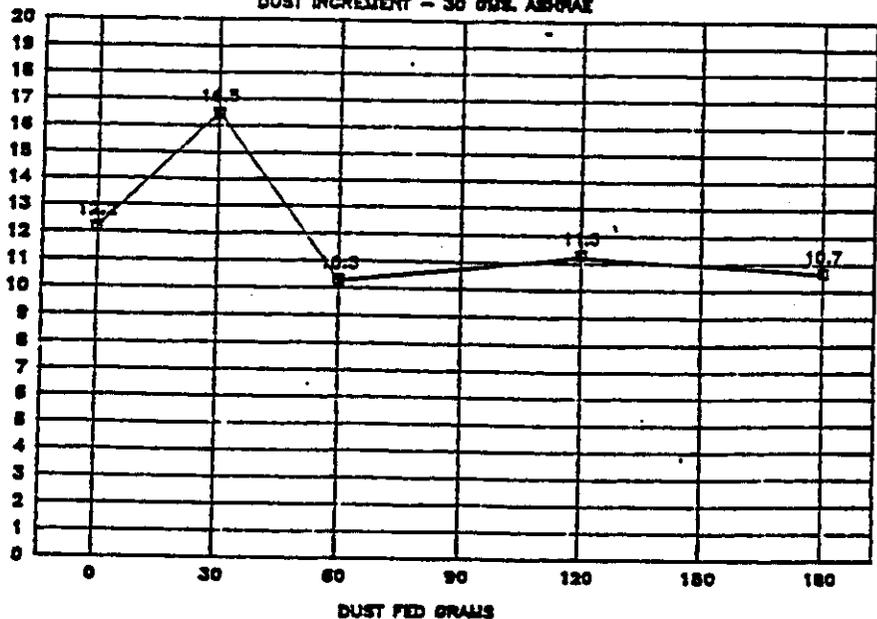
ASHRAE SYNTHETIC DUST WEIGHT ARRESTANCE - PERCENT



DUST FED VS. ATMOS. DUST SPOT EFF.

DUST INCREMENT - 30 GMS. ASHRAE

ATMOSPHERIC DUST SPOT EFFICIENCY - PERCENT



DATE

2-14-1992

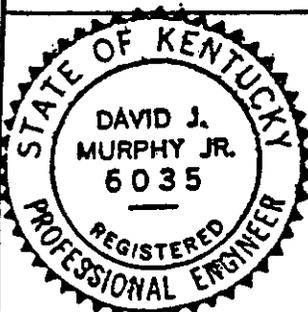
TEST SUPERVISOR

J.P.S.

ENGINEERING

APPROVAL

David J. Murphy Jr.





AIR FILTER TESTING LABORATORIES, INC.

4632 Old LaGrange Road • Crestwood, Kentucky 40014

ASHRAE AIR FILTER TEST STANDARD 52-76
PERMANENT CLEANABLE TYPE OF DEVICES

DEVICE TESTED

TEST REQUESTED BY NEWTRON PRODUCTS Co.
MANUFACTURER NEWTRON PRODUCTS Co.
PRODUCT NAME ELECTROSTATIC AIR CLEANER
HOW LABORATORY PROCURED TEST SAMPLE FURNISHED BY MANUFACTURER
MODEL NO. NEWTRON/CO DIMENSIONS 24 IN. H 24 IN. W 1 IN. D

REPORT NO. 6714
TEST NO. (1-7)A
SHEET NO. 1

TEST RESULTS

* DEVICE IS CLEANED IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS PRIOR TO EACH SUCCEEDING TEST.

TEST NUMBER	1	2	3	4	5	6	7	
TEST AIR FLOW RATE	1200	1200	1200	1200	1200	1200	1200	CFM
INITIAL RESISTANCE	0.16	0.16	0.16	0.16	0.17	0.16	0.17	IN.W.G.
FINAL RESISTANCE	0.50	0.50	0.50	0.50	0.50	0.50	0.50	IN.W.G.
INITIAL ATMOSPHERIC DUST SPOT EFFICIENCY	<20	<20	<20	<20	<20	<20	<20	%
AVERAGE ATMOSPHERIC DUST SPOT EFFICIENCY	<20	<20	<20	<20	<20	<20	<20	%
AVERAGE SYNTHETIC DUST WEIGHT ARRESTANCE	87	85	88	85	88	88	88	%
AVERAGE DUST HOLDING CAPACITY	85	90	95	85	70	85	80	Gm.

