

# Introduction to Awair's Index and the Awair Score



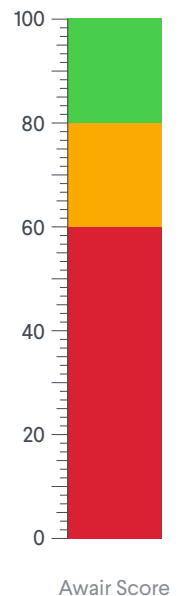
An Air Quality Index (AQI) is a measurement tool used to give a basic overview of current air quality. Government, private, and environmental organizations use indexes as shorthand to let you know the current state of the air around you. Although many governments and organizations use AQIs to report air quality, there's no set standard and AQI ranges can vary significantly. For this reason it's important that AQI's be clear and easy to understand.

In order to create an AQI that is both easy to understand and accurate, Awair has used aggregated AQI information from a number of different national standards as well as environmental and worker safety organizations. These include such groups as the EPA (Environmental Protection Agency), the WHO (World Health Organization), ASHRAE (American Society of Heating, Refrigeration and Air-Conditioning Engineers), OSHA (Occupational Safety and Health Administration) and others.

Awair uses a 5 level index for each category of air quality that Awair measures. These categories are: **temperature, relative humidity (RH), carbon dioxide (CO<sub>2</sub>), chemicals (TVOCs), and PM2.5 (particulate matter)**. Each index level has an associated color:

These indexes are aggregated into the Awair Score, a single number ranging from 0 (very unhealthy and uncomfortable air) to 100 (perfectly healthy and comfortable air). This number is also color-coded with a green, yellow and red color scheme.

### 3 Color-Coded Awair Score



# Temperature

## How does this affect me?

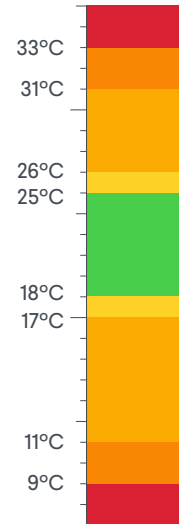
Temperature has an obvious effect on comfort, but it can also impact your health. When it's hot you may sweat, feel sluggish or fatigued, and can promote mold growth. High levels of heat can cause heat exhaustion which can include such unpleasant symptoms as dizziness, weakness, confusion, muscle cramps, and nausea. Low levels of heat can cause shivering and great discomfort. Being either too hot or too cold can cause difficulty concentrating and a loss of productivity.

## What are the causes?

Being too hot or cold is usually caused primarily by the weather and the construction of the building you're in. Human activities such as cooking or using appliances can also affect the temperature of the environment, usually making it hotter.

## What can I do about it?

- Heating and air conditioning are the best ways to control the temperature of any building.
- In hot weather, keep the doors and windows closed and covered during the day. The more light that gets in, the hotter the building will be. In the evening you can uncover the windows.
- If it's cooler outside you can open doors and windows to let airflow into the house.
- In cold weather make sure to keep doors and windows closed.
- Weather stripping can stop hot or cold air from leaking from your home.



# Relative Humidity

## How does this affect me?

Humidity has a major impact on our environment and how we feel the air around us. The ideal range of humidity (index 1) is around 40~50%.

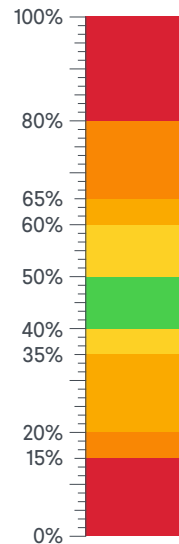
- **High humidity:** Dust mites, mold, and other fungi thrive in high humidity. The increase in these pollutants can cause allergy and asthma attacks. The presence of mold can cause illness and respiratory infection. High humidity is also often uncomfortable. It makes it harder for the moisture on your skin to evaporate, making you feel hot and causing excessive sweating.
- **Low humidity:** Bacteria and viruses are more common in low humidity. Particulate matter will also dry out and become airborne, leading to allergy, asthma, and respiratory infection problems. With regards to comfort, low humidity can dry out skin and lips leading to itching and chapping.

## What are the causes?

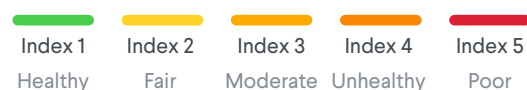
Indoor humidity is determined primarily by the weather and climate as well as the construction of the building. It's also affected by human behavior. Things like washing, cooking, and bathing contribute to moisture.

## What can I do about it?

- The best ways to control humidity levels are to use a humidifier or a dehumidifier. These allow you to increase or decrease the moisture in the air to a comfortable and healthy level.
- Use bathroom fans when bathing or cleaning.
- Use the exhaust fan when cooking.
- Air conditioning and fans can move air around, removing excess moisture through evaporation.
- Make sure your furnace and air conditioner filters are cleaned regularly.



### Awair's 5 Indexes



# Carbon Dioxide

## How does this affect me?

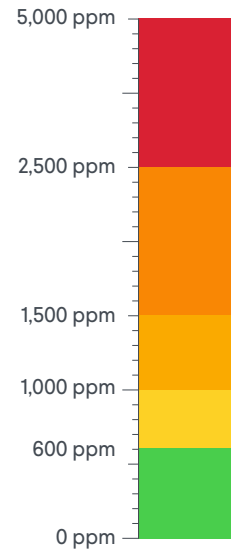
- **Comfort:** CO<sub>2</sub> has a major impact on both comfort and productivity. The air in a room with too much CO<sub>2</sub> feels stale, stuffy, and stagnant. It will smell musty and can cause Sick Building Syndrome symptoms.
- **Productivity and health:** Exposure to moderate CO<sub>2</sub> (index 3) can cause “foggy head,” eye and throat irritation and some fatigue. Some nausea might be reported. At higher levels (index 4-5) nausea, headaches, severe cognitive impairment, and fatigue as well as intense nausea are common.

