AIRTECHNIC
www.airtechnic.gr
Air-Conditioning & Ventilation Components & Systems

VENTS

STOP COVID

GUIDANCE ON GENERAL VENTILATION DURING COVID-19

VENTILATION-SYSTEM.COM

CONTENTS

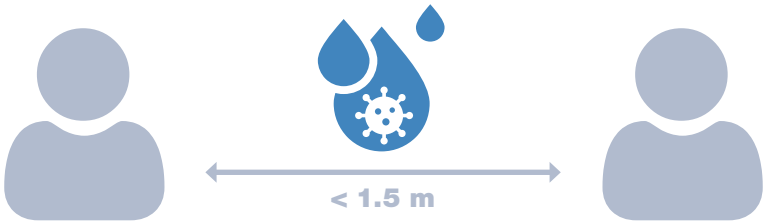
AIR EXCHANGE PROCESSES UNDER COVID-19 CONDITIONS

CLEAN AIR AGAINST VIRAL DISEASES

One of the main conditions for maintaining health and normal human life is fresh and clean air. The implementation of effective anti-epidemic measures in its time saved humanity from such dangerous infectious diseases as smallpox, plague, cholera and significantly reduced tuberculosis infection rate.
However, humanity periodically has to face new challenges in the field of health care.
The COVID-19 pandemic is currently one of such serious challenges.

Dr. Tedros Adhanom Ghebreyesus, Director-General of the World Health Organization, in his opening remarks at a press briefing on COVID-19 on April 6, 2021, noted that despite the accelerated pace of COVID-19 vaccine development, production and use, as well as the start of vaccination in 190 countries, the global community must take five essential steps in the coming year, including the creation of a healthy and safe living environment for people.
It is known that the main channel of COVID-19 spread is airborne.
The virus is transmitted from one person to another through close contact.
In accordance with this conclusion, specialists have developed a number of effective preventive measures to fight the disease, including wearing medical masks, maintaining the necessary distance between people, reducing social contacts, etc.
However, recent scientific data cast doubt on the leading role of the airborne route of infection.
Studies have confirmed that viruses can spread with aerosols, the tiny particles that are emitted by infected people even during normal conversation.

Aerosols from sneezing, coughing, or speaking can remain in the air for hours and can spread tens of meters.
The more people in the room and the longer they are in dangerously close proximity to each other, the greater the risk of viral transmission.
This is especially true for rooms with insufficient ventilation, where the number of viruses is constantly growing.



HOW TO MINIMIZE THE RISKS OF COVID-19 INFECTION

The key factor to minimizing the risk of airborne virus spread is to improve air quality through ventilation — the inflow of clean air from outside and the simultaneous removal of stale, contaminated air, and the timely replacement of fine filters for purification of the extract and supply air. Certainly, ventilation is not the only measure against infection.
A wide range of anti-epidemic measures should be applied:

Wet cleaning

Distancing from each other

Wearing personal respiratory protection

Hand washing

Room ventilation