TEST SECTION DUCT SIZE 24 IN. X 24 IN. DUST FEEDING RATE 2.0 Gm/1000 CF
SEE BACK SIDE (PAGE 1A) FOR PERFORMANCE CURVES

PHYSICAL DESCRIPTION

FACE DIMENSIONS 24 IN. X 24 IN. Nom.
DEPTH 1 IN. Nom.
MEDIA AREA 3.36 Ft²
TYPE MEDIA WOVEN SYNTHETIC & FOAM
TYPE & AMOUNT ADHESIVE NONE

* SAME FILTER TESTED IN AFTL, INC. REPORT No. 6625

DATE

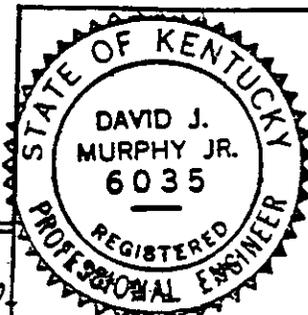
7-14-1992

TEST SUPERVISOR

J.P.S.

ENGINEERING APPROVAL

David J. Murphy



STANDARD ASHRAE TEST USING 0.5 MICRON TEST DUST



AIR FILTER TESTING LABORATORIES, INC.

4632 Old LaGrange Road • Crestwood, Kentucky 40014

ASHRAE STANDARD 52.1-1992
AIR FILTER PERFORMANCE CURVES

STATICALLY
TESTED
DEVICES

REPORT NO. 6972

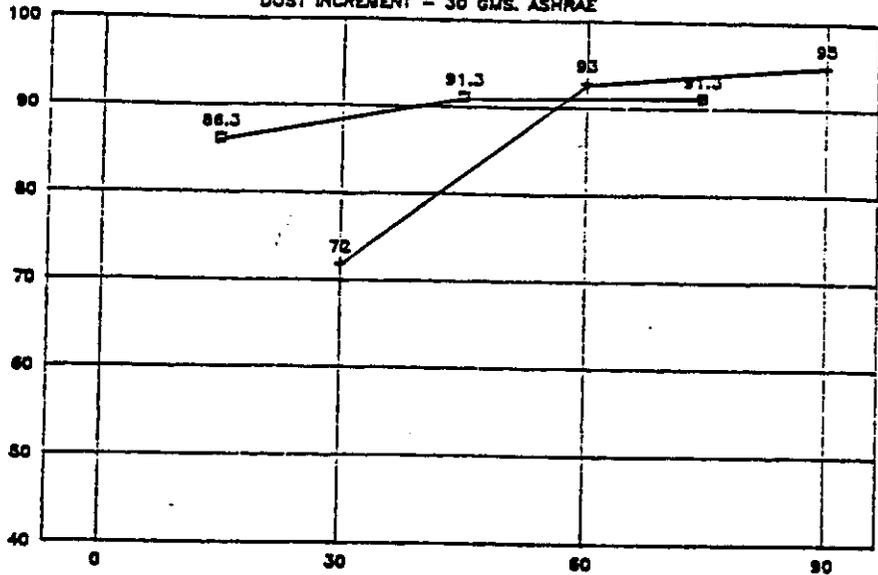
TEST NO. 1

SHEET NO. 3

DUST FED VS. ARRESTANCE

DUST INCREMENT - 30 GMS. ASHRAE

ASHRAE SYNTHETIC DUST WEIGHT ARRESTANCE - PERCENT



□ ASHRAE DUST ⚡ RAGWEED POLLEN

DATE

12-21-1992

TEST SUPERVISOR

J.P.S.

ENGINEERING

APPROVAL

David J. Murphy Jr.

NEW 1'S ABILITY TO REMOVE RAGWEED POLLEN.





AIR FILTER TESTING LABORATORIES, INC.