## What are the causes?

Outside air, and air inside a building that has been unoccupied for 4-8 hours will have 400 ppm of CO<sub>2</sub> (background level of the atmosphere). The rest is usually caused by people and their pets. As we breath out we exhale CO<sub>2</sub>. Overcrowding or poor ventilation are the primary causes of excessive CO<sub>2</sub>.

## What can I do about it?

- Ventilate by opening a window or activate the ventilation system if one is available.
- Indoor plants absorb some CO<sub>2</sub> and produce oxygen. Keeping plants in the home or office can help a lot.
- Use the exhaust fan or open a window when cooking.
- Check fireplaces, gas heaters, gas stoves, and other combustion sources for proper ventilation.
- Consider using an air purifier.



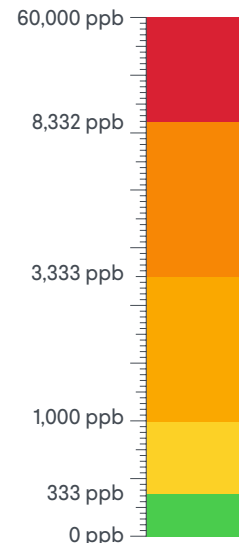
# Chemicals (TVOCs)

## How does this affect me?

Exposure to VOCs can have many effects on health and comfort. Moderate exposure (index 3) can cause problems, especially for the elderly, young children, expectant mothers, and people with asthma, allergies or eczema. People may also experience headache, dizziness, eye and eyelid irritation, allergic skin reactions, and fatigue. Higher concentrations (index 4-5) can cause nausea, headaches, rash, eye and throat irritation, lethargy, and malaise.

Long term exposure has been linked to overworked liver and kidneys, cognitive impairment, personality changes, and cancer.

- Personal care products like perfume, cologne, nail polish, nail polish remover, and rubbing alcohol
- Cleaning material such as glass cleaner, dishwashing detergent, and laundry detergent
- Deodorizers, moth balls, and air fresheners
- Refrigerants and fuels
- Tobacco smoke
- Alcoholic drinks
- Automobile emissions in attached garages



## What are the causes?

VOCs are naturally occurring, man-made, and ubiquitous. They evaporate and sublime from a large number of products and materials we use every day

- Paints, paint stripper, adhesives, adhesive removers, and protective coatings
- Aerosol sprays
- Upholstered furniture and carpets

## What can I do about it?

- Ventilate by opening windows, turning on your oven hood vent or using a ventilation system whenever you use the products above.
- Store materials like paints and adhesives away from heavily occupied spaces. Outside or in a garage is preferable.
- Try to minimize the use of VOC sources such as air fresheners and candles.
- Keep all containers tightly sealed.
- Use an air purifier that specifically reduces TVOCs.

# PM2.5 (Particulate Matter)

## How does this affect me?

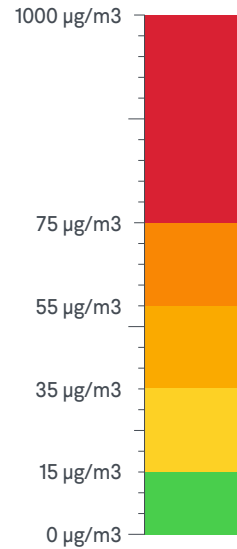
Particulate Matter is far more problematic than many people realize. PM2.5 is a primary trigger for allergy and asthma attacks as well as eczema outbreaks. It can also worsen symptoms of chronic and acute bronchitis. Exposure to PM2.5 is linked to respiratory problems, heart disease and cancer.

## What are the causes?

Particulate matter comes from many sources. Some are natural, such as human dander, animal dander, pollen, and mold spores. Others are man-made, such as cigarette smoke, smoke from factories and manufacturing, combustion from vehicles, and a large number of other activities.

## What can I do about it?

- Do not dry dust your home or office. Dry dusting simply moves dust around or flings it into the air where it is more easily breathed in.
- Use a damp cloth to remove dust from all surfaces. Use furniture polish and multipurpose sprays if possible.
- Regularly vacuum any carpets and upholstery.
- Inspect and clean duct work
- HEPA air purifiers are the best at removing particulates from the air.



## References

### Temperature

ASHRAE Standard 55  
ISO 7730

### Relative Humidity

ASHRAE standard 55  
ASHRAE Standard 62.1-2013  
ISO 7730

### Carbon Dioxide

ASHRAE standard 62.1  
Is CO2 an indoor pollutant? Direct effects of low-to-moderate CO2 concentrations on human decision-making performance.  
Carbon dioxide toxicity and climate change: a serious unapprehended risk for human health  
Indoor Air 2000, associations between Indoor CO2 Concentrations and Sick Building Syndrome Symptoms in US office buildings

### Chemicals (TVOCs)

EPA VOCs impact on indoor air quality  
Bundesgesundheitsbl - Gesundheitsforsch - Gesundheitsschutz 2007 50: 990-1005 DOI 10.1007/s00103-007-0290-y c Springer Medizin Verlag 2007  
Sensirion: Indoor Air Quality and VOCs

### PM2.5 (Particulate Matter)

WHO Air Quality Guidelines for PM, Ozone, Nitrogen Dioxide and Sulfur Dioxide  
WELL Building Standard Air Quality  
EPA Air Quality Index Breakpoints