

Blueair Performance Book



Dear Reader,

In 1996, the original Blueair team set up business with a clear goal – to make the best air purifier in the world. But achieving this goal is not just about delivering the cleanest air in the fastest time possible. We also want to ensure a Blueair air purifier is:

- safe and durable, so that you can rely on it at home.
- quiet enough to be used when you sleep.
- designed to fit into your home environment.
- energy efficient.

At Blueair, we are deadly serious about fulfilling all of the above promises to our customers. And it is why we today can proudly say we not only make the highest performing air purifiers in the world, but also the most energy efficient ones. Our units are also globally acclaimed for being whisper-silent and having award-winning contemporary design.

The aim of this book is to share some useful information with you about the professional certifications and designations earned by Blueair's air purifiers. Over the following pages, you can read brief presentations of the testing, reports and rewards as well as other background information.

There is so much we want to tell you about Blueair, our technology and our achievements. We hope this book give you some useful insights into our products, beyond what is normally given to customers by most manufacturers, which will convert you into an ambassador for Blueair.

If you have any questions about the content of this document, please do not hesitate to contact your local Blueair representative.

Yours sincerely,



Johan Wennerström, R&D Manager
Blueair

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Quality and safety

Blueair units comply with essential requirements for electronic appliances, encompassing health, safety, function and environment. Blueair units have followed prescribed control procedure of the varying standards found in the countries where our products are sold.

Background

Certain product safety standards, industry requirements and conformity to local requirements are mandatory in many markets before a product can be sold. Standards are not only for safety but also for opening market opportunities and assuring quality of the product.

Standards and certifications

All Blueair air purifiers are safety and quality certified. Blueair is responsible for certifying all units to comply for international markets with CE mark, S mark, CB Scheme and ETL mark protocols. Certain national standards are controlled by the distributors responsible for the market.

CE mark

For markets within the European Economic Area (EEA), all products sold need to be CE marked. With the CE mark, the manufacturer ensures that the product complies with essential requirements of EU directives including health, safety, function and environment. The CE mark assures that prescribed control procedure has been applied.

For more information go to:

http://ec.europa.eu/enterprise/policies/single-market-goods/cemarking/index_en.htm

S mark

The S mark certifies that a product complies with European safety standards for fire, electric shock, mechanical injuries, radiation injuries, burns and certain types of environmental damage. Certifying a product with S mark is voluntary. Tests and certifications are performed independently and can function as a complement to the CE mark.

For more information go to:

<http://www.intertek.com/marks/s/>

CB scheme

Electrical and electronic products require safety certification for each country where it is sold. However, standards and requirements are different for every market. The CB Scheme is an international program that facilitates safety tests for a product to comply with standards in over 50 countries. The CB test report certifies safety of electrical and electronic products in accordance to international (IEC) standards and national regulations.

For more information, go to the IECEE website:

<http://www.iecee.org/cbscheme/default.htm>

ETL mark

A product bearing the ETL mark complies with North American safety standards and has met the U.S. minimum requirements. The mark indicates that the manufacturer's production conforms to set standards and is continuously inspected. Only laboratories recognized by Occupational Safety and Health Administration (OSHA) are allowed to test and certify products for the ETL mark.

For more information, go to:

<http://www.intertek.com/marks/et/>

Japanese S mark

The Japanese S mark is a voluntary certification administered in Japan for electrical products. Tests are conducted in accordance with the standards J60335-1, J60335-2-65 and J55014-1. This means that the products comply with material control law and the Japanese product liability law. The certification is issued by a third part certification body that is a member of the Steering Council of Safety Certification for Electrical and Electronic Appliances and Parts of Japan (SCEA).

For more information, go to:

<http://www.ul.com/global/eng/pages/corporate/aboutul/ulmarks/mark/>

KC mark

The KC mark is mandatory for certain electrical products sold in South Korea. The purpose for the KC mark is to protect consumers from the hazardous aspects of appliances (electric shock, fires, mechanical, thermal, radiation and chemical hazards etc.) The KC mark also includes a factory inspection once a year.

For more information, go to:

<http://hongkong.intertek-etlsemko.com/services/ek/>

C-tick mark

The C-tick is registered to The Australian Communications Authority (ACMA). The mark certifies compliance with EMC standards and indicates a traceable link between the product and the supplier that is responsible for placing the product on the Australian market.

