

# Criteria for recommendation of Air Purifier

## LRV3

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The criteria were adopted on the 2020-09-28



## Background

The air we breathe indoors is an important health factor. A high amount of dust and particles contribute to unhealthy indoor air which can irritate the sensitive mucosa of upper and lower airways and impair lung function in sensitive individuals. Airborne allergens such as pollen or allergens from animals and mites cause problems for those who are allergic. Indoor gases can also have a negative effect on health. There is evidence that patients with respiratory problems (rhinitis and asthma) experience less symptoms breathing filtered air free from allergen and irritants <sup>(1) (2)</sup>.

There is a variety of air purifiers on the market. Asthma and Allergy Nordic has developed a number of requirements - uniform criteria based on clinical and technical knowledge (in applicable parts derived from WHO guidelines, ISO-standard, EU-regulation and Swedish authorities' regulations) which can be used by producers.

An air purifier can remove number of the unwanted substances in the indoor air such as pollen and dust. There are different particle filters depending on the particle size and degree of separation required. Gases are usually adsorbed in a carbon filter with a special impregnation depending on the type of gas. Other techniques such as ionization and air purifier in combination with humidifier can also be used. These criteria for recommendation of air purifier apply only to air purifiers that circulate the air and where particulate separation is handled in some form of filter.

Ionization directly in a room is not recommended. However, ionization in front of a filter where the particles are deposited can though be recommended. Ionization without filtration leads to a deposition of particles on all oppositely charged surfaces, which contaminate the surfaces.

If the particles are ionized in front of a filter, the particles will be deposited in the filter and the air will be cleaned.

Air purifiers which are approved as medical aid cannot be assessed for recommendation by the Swedish Asthma- and Allergy Association.



Most air purifiers on the market are intended for the separation of particles. Some of them can be supplemented with gas absorbent. Parameters that affect the efficiency of an air purifier are the following:

- Airflow
- Filtration Efficiency
- Shortcut between air inlet and outlet
- Replacement / cleaning of filters

When an air purifier is tested, it is placed in a closed chamber where particles are then supplied. The air purifying process then commences and what is measured is how efficiently it removes the particles in the chamber. The result is presented as "Clean Air Delivery Rate, CADR", which can be said to be a collective name for the top three points above (airflow, filtration efficiency and shortcut between air Inlet and outlet). We will continue to use the trade term "CADR" in this document.

The higher the CADR, the more efficient the air cleaner.

Other parameters that affect the consumer's way of using the air purifier are:

- Noise level
- Operating costs

AAN assesses an air purifier based on how much clean air it delivers (CADR) at a given noise level. This is important because many air purifiers are placed in an environment where background noise can be disturbing. The criteria in this document are based on calculations for a living space of 20 m<sup>2</sup> where the noise level from the air purifier must not exceed 30 dBA <sup>(3)</sup>. However, we have a minimum requirement which means that an air purifier must at least be able to clean a living space of 10 m<sup>2</sup> to be recommended.

Evaluation of an Air Purifiers CADR (Clean Air Delivery Rate) is based on particle arresstance at MPPS (Most Penetrating Particle Size). MPPS is the particle size at which an air filter shows minimum arresstance<sup>(4)</sup>.



## Criteria

When considering options for AAN labelling air purifiers for consumers the following parameters are considered

- CADR
- Sound Power level
- Service and maintenance
- The effect of the air purifier on the indoor environment, such as ozone generation.

## General information

The air purifier must meet all regulatory requirements and be approved from an electrical safety point of view by an accredited authority. If the product is in any way ionizing, a test result for approved ozone levels is required<sup>(5)</sup>.

All existing approvals and test results must be attached to the application.

## CADR (equivalent air flow)

These criteria consider the efficiency of the air purifier's in particle separation (CADR) at a given noise level. As additional information to the consumer, the air purifier's energy efficiency (CADR/W) at max 30 dBA<sup>(3)</sup> is also presented.

The air purifier's CADR must be adapted to the size of the room where it will be used.

In order to achieve fresh air flow in a living space our calculations are based on about 0.5 air changes/hour<sup>(6)</sup>.

To achieve a theoretical reduction of particles in the indoor air by about 80% the air purifier's CADR (measured at a particle size of 0.3 - 0.5  $\mu\text{m}$ <sup>(4)</sup>) should be 4 times greater than the outdoor air flow from the ventilation.

Testing shall be performed at all operating modes where the sound pressure level does not exceed 30 dBA in a living space of 20 m<sup>2</sup> and at maximum capacity. The recommendation applies to all operating modes where the sound pressure level does not exceed 30 dBA in a living space of 20 m<sup>2</sup>.



The minimum requirement for an air purifier to be recommended is, however, that it must at least be able to clean a living space of 10 m<sup>2</sup>. For an air purifier to be able to clean a living space of 10 m<sup>2</sup> with a ceiling height of 2.4 m, thus the requirement for the air purifier's CADR per hour is:  $10 \times 2.4 = 24 \text{ m}^3 \times (4 \times 0.5) = 48 \text{ m}^3/\text{h}$ .

For an air purifier to be recommended by AAN, it must have a CADR of at least 48 m<sup>3</sup>/h.

The higher CADR at 30 dBA the more effective air purifier.

### Sound pressure level

A noise level exceeding 30 dBA can be experienced as disturbing in an otherwise quiet environment. The noise level of the air purifier, when placed according to the supplier's recommendations, must not exceed 30 dBA when the air purifier is placed in a living space of 20 m<sup>2</sup>.