4632 Old LaGrange Road • Crestwood, Kentucky 40014

ASHRAE AIR FILTER TEST STANDARD 52.1-1992
STATICALLY TESTED DEVICES

DEVICE TESTED

TEST REQUESTED BY NEUTRON PRODUCTS CO.
MANUFACTURER NEUTRON PRODUCTS CO.
PRODUCT NAME ELECTROSTATIC AIR CLEANER w/MICROBAN[®]
HOW LABORATORY PROCURED TEST SAMPLE FURNISHED BY MANUFACTURER
MODEL NO. 1-2424 DIMENSIONS 24 IN. H 24 IN. W 1 IN. D

REPORT NO. 6972
TEST NO. 1
SHEET NO. 1

RATED PERFORMANCE DATA FROM MANUFACTURERS CATALOG NO.	DATED	
AIR FLOW CAPACITY		→
INITIAL RESISTANCE		→
FINAL RESISTANCE		
INITIAL ATMOSPHERIC DUST SPOT EFFICIENCY		
AVERAGE ATMOSPHERIC DUST SPOT EFFICIENCY		
AVERAGE SYNTHETIC DUST WEIGHT ARRESTANCE		
ASHRAE DUST HOLDING CAPACITY		

TEST RESULTS

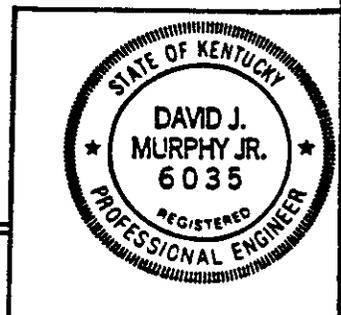
TEST AIR FLOW RATE	<u>1200 CFM</u>	<u>300</u>	→	<u>FPM</u>
INITIAL RESISTANCE		<u>0.15</u>	→	<u>IN. W.G.</u>
FINAL RESISTANCE				<u>0.50 IN. W.G.</u>
INITIAL ATMOSPHERIC DUST SPOT EFFICIENCY				<u>220 %</u>
AVERAGE ATMOSPHERIC DUST SPOT EFFICIENCY				<u>220 %</u>
AVERAGE SYNTHETIC DUST WEIGHT ARRESTANCE				<u>90 %</u>
ASHRAE DUST HOLDING CAPACITY				<u>80 GM.</u>

TEST SECTION DUCT SIZE 24 IN. x 24 IN. DUST FEEDING RATE 2.0 GM/1000 CF
SEE BACK SIDE (PAGE 1A) FOR PERFORMANCE CURVES

PHYSICAL DESCRIPTION

FACE DIMENSIONS 24 IN. x 24 IN. Nom.
DEPTH 1 IN. Nom.
MEDIA AREA 3.36 Ft²
TYPE MEDIA WOVEN SYNTHETIC w/MICROBAN[®] & FOAM
TYPE & AMOUNT ADHESIVE NONE

POLLEN TEST
RAGW



DATE 12-21-1992 TEST SUPERVISOR J.B.S. ENGINEERING APPROVAL David J. Murphy Jr.



AIR FILTER TESTING LABORATORIES, INC.

4632 Old LaGrange Road • Crestwood, Kentucky 40014

ASHRAE AIR FILTER TEST STANDARD 52.1-1992
STATICALLY TESTED DEVICES

TEST REQUESTED BY NEUTRON PRODUCTS Co.
MANUFACTURER NEUTRON PRODUCTS Co.
PRODUCT NAME ELECTROSTATIC AIR CLEANER
HOW LABORATORY PROCURED TEST SAMPLE FURNISHED BY MANUFACTURER
MODEL NO. NEUTRON/CO DIMENSIONS 24 IN. H 24 IN. W 1 IN. D

REPORT NO. 6862
TEST NO. 1A
SHEET NO. 1

DEVICE TESTED

RATED PERFORMANCE DATA FROM MANUFACTURERS CATALOG NO.		DATED	
AIR FLOW CAPACITY			→
INITIAL RESISTANCE			→
FINAL RESISTANCE			
INITIAL ATMOSPHERIC DUST SPOT EFFICIENCY			
AVERAGE ATMOSPHERIC DUST SPOT EFFICIENCY			
AVERAGE SYNTHETIC DUST WEIGHT ARRESTANCE			
ASHRAE DUST HOLDING CAPACITY			

TEST RESULTS

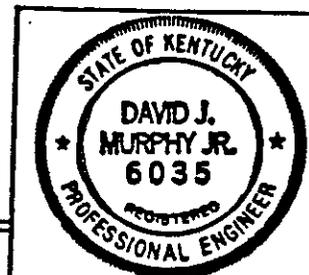
TEST AIR FLOW RATE	<u>1200 CFM</u>	<u>300</u>	→	<u>FPM</u>
INITIAL RESISTANCE		<u>0.17</u>	→	<u>IN. W.G.</u>
FINAL RESISTANCE				<u>0.50 IN. W.G.</u>
INITIAL ATMOSPHERIC DUST SPOT EFFICIENCY				<u><20 %</u>
AVERAGE ATMOSPHERIC DUST SPOT EFFICIENCY				<u><20 %</u>
AVERAGE SYNTHETIC DUST WEIGHT ARRESTANCE				<u>88 %</u>
ASHRAE DUST HOLDING CAPACITY				<u>80 GM</u>

TEST SECTION DUCT SIZE 24 IN. X 24 IN. DUST FEEDING RATE 2.0 GM/1000 CF
SEE BACK SIDE (PAGE 1A) FOR PERFORMANCE CURVES

PHYSICAL DESCRIPTION

FACE DIMENSIONS 24 IN. X 24 IN. NOM.
DEPTH 1 IN. NOM
MEDIA AREA 3.36 FT²
TYPE MEDIA WOVEN SYNTHETIC & FOAM
TYPE & AMOUNT ADHESIVE NONE

* SPECIAL TEST DUST -
BY WEIGHT
72% SILICA FRACTION 0-5UM
23% POWDERED CARBON
5% COTTON LINTERS



DATE 10-14-1992 TEST SUPERVISOR J.P.S. ENGINEERING APPROVED David Murphy

NEWTON'S ABILITY TO REMOVE SMALL PARTICULATE 0.1 to 5 MICRONS



MICROBAN EFFECTIVENESS TEST

Air Filter Testing Laboratories, Inc.

4632 Old LaGrange Road • Crestwood, Kentucky 40014 • Phone (502) 222-5720

I) DEVICE TESTED:

TEST REQUESTED BY: NEWTRON PRODUCTS
MANUFACTURER: NEWTRON PRODUCTS
PRODUCT NAME: NEWTRON 24"x24"x1" W/MICROBAN (FRONT AND REAR SCREENS)

REPORT # NEW107

II) TEST CONDITIONS:

TEMPERATURE- 25°C
RELATIVE HUMIDITY- 73%
AIR FLOW RATE- 1,200 CFM
BACTERIA- *ESCHERICHIA COLI*
(1.1-1.5 micron X 2.0-6.0 micron RODS)
DUST LOADED- 180g/RESISTANCE = 0.51" W.G.

III) TEST RESULTS:

PLATE #	CFU UPSTREAM	CFU DOWNSTREAM	% EFFICIENCY
I	266	97	63.53
II	233	56	75.97
III	211	109	48.34
IV	239	88	63.18
V	201	82	59.20
VI	209	105	49.76
VII	217	84	61.29
VIII	246	105	57.32
IX	242	102	57.85

*MEDIAN VALUE

AVERAGE BACTERIAL REMOVAL
EFFICIENCY (%) = 59.60

SURFACE COUNT AFTER CHALLENGE:

(0 HRS.)- 9 CELLS (E. COLI)/25cm²
(12 HRS.)- 6 CELLS (E. COLI)/25cm²
(24 HRS.)- 6 CELLS (E. COLI)/25cm²

DATE: 08/16/1993

TEST SUPERVISOR: MICHAEL A. MURPHY

ENGINEERING APPROVAL:



Microban Products Company
Quality Control Laboratory

Report ID: 92-00-25 Page 1 of 2

Requestor: ROBERT WATTERSON

To Lab: 02-24-92 From Lab: 02-27-92

Photographs: YES

Contact:

Contact:

Microban Additive: B

End Use: PRODUCTION

Client: NEWTRON

Account Rep:

Manufacturer:

Fabricator:

Polymer:

Product: FILTER

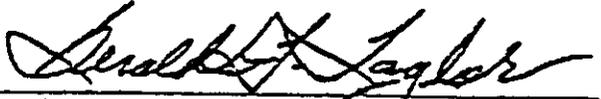
TEST METHOD: Antimicrobial Zone of Inhibition Test; Kirby-Bauer Method *
Manual of Clinical Microbiology, pp 981-984,
Lennett, Balows, Albert, et al, 1985.