For more information, go to:

http://www.acma.gov.au/scripts/nc.dll?WEB/STANDARD/1001/pc=PC_2796

CCC mark

Many products being exported to or sold in the Peoples Republic of China market requires the China Compulsory Certification (CCC) mark. The mark is a safety and quality system administered by the Certification and Accreditation Administration (CNCA). Testings include tests on product samples and inspections of the manufacturing facilities.

For more information, go to:

<http://www.ccc-mark.com/index.html>

Safety marks



CE mark



S mark



ETL mark



Japanese S-mark



KC mark



C tick



CCC mark

Performance and room size

Blueair units are top performing when it comes to reducing indoor air pollution. The Blueair 600 Series has the highest ratings in the industry for air purifiers. Blueair units are designed to be used in all types of environments, from bedrooms to large open areas up to 65m² (698 sq.ft.).

Background

When choosing an air purifier, performance should be considered first. The major factors affecting performance of an air cleaner are its efficiency and airflow. Another key consideration is the room capacity of each unit.

Standards and certifications

Clean Air Delivery Rate (CADR) indicates how much filtered air is delivered by the air purifier and how well the system removes pollutants (tobacco smoke, dust and pollen) from the air. CADR is sponsored by the Association of Home Appliances Manufacturers (AHAM), an independent organization that ensures testing results are accurate and impartial. AHAM has also developed a validated way to convert an air purifier's performance into its room size coverage.

Tests are performed in accordance with the standard ANSI/AHAM AC-1-2006, the only air purifier standard recognized as an American national standard. CADR is endorsed by both the U.S. Food and Drug Administration (FDA) and the U.S. Environmental Protection Agency (EPA).

Testing and results

Certified ratings of Blueair air purifiers (February 2012):

Model	Dust CADR	Tobacco CADR	Pollen CADR	Room Size
200 Series	155	155	155	22 m ² (240 sq. ft.)
400 Series	240	240	240	34 m ² (370 sq. ft.)
500 Series	375	375	375	54 m ² (580 sq. ft.)
600 Series	>400	>450	>450	65 m ² (698 sq. ft.)
ECO10	195	200	190	28 m ² (298 sq. ft.)

Learn more and see all certified air purifiers on AHAM's website at:
http://www.ahamdir.com/aham_cm/site/pages/search_airCleaners.html

Seal and mark

The AHAM Portable Electric Room Air Cleaner Certification Seal marks that Blueair units are accurately stated in accordance with the requirements of the set standard.

	<h1>Clean Air Delivery Rate</h1> <p><i>Certified Rating</i></p>
<p><i>From air cleaner to air cleaner, compare the CADR numbers. First, look at suggested room size. Then refer to the tobacco smoke, dust and pollen Clean Air Delivery Rate (CADR) numbers. The higher the numbers, the faster the unit filters the air.</i></p> <p>This air cleaner is suggested for use in a single closed room up to _____ square feet.</p> <p><i>Room size ratings conform to the AHAM Certification Program criteria of 80% smoke reduction. Higher Clean Air Delivery Rates provide improved performance in all room sizes. Portable air cleaners will be much more effective in rooms where all doors and windows are closed.</i></p>	
<p>Tobacco Smoke: _____ Dust: _____ Pollen: _____</p> <p><i>These values represent performance that can be expected within the first 72 hours of operation. Subsequent performance may vary with use.</i></p> <p style="text-align: right;">www.cadr.org</p>	
<p>Association of Home Appliance Manufacturers </p>	



Energy efficiency

The low energy consumption of Blueair units ranges from 7 to 120 Watts depending on unit and speed level. With the ECO10, Blueair offer the most energy efficient air purifier in the world.

Background

For maximum performance, an air purifier should run 24 hours a day and seven days a week. Traditional room air purifiers use approximately 550kWh a year when running continuously. This is more energy than some new refrigerators. Note that power consumption should not be considered separately but together with performance.

Standards and certifications

ENERGY STAR® is a program of the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy. The program is developed to help consumers save money and protect the environment through energy efficient products. Criteria for ENERGY STAR qualification include CADR (≤ 50 CADR for dust), CADR/Watt (≥ 2.0 CADR/Watt for dust), standby power usage (≤ 2.0 Watts) and ozone emission that meet UL Standard 867 (≤ 0.050 ppm).

