

**Step 4**  
**AIR CONDITIONING**

# AIRLIFE

 Integration into the CARRIER product range

The different elements that improve the Indoor Air Quality are at the moment mainly used in three product ranges:

**Individual air treatment**  
MODULES

42GM

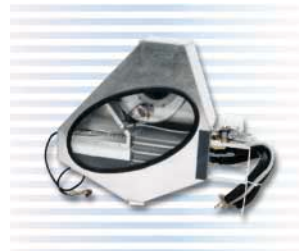


**INSTALLATION IN THE AIR CORRIDOR**

Its low height permits easy integration into the air corridor of false ceilings.

**Air treatment**  
MODULES

42GR

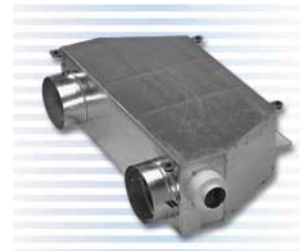


**INSTALLATION IN THE PLANT ROOM**

Designed for integration into a plant room.

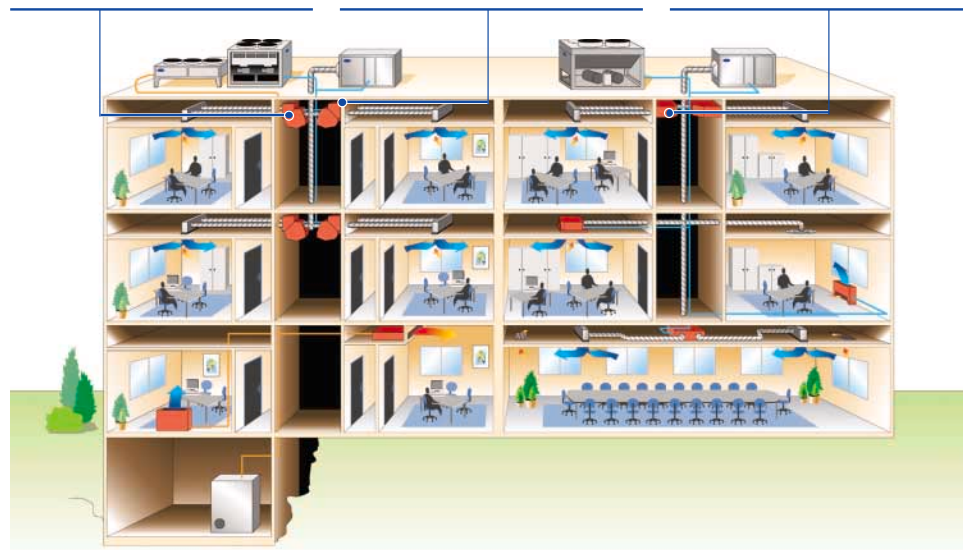
**Individual comfort**  
MODULES

42BJ



**INSTALLATION IN THE FALSE CEILING**

Designed for installation in an air circulation corridor, in false ceilings, with air supply/return ducts on the same side.



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# TECHNICAL NEWS LETTER

Special  
LIGHT AND  
MEDIUM-SIZE  
INDUSTRIAL  
APPLICATIONS

# AIRLIFE



«the air inside an office  
is probably ten times  
more polluted than the outside air»

## EDITO

According to Gary RAW,

Director of the Centre for Safety, Health and the Environment in Great Britain, «The air inside an office is probably ten times more polluted than the outside air». And we spend 90% of our time in enclosed spaces (...)

*continued on the next page*

# RESEARCH The air quality in offices

(continued from cover page)

... According to the American Medical Association (AMA) skin and lung irritation, nausea, asthma and other respiratory

**«50% of all illnesses are caused or aggravated by pollution...»**

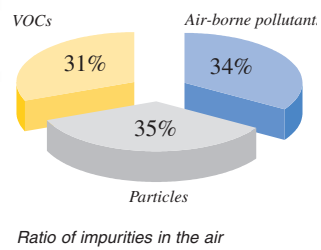
50% of all illnesses, including allergies, are caused or aggravated by the pollution of the indoor air.

The WHO (World Health Organisation) has ranked allergies third in the list of worldwide ailments after cancer and cardiovascular diseases. All studies are confirmed by the Indoor Air Quality Observatory. Today, offices and houses can contain bacteria, viruses, mould, fungus, mites and Volatile Organic Compounds (VOCs). All these pollutants impair air quality and can be harmful to our health: headache, fatigue, nose, eye,

construction or restoration operation on the environment. But a zero pollution level does not exist, the indoor air can still be very harmful to our health.

**«...being exposed to these pollutants for too long can cause cancer.»**

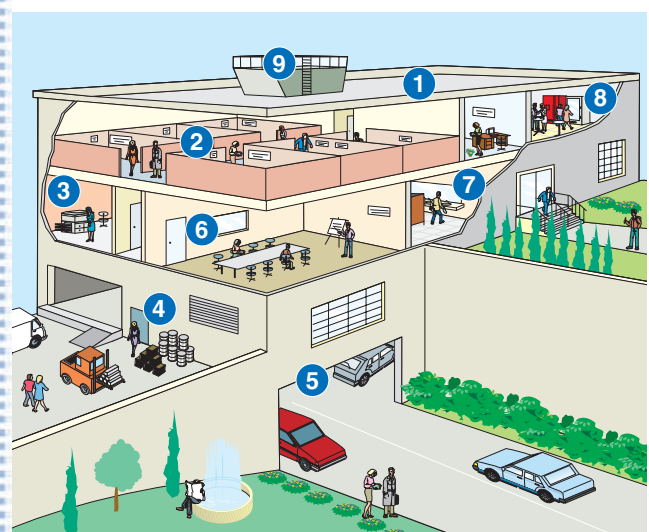
To remedy this problem, there is an economical solution. What is it?