The sound level in a room can vary depending on e.g. room size, design and furnishings. Attenuation from soft sofas and beds or from thick curtains and rugs can lower the sound level, while hard surfaces and sparse furniture can provide a higher sound level.

The sound effect of the air purifier shall be tested in a reverberation room in accordance with EN 23741 in order to be able to compare different manufacturers under the same conditions. Testing shall be performed on all operating modes.

For a smaller living space of 10 m<sup>2</sup> with a ceiling height of 2.4 m and reverberation time of 0.5 s, the sound power level should not exceed 33 dBA, which corresponds to a 30 dBA sound pressure level. In a living space of 20 m<sup>2</sup>, the sound power level should not exceed 36 dBA and if the room is 30 m<sup>2</sup>, the sound power level should not exceed 39 dBA with the same calculation as above.

We recommend the air purifiers to be placed in the living space where you spend most time, e.g. in your bedroom. But since air purifiers are placed in both bedrooms and other living spaces and both its function and sound level are affected by its location and other furnishings in



the room, we have chosen to calculate its efficiency at a sound power level of max 36 dBA corresponding to a sound pressure level of 30 dBA in a living space of 20 m<sup>2</sup>.

### **Service and maintenance**

An air purifier as well as complete specifications and operating instructions shall be provided together with the application. Assessment of operation and functionality shall be carried out. All controls and surfaces concerned are tested for nickel. The release of nickel should not exceed 0.5 µg/cm<sup>2</sup> per week in accordance with the current EU regulation<sup>(7)</sup>. The manufacturer shall guarantee access to a replacement filter for a period of five years following that the air purifier has been taken out of production.

### **Location in the room**

To get the best effect from an air purifier, it should be placed as freely as possible in the room. If it is placed next to or behind a sofa, its effect can be limited in other parts of the room. An air purifier in principle only benefits the space in which it is located and therefore open doors and windows can reduce its efficiency effect.

The manual/user guide must contain information on how the air purifier is to be placed in the room to achieve maximum efficiency. It should also explain why the placement is important and describe how the air purifier should not be placed.

## **Recommendation**

### **How is an air purifier recommended by AAN?**

To perform the necessary tests, an air purifier must be sent to an independent accredited laboratory. There, CADR, sound power level and energy consumption are tested. The air purifier must also undergo a technical examination, test of nickel release and assessment of handling, functionality and instructions for use.

After performed and approved tests as above, the air purifier is classified by AAN. The classification is the basis for an agreement between the Company and AAN regarding recommendation.



## Use of logotype

In order to obtain the right to use the Association's logo in marketing, the product must be reviewed and recommended in accordance with this criteria document. The name of AAN and/or logotype may only be used in conjunction with the following information, which is also regulated in agreements regarding the use of the logo and must be in direct connection with the use of the name of AAN and/or logotype. The information must be clearly visible in all marketing, advertising, PR etc. where information is provided that the product is recommended by AAN. Information that must be associated with the name of AAN and/or logotype is as follows:

1. What room volume has your product received recommendation for?
2. Which operating mode (s) has your product been recommended for?
3. What sound power level does your product have in the recommendation regarding points 1 and 2 above (must be less than or equal to 30 dBA)

If the maximum capacity is different/higher than the recommended capacity, and the manufacturer wishes to specify the maximum capacity in the product description, it should be stated that the maximum capacity is not included in the recommendation.

## How is an application made?

Information and application forms are obtained digitally via contact with the administrator, [Marianne.Jarl@astmaoallergiforbundet.se](mailto:Marianne.Jarl@astmaoallergiforbundet.se)

## References

- <sup>(1)</sup> Sublett JL. Effectiveness of Air Filters and Air Cleaners in Allergic Respiratory Diseases: A Review of the Recent Literature *Curr Allergy Asthma Rep.* 2011;11:395-402
- <sup>(2)</sup> Brehler R et al. Positive effect of fresh air filtration system on Hay Fever Symptoms. *International Archives of Allergy and Asthma* 2003;130:60-65
- <sup>(3)</sup> Sound pressure level To enable an assessment of the air purifier's suitability, we have based our criteria, on what can be considered reasonable noise level in a living space, on guidelines



stated by WHO: NIGHT NOISE GUIDELINES FOR EUROPE, (EXECUTIVE SUMMARY XVIII)

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[https://www.euro.who.int/\\_data/assets/pdf\\_file/0017/43316/E92845.pdf](https://www.euro.who.int/_data/assets/pdf_file/0017/43316/E92845.pdf)

<sup>(4)</sup> MPPS (the most penetrating particle size)

Description from ISO 29463

<https://www.sciencedirect.com/topics/engineering/most-penetrating-particle-size>

<sup>(5)</sup> Ozon: BS EN 60335-2-65:2003+A11:2012

<sup>(6)</sup> Air flow To enable an assessment of the air purifier's suitability for use we have in these criteria proceeded from what can be considered a reasonable air flow in a living space. The calculations are therefor based on recommendations from the Swedish Public Health Agency. Quote: "In homes, the specific air flow (air turnover) should not be less than 0.5 room volumes per hour (rv/h)". *FoHMFS 2014:18, 4th of February 2014*

<https://www.folkhalsomyndigheten.se/contentassets/641784832543443ea4eebe9b300c244e/fohmfs-2014-18.pdf>

<sup>(7)</sup> Nickel EU regulation (REACH, EC Regulation 1907/2006)