Testing and results

ENERGY STAR measures the efficiency by using a CADR-to-Watt ratio. Blueair is among the first air purifier manufacturer to earn ENERGY STAR designation for all its air purifiers.

Blueair air purifiers significantly exceed minimum requirements for qualification by its high CADR. Performance are 2.48 CADR/Watt for 200 Series, 4.54 CADR/Watt for 400 Series, 3.968 CADR/Watt for 500 Series and as high as 19.66 CADR/Watt for ECO10. All Blueair units also meet U.S. government's criteria for ozone emission. For more detailed information about ozone emission, read the next chapter: Ozone.

Learn more about the ENERGY STAR program, go to:
http://www.energystar.gov/index.cfm?c=room_airclean.room_airclean

Marks and labels

The ENERGY STAR label must be placed on the product packaging of ENERGY STAR qualified air purifiers with the statement:

"This product earned the ENERGY STAR by meeting strict energy efficiency guidelines set by the US EPA. US EPA does not endorse any manufacturer claims of healthier indoor air from the use of this product."



Ozone

Blueair's patented HEPASilent™ filter technology uses active ionization (particle charging) to capture and remove particles from indoor air. However, Blueair systems should not be associated with dangerous indoor ozone that could be formed by ionization. In fact, already in 1999 Blueair units were tested at Karolinska Institutet (Sweden) and shown to actually reduce ozone in a sealed room, the concentration in the output air was lower than in the incoming. Since this report was published, Blueair units have been continuously tested to be made sure that they do not emit ozone.

Background

Ozone is a molecule composed of three atoms of oxygen (not to be confused with the two-atom-oxygen molecule that we breathe to support life). Ozone from electronic air cleaners is created when air pass through a corona field. Ozone can decrease lung function and cause health effects such as chest pain, shortness of breath, throat irritation and aggravation or higher susceptibility to respiratory health problems.

Learn more about ozone in air purification:
<http://www.epa.gov/iaq/pubs/ozonegen.html>

Standards and certifications

One of the most stringent testing for ozone safety is set by the U.S. Food and Drug Administration (FDA) to a threshold of 0.050 ppm (parts per million). Certifications of air purifiers meeting this limit is conducted by the California Air Resource Board (ARB) through tests outlined in the UL Standard 867 Section 37.1.2.

Testings and results

All Blueair units have been tested and certified by ARB for complying with the UL Standard 867 Section 37.1.2 criteria of emitting less than 0.050 ppm o.

Certified units are listed on the ARB website:
<http://www.arb.ca.gov/research/indoor/aircleaners/certified.htm>

Marks



Noise

Blueair's whisper-silent operation is a result of the HEPASilent™ filtration technology. The patented Blueair technology allows the fan to push air more easily through the filter, making it possible for the unit to deliver high air flow with low noise. With high cleaning capacity even at lower speeds, Blueair units are the perfect air purifiers for rooms where silence is desirable, such as bedrooms.

Background

Noise from air purifiers are mainly produced from the fan or motor and the air pressure through the filter. High noise can cause severe annoyance and even affect health, causing physical and mental stress. The following references can be used as guidelines when comparing noise levels:

- Normal speech at three feet distance: 65 dB
- Standard vacuum cleaner: 70 dB
- Normal business office: 50 to 60 dB.
- Bedrooms at nighttime (for adequate rest and sleep): 35-40 dB

Learn more about noise:

<http://www.epa.gov/air/noise.html>

Testings and results

Testing is conducted at Blueair testing facilities where A-weighted sound pressure levels, dB(A), are measured in a normal sized room, 74m³ (2.6 cu. ft.). The testing room has a mix of soft and hard surfaces in order to simulate a normal living room or bedroom. A class 1 graded sound level meter, according to standards IEC.651, IEC.225 and IEC.804, is positioned at 1 meter (3.3 ft) distance from the units front side and at a height from the floor that equal to half of the units height.

Measured sound levels of Blueair units:

	203	270E	ECO10	403	450	503	603	650E
Normal speed (dB)	32	32	32	32	32	32	32	32
Maximum speed (dB)	56	56	49	52	52	66	66	66

Design

Sleek and stylish, Blueair air purifiers are designed to fit in with your lifestyle and décor, which means you can place your Blueair anywhere you like in any room.