Ratio of impurities in the air

**For the last ten years Carrier has worked on the development of an Indoor Air Quality control system that is integrated into the air conditioning units.**

**A major innovation that is the beginning of a new era in air conditioning...**



Pollution zones in office buildings

- 1- Roof**  
Asbestos, histoplasmosis...
- 2- Offices**  
Marker solvents... textiles, carpets... formaldehyde (PC printer)...
- 3- Photocopier zone**  
Photocopiers, VOCs, ozone...
- 4- Loading bay**  
Carbon monoxide, ozone, fuel oil, paints...
- 5- Car park**  
Particles, nitrogen dioxide...
- 6- Conference area / auditorium**  
Pollution created by human activity, pollutants emitted by heating systems...
- 7- Sanitary areas**  
Cleaning products, humidity...
- 8- Kitchens / restaurant**  
Mould, odours...
- 9- Ventilation system**  
Pesticides, legionella, pollen, glass fibres...

## THE FRENCH LAW

French workplace codes (art. R232- 5; art. R232- 5- 1; art. R232- 5- 3...) set the minimum fresh air flow rates per occupant (in cubic metres per hour) depending on the application:

- offices, areas without physical work (25 m<sup>3</sup>/h/person);
- restaurants, sales areas, meeting rooms (30 m<sup>3</sup>/h/person);
- workshops and areas with light physical work (45 m<sup>3</sup>/h/person);
- other workshops and rooms (60 m<sup>3</sup>/h/person).

The air renewal rates for the workplace code result directly from the RSDT.

An extract of the document, dated August 9, 1978 (relating to the revision of the RSDT), article 64, describes the admissible CO<sub>2</sub> thresholds:

«(...) The carbon dioxide concentration conditions in the atmosphere of normally occupied areas must never exceed 1/1000, with a tolerance of 1.3/1000 in rooms where it is forbidden to smoke.

If the occupation of the rooms varies a lot, modulated or interrupted ventilation is permitted, provided the carbon dioxide concentration does not exceed the fixed values above.

If the rooms are not occupied, ventilation can be stopped (...).

These official texts permit changing the ventilation rate in accordance with the actual room occupation.

# THE Carrier SOLUTION AIRLIFE

AIR CONDITIONING AND INDOOR AIR QUALITY IN ONE PRODUCT

## Step 1 HIGH-EFFICIENCY FILTRATION

Made more efficient by the use of a new «F6» type filter in accordance with standard EN 779.

**Filter characteristics**  
45% of particles with a size of 1 µm or less are blocked, either by impact with the fibres or by the tension between the fibres or by interception.



## Step 3 THE DILUTION or modulation of the fresh air flow rate

In order to control the air flow rate in a room, CARRIER units can be equipped with a fresh air flow modulation system.

### Three objectives

□ Adaptation of the ventilation rate according to the actual room occupation in order to maintain the CO<sub>2</sub> concentration below 1000/1300 ppm, (this modulation reduces the risks of under-ventilation in the case of over-occupation of a room).

□ Maintaining good Indoor Air Quality to ensure the comfort and hygiene of the occupants (this is improved by the air purification module), in accordance with the workplace code.

□ Control of the energy expenditure due to the air renewal in the rooms, when this is changed to prevent over-ventilation of the building and to minimise the operating costs especially during unoccupied periods.

### Operating principle

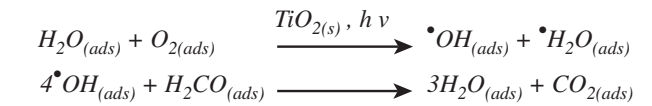
The occupants in a room release on average 16.2 l/h CO<sub>2</sub>, depending on their activity. A CO<sub>2</sub> sensor located in the return air duct of the terminal

## Step 2 AIR PURIFICATION

CARRIER and the UTC Research Centre have combined their resources to develop a patented air purification system: the UV-PCO module (photocatalytic oxidation using UV rays) can be integrated into the terminal units.

The purification or elimination of contaminants is achieved by degrading the gases that are present in the air and potentially irritating to people, such as VOCs, odours and air-borne pollutants.

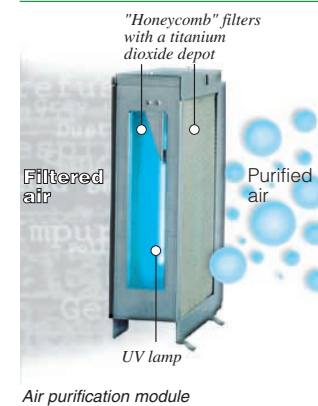
The air purifier is placed between the filter and the fan-motor assembly of the unit. As the name indicates, it purifies the air using a photocatalytic process and a UV lamp that emits its light in the direction of a catalytic filter covered with titanium dioxide (TiO<sub>2</sub>). This leads to the following reaction: the TiO<sub>2</sub> molecules transform the water and oxygen contained in the air into free radicals. These will destroy the volatile organic compounds and unpleasant odours and transform them into CO<sub>2</sub> and H<sub>2</sub>O, as shown below:



Photocatalytic reaction on H<sub>2</sub>CO formaldehyde

Moreover, the use of UV rays will destroy the majority of air-borne pollutants present in the building atmosphere.

The UVC rays situated between 200-280 nm are used



Air purification module

most frequently for their germicidal action. In fact, if the air-borne pollutants pass over the UVC rays, the ultraviolet light penetrates the membrane and the core of the micro-organism and cuts the molecular links of the DNA (deoxyribonucleic acid). This process makes it impossible for the cells to reproduce and kills them a few moments later.

### Fresh air flow modulation system