Organisms:		STAPH. AUREUS		E. COLI	
Sample #	Microban(%)	Zone Radii (mm)	Contact Growth %	Zone Radii (mm)	Contact Growth %
1. 3762		6.5	0	2.5	0
2.					
3.					
4.					
Positive Control		7.2	0	3	0
Negative Control					

Comments: #3762 - PDH62658 AMBER 20:1 .5% MICROBAN

* Modified: Use 19 - 20 mm diameter or 25 mm square sample.
Use 0.5 McFarland Nephelometer for concentration of organisms,
150 000 000 organisms per millilitre.

*T Trace (< 0.5 mm)


Gerald F. Taylor, M.T. (ASCP), SM
Microbiologist

Report ID: 92-00-25 Page 2 of 2

Requestor: ROBERT WATTERSON

To Lab: 02-24-92 From Lab: 02-27-92

Photographs: YES

Contact:

Contact:

Microban Additive: B

End Use: PRODUCTION

Client: NEWTRON

Account Rep:

Manufacturer:

Fabricator:

Polymer:

Product: FILTER

TEST METHOD: Antimicrobial Zone of Inhibition Test; Kirby-Bauer Method *
Manual of Clinical Microbiology, pp 981-984,
Lennett, Balows, Albert, et al, 1985.

Organisms:		LEGIONELLA PNEUMO.			
Sample #	Microban(%)	Zone Radii (mm)	Contact Growth %	Zone Radii (mm)	Contact Growth %
1. 3762		4	0		
2.					
3.					
4.					
Positive Control					
Negative Control					

Comments: #3762 - PDH62658 AMBER 20:1 .5% MICROBAN

* Modified: Use 15 - 20 mm diameter or 25 mm square sample.
Use 0.5 McFarland Nephelometer for concentration of organisms,
150 000 000 organisms per millilitre.

*T Trace (< 0.5 mm)


Gerald F. Taylor, M.T. (ASCP), SM
Microbiologist



AIR FILTER TESTING LABORATORIES, INC.

4632 Old LaGrange Road • Crestwood, Kentucky 40014

ASHRAE AIR FILTER TEST STANDARD 52-76
STATICALLY TESTED DEVICES

DEVICE TESTED

TEST REQUESTED BY NEUTRON PRODUCTS
MANUFACTURER NEUTRON PRODUCTS
PRODUCT NAME CONTRACTOR'S CHOICE
HOW LABORATORY PROCURED TEST SAMPLE FURNISHED BY MANUFACTURE
MODEL NO. CONT CHOICE/CO DIMENSIONS 24IN H 24IN W 1IN D

REPORT NO. 6066A
TEST NO. 1A
SHEET NO. 1

RATED PERFORMANCE DATA FROM MANUFACTURERS CATALOG NO.		DATED	
AIR FLOW CAPACITY			→
INITIAL RESISTANCE			→
FINAL RESISTANCE			
INITIAL ATMOSPHERIC DUST SPOT EFFICIENCY			
AVERAGE ATMOSPHERIC DUST SPOT EFFICIENCY			
AVERAGE SYNTHETIC DUST WEIGHT ARRESTANCE			
ASHRAE DUST HOLDING CAPACITY			

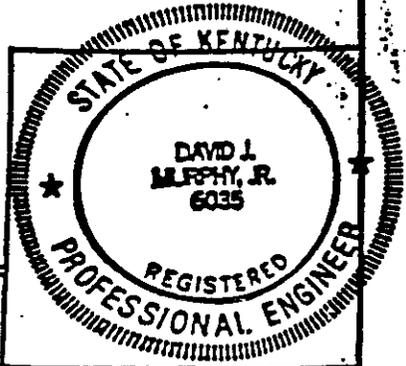
TEST RESULT

TEST AIR FLOW RATE	<u>1200 CFM</u>	<u>300</u>	→	<u>FPM</u>
INITIAL RESISTANCE		<u>0.08</u>	→	<u>IN.W.G.</u>
FINAL RESISTANCE				<u>0.50 IN.W.G.</u>
INITIAL ATMOSPHERIC DUST SPOT EFFICIENCY				<u>720 %</u>
AVERAGE ATMOSPHERIC DUST SPOT EFFICIENCY				<u>720 %</u>
AVERAGE SYNTHETIC DUST WEIGHT ARRESTANCE				<u>78 %</u>
ASHRAE DUST HOLDING CAPACITY				<u>100 GM</u>

TEST SECTION DUCT SIZE 24IN. X 24IN. DUST FEEDING RATE 20 GM/1000 CF
SEE BACK SIDE (PAGE 1A) FOR PERFORMANCE CURVES

PHYSICAL DESCRIPTION

FACE DIMENSIONS 24IN. X 24IN. Nom
DEPTH 1IN. Nom
MEDIA AREA 3.36 Ft²
TYPE MEDIA WOVEN SYNTHETIC & FOAM
TYPE & AMOUNT ADHESIVE NONE



DATE 3-29-1991 TEST SUPERVISOR J.P.S. ENGINEERING APPROVAL David J. Murphy

CO Detectors How Selective Are They?

**William B. Helfman, M.D., Ph.D., Quantum Group Inc.
Lara A. Gundel, Ph.D., Lawrence Berkeley National Laboratory
Michael G. Apte, Ph.D., Lawrence Berkeley National Laboratory**

Part One - Early Carbon Monoxide Detection Technology

Why Carbon Monoxide Detectors?

It is a proven fact that exposure to unacceptable levels of carbon monoxide (CO) for an extended period results in illness, and could lead to death. In the United States alone, it is estimated that 10,000¹ people seek medical attention and at least 5,000² die from CO poisoning annually.

CO is a highly toxic product of combustion. It is a tasteless, odorless and colorless gas that can leak from heaters that burn fossil fuels. It accidentally took the life of former tennis star Vitas Gerulaitis on September 19, 1994. According to New York's Southampton Police Investigators, Gerulaitis was apparently overcome by exhaust fumes from a faulty propane heater that seeped into the heating and air conditioning systems afflicting the entire residence with lethal levels of CO. He was found lying in bed, fully clothed. It was apparent in the investigation that Gerulaitis was resting, and was unknowingly overcome by these tasteless, odorless CO fumes. Immediately following this senseless death, public awareness of CO detectors rose.

The Rise of CO Detectors Was it Premature?

Increased sales of CO detectors were reported by nationwide manufacturers, suppliers and stock analysts. Satisfying consumer demand became the immediate challenge.

Chicago enacted the nation's first law mandating CO detectors in all single and multiple family housing, and in Class "C" assembly buildings, such as schools, churches, theaters, museums, etc. The law affected residents/buildings that heated with "fossil fuels", defined in City Ordinance Chapter 13-64-290 "as coal, natural gas, kerosene, oil, propane and wood".

While Chicago's law became effective on October 1, 1994, it was first drafted in 1991 shortly after CO from a faulty heating system killed an entire ten (10) member family. Why did it take three (3) years to enact such a law? Was the ordinance "bogged-down" by bureaucracy? Did Chicago finally react to the public's horror over the death of Vitas Gerulaitis? Was Chicago's reaction premature - or without adequate knowledge of CO detectors?

The False "Sense of Danger"

CO detectors, whether past or present technology, are good life-safety devices. As such, they are designed to alarm in the presence of predetermined levels of CO. Were the devices that flooded the market in the early to mid 90's too good ... too sensitive? Did they react too quickly to minute concentrations of CO? Were the detectors "tricked" by outside stimuli that produced nuisance alarms?

Figure One summarizes some of the major nationwide incidents that led to the early controversy surrounding CO detectors and the question as to whether these life safety devices actually pose a false "sense of danger". These incidents, and several others, generated more stringent regulation, redesign of existing CO detectors, and improved CO sensor technology.