Background

The union of visually pleasing form and effective function is a hallmark of Swedish design, and Blueair is pleased to live up to that tradition.

Awards

One of the most prestigious Scandinavian design awards is the Excellent Swedish Design. The prize was handed out by Svensk Form in 1983-2002 for product design that represented innovation, good design and superior quality in materials, manufacture process and function.

Designation

Blueair earned the diploma for Excellent Swedish Design in 1998 with the following verdict:

"The product is just as pure and simple as its function. No decoration for the sake of decoration, but well-produced design exercises. The result is just as discreet as an air purifier should be, since it will be located in a wide variety of milieus where it must blend in. The design team also helped with the marketing: the posters and display breathe the same air as the product's design."

Mark



Particle efficiency

The HEPASilent™ filter technology captures 99.97% of particles that are 0.1 micron or larger in size.

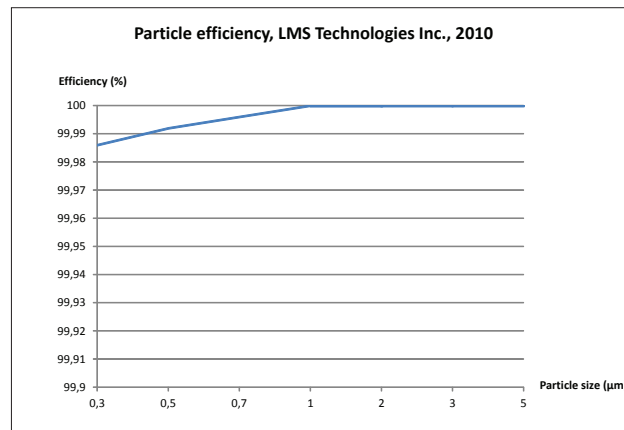
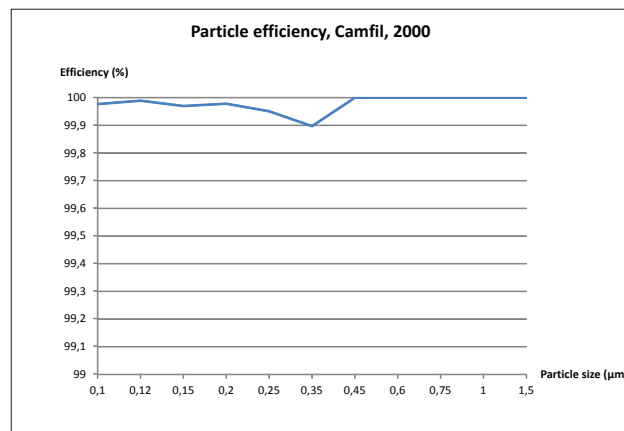
Background

The efficiency of an air purifier indicates how much of pollutants are removed from the air when the air passes through the system once. Note that efficiency does not show the volume of filtered air. Only in combination with high airflow is high efficiency an essential component of good air purification.

Testings and results

In 2000, a test on the HEPASilent™ filtration technology was conducted in Sweden at Camfil Component AB. The test showed the efficiency of 99.97% in capturing particles down to 0.1 microns in size. The test was performed on a Blueair 501 unit fitted with particle filter, placed in a space of 3.6 m² (32 sq. ft.). Airflow was 150 m³/h (88 cfm). Elapsed testing time was 120 s.

The high efficiency results from Camfil Component AB has been confirmed by other laboratories tested elsewhere such as in the U.S in 2010 at LMS Technologies, Inc. This test was performed on a Blueair 650E unit fitted with particle filter.



Microbe removal efficiency

Blueair air purifiers use Particle filters for removal of airborne particles including airborne microbes such as bacteria, virus and mold. The naturally anti-bacterial filters are made of polypropylene and mechanically filter out airborne particles without use of harmful chemicals.

The polypropylene filter is hydrophobic and water resistant which prevents bacterial and mold growth. The absence of water dries out and kills the microbes that are captured.

Background

A great number of diseases and infections are caused by airborne pathogens, which are transmitted in the air. This makes the control of airborne microbes hugely important.

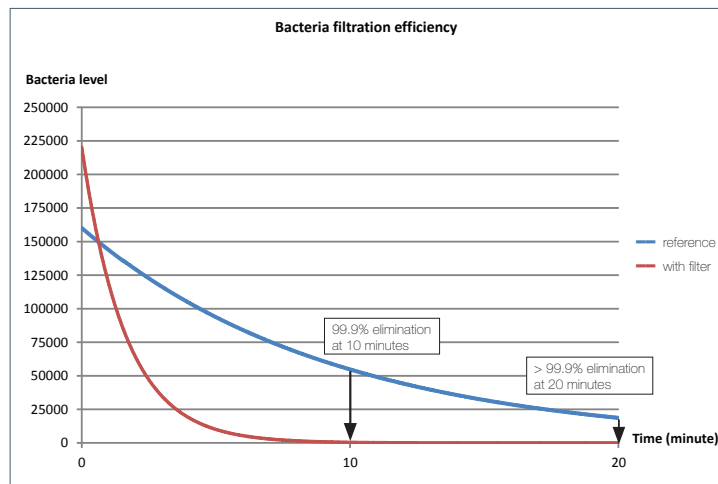
Testing and results

In 2010, Kitasato Research Center of Environmental Sciences (Japan) tested the filtration efficiency of Blueair air purifiers and showed how well they remove bacteria, virus and mold.

Tests on a Blueair 650E fitted with particle filter, running at full speed in a 10 m³ (353 cu. ft.) chamber, show that the efficiency in removing all three kinds of airborne microbes from the air reaches a minimum of 99% within 10 minutes and more than 99.9% within 20 minutes.

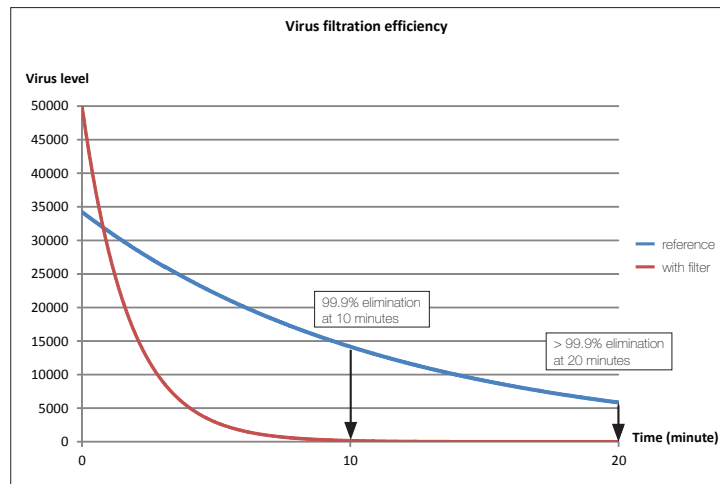
Bacteria filtration efficiency

Natural reduction of airborne bacteria is shown as reference in the graph. The bacteria level after running the unit for 10 minutes is 99% lower than the natural reduction. After 20 minutes, the level is over 99.9% lower.



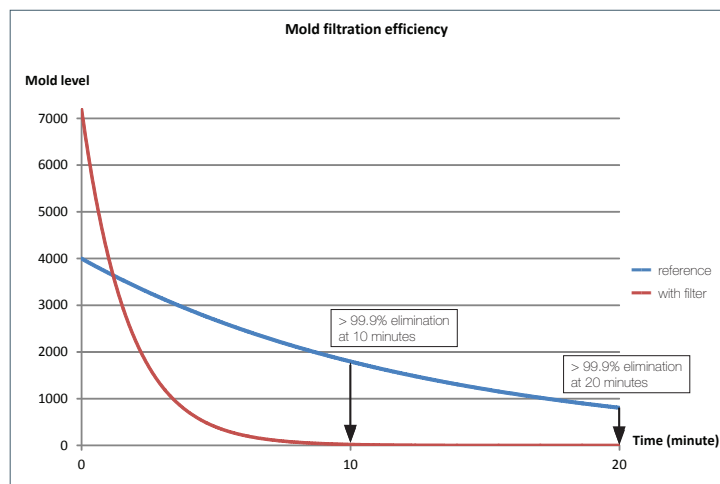
Virus filtration efficiency

Natural reduction of airborne virus is shown as reference in the graph. The virus level after running the unit for 10 minutes is 99% lower than the natural reduction. After 20 minutes the level has been reduced by more than 99.9%.



Mold filtration efficiency

Natural reduction of airborne mold spores is shown as reference in the graph below. After running the unit for 10 minutes, the mold level is over 99.9% lower than the natural reduction. The reduction is consistent after 20 minutes.



Gaseous removal efficiency

Fast reduction of odor and gaseous pollutants is best achieved by SmokeStop™ filters. Blueair SmokeStop™ filters are particle filters enhanced with active carbon.

Background

The exposure to gaseous pollutants has increased with the usage of chemical-based household and personal cleaners, indoor pesticides and aerosol. Also plastics, binders and glues in synthetic building materials, carpets and furnishing are off gassing. The irritating gases may be factors in a host of illness, from respiratory disease to chemical sensitivity. Odor causes negative effects as well as unpleasant feelings. Strong odor has also shown to have significant negative effect on asthma.

Standards and certifications

Shanghai Institute of Measurement and Testing Technology tests air purifiers' removal rate of formaldehyde and VOCs in accordance with GB/T 18801-2001 and GB/T 18883-2002.

Kitasato Research Center of Environmental Sciences (Japan) tests air purifiers' filtration efficiency of malodorous substances. Tests for tobacco smoke was tested in accordance with the standard JEM 1467.

Testing and results

Test results from both mentioned laboratories prove the very high efficiency of Blueair units using SmokeStop™ filters in reducing gases and odors.

VOC filtration efficiency

In 2009, the Shanghai Institute of Measurement and Testing Technology tested Blueair 503 fitted with SmokeStop™ filter in removing VOC.

Nature attenuates refers to the natural reduction of VOC in the air without an air purifier present. Testings were conducted in a 30 m³ (1060 cu. ft.) room with a temperature of 19-21° C (66-68 ° F) and humidity of 45-55% RH. Initial concentration of VOC was 4.2 mg/m³ (148 mg/ft³). The unit was tested on full speed.

Removal Rate using unit 503

Time	Nature attenuates	SmokeStop™ filter
2 hours	7%	96%
3 hours	11%	98%

Formaldehyde filtration efficiency

In 2009, the Shanghai Institute of Measurement and Testing Technology conducted tests on Blueair 503 fitted with SmokeStop™ filter in removing formaldehyde from the air.

Nature attenuates refers to the natural reduction of formaldehyde in the air without an air purifier present. Tests were conducted in a 30 m³ (1060 cu. ft.) room with a temperature of 19-21° C (66-68° F) and humidity of 45-55% RH. Initial concentration of formaldehyde was 1.5 mg/m³ (53 mg/ft³). The unit was tested on full speed.

Removal Rate using unit 503

Time	Nature attenuates	SmokeStop™ filter
2 hours	10%	94%
3 hours	13%	96%

Deodorization Performance

In 2010, deodorization performance test was conducted by the Kitasato Research Center of Environmental Sciences (Japan). The table shows how long it takes (minutes) to eliminate each tested substance to 99% if operating the Blueair 650E fitted with SmokeStop™ filter on full speed in an unventilated room.

	Small room, 23 m ³ (812 cu. ft.)		Living room, 78 m ³ (2755 cu. ft.)	
	Particle filter	SmokeStop™ filter	Particle filter	SmokeStop™ filter
Ammonia	191 min	22 min	635 min	75 min
Hydrogen Sulfide	1944 min	16 min	6480 min	53 min
Methyl Mercaptan	N/A	18 min	N/A	61 min
Trimethylamine	44 min	26 min	147 min	85 min
Formaldehyde	54 min	38 min	180 min	127 min
Toluene	78 min	27 min	258 min	91 min

Deodorization test for tobacco smoke

In 2010, a deodorization test for tobacco smoke was conducted by the Kitasato Research Center of Environmental Sciences (Japan) in a 1 m³ (35 cu. ft.) unventilated chamber. The units were fitted with SmokeStop™ filters and operated on full speed.

Deodorization Test of smoke after 30 min

	SmokeStop™ filter	Particle filter
650E	100%	53.0%
450E	100%	42.3%
270E	95.8%	50.6%

Blueair Inc.

17 N. State, Suite 1830, Chicago, IL 60602
Phone: (888) 258-3247, Fax: (312) 727-1153
info@blueair.com www.blueair.com

Blueair AB

Danderydsgatan 11, SE-114 26 Stockholm, Sweden
Tel: +46-8-679 45 00, Fax: +46-8-679 45 45
info@blueair.se www.blueair.com