Figure One
Major Nuisance
Alarms

Incident	Number of CO Alarms	Major Cause of Alarms
Chicago 12/22/94	1852	Chicago Tribune, 12/23/94: "A weather system known as an inversion appears to have contributed to the 1852 CO alarms in a 24-hour period..."
S. California 11/1/95-12/6/95	3300	Los Angeles Times, 12/8/95: "Fog sets off gas detectors causing scares. Moisture traps CO close to the ground, triggering false alarms and generating more than 3300 calls to authorities. Newer devices avoid these problems."

1. Medical Essay, Mayo Clinic Health Letter, 2/84

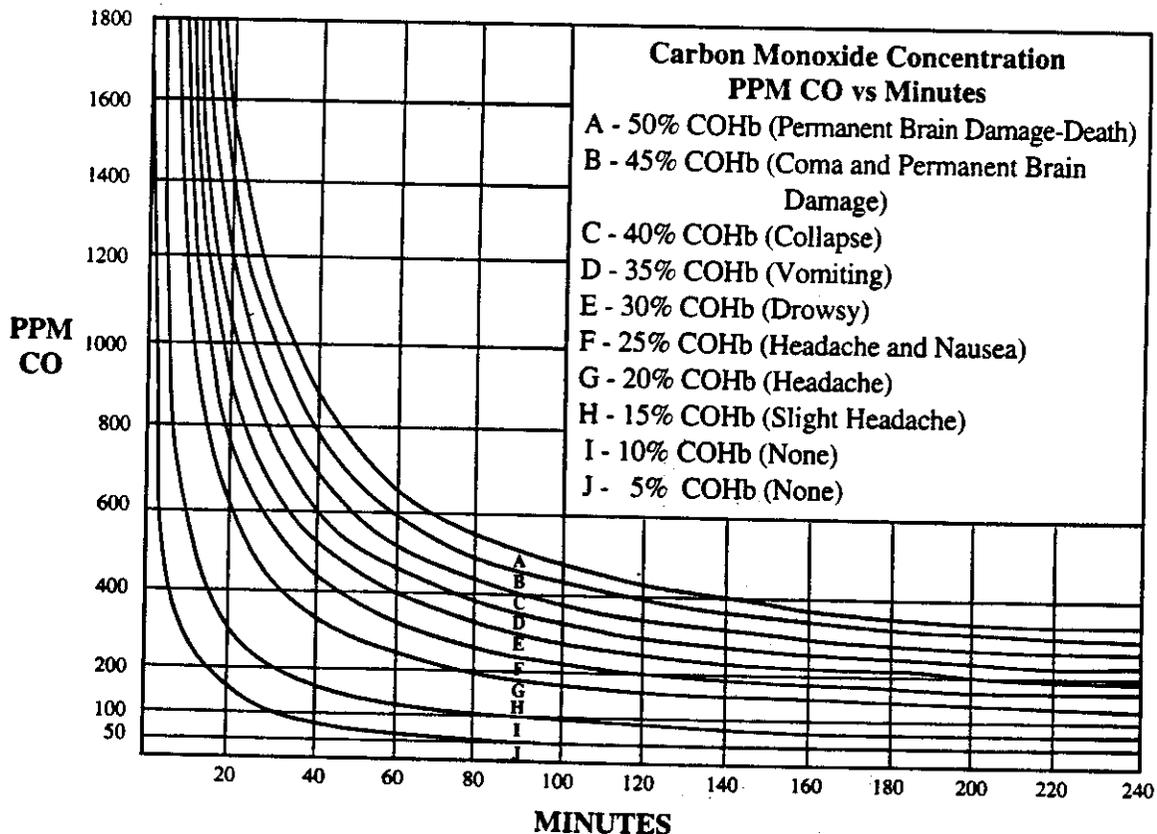
2. Journal of American Medical Association (JAMA), 8/7/91, Vol. 266, Issue 5, pages 659-663.

At the time of the Chicago incident described in Figure One, the majority of the CO detectors in the field already met the existing UL 2034 (Standard for Single and Multiple Station Carbon Monoxide [CO] Detectors). However, in February 1995, Underwriters Laboratories Inc. (UL), the leading product safety testing and standards setting organization, announced revisions to the existing UL 2034 standard. These changes were brought about as a result of an Industry Advisory Group meeting sponsored by UL on December 13, 1994.

In summary, all CO detectors bearing the UL mark would now be required to meet additional and/or revised criteria such as:

1. Product markings and instruction booklets to advise residents how to respond to an alarm condition.
2. The addition of a "reset button" capable of generating both a *warning* and an *alarm*. An initial *warning* that could be manually silenced allowing residents to ventilate and investigate the suspect area, and a *subsequent alarm* should elevated levels of CO (100 parts per million [ppm] or higher) exist after the first 5 minutes and 59 seconds.
3. A stability test, requiring CO detectors to ignore low concentrations (15 ppm) of CO for at least 30 days. (Previously, detectors were only required to ignore 15 ppm for 8 hours.) As a benchmark, it is helpful to note a reproduction of UL's graph (Fig. 38.1 from UL 2034 2nd Edition, Oct. 29, 1996), as illustrated in Figure Two.
4. A "rush hour" test, requiring that detectors do not respond to a 35 ppm CO concentration for a one hour duration, twice a day for thirty (30) days.
5. Alarm threshold markings by which manufacturers are required to indicate their products' alarm thresholds.

Figure Two Carbon monoxide concentration (ppm CO) versus time (minutes). COHb in the figure below symbolizes carboxyhemoglobin which is the stable combination of CO and hemoglobin formed in the blood when CO is inhaled.



Part Two - Today's Technology

A New Beginning

The incidents ... the mandatory requirements ... the skepticism ... and the increased standards all equate to a new beginning or "evolution" for the CO detection industry. From the ashes rose a proliferation of manufacturers, with a variety of improved, sophisticated CO life safety devices. How do these products perform today? The "key" is their sensor technology.

CO Sensor Technology

The manufacturers listed in Figure Three all utilize one of the following CO sensor technologies.

1. Biomimetic (BIO) Sensing Technology

Biomimetic (BIO) sensors react to CO similar to the way hemoglobin in human blood reacts. The sensing elements undergo light transmission changes when exposed to CO. Put simply, the darker the sensor, the greater the CO exposure. The BIO sensor is designed with a specific threshold or "sensing window". If the CO concentration in the area is below this preset threshold, then it will not respond. The rate at which the CO concentration changes, and the intensity of the change, is constantly monitored by a highly intelligent circuit.

2. Electrochemical Cells (EC) Technology

Electrochemical (EC) sensors operate similar to a fuel cell, but in reverse. Three (3) platinum wire electrodes are placed in contact with an electrolyte to form an electrochemical sensor. The cell membrane allows gas to enter, and prevents the liquid electrolyte from leaking. The gas diffuses and reacts with the working electrode, changing its potential. This generates a voltage change in the monitoring circuit, proportional to the concentration of CO.

3. Metal Oxide Semiconductor (MOS)

Metal oxide semiconductor (MOS) sensors consist of tin oxide. This is heated to cause oxidation of carbon monoxide to carbon dioxide. This chemical reaction donates electrons to the surface. Next, the surface of the tin oxide changes its resistance to electric current. The corresponding decrease in resistance in the monitoring circuit is set proportional to the carbon monoxide concentration in the air.

*Figure Three
Manufacturer's
Technologies*

BIO	EC	MOS
Quantum Group	AIM	First Alert (PICO)
First Alert (NICO)	Coleman	American Sensor
		Nighthawk

An Introduction to LBNL's Testing

Interferent resistance and CO selectivity tests were recently performed at Lawrence Berkeley National Laboratory (LBNL) under the sponsorship of Quantum Group, Inc. This research was conducted in an effort to independently investigate differences among the sensor technologies and to thoroughly explore the effects that a variety of common household vapors have on CO detectors. The information that follows summarizes the results of LBNL's testing. It is our sincere hope that this study will help the public to understand the importance of "selectivity" as a parameter for judging the reliability of CO detectors. We also anticipate that such studies will send a signal to the manufacturers of CO detectors that will lead to the development of more highly selective, therefore more highly reliable, residential CO detectors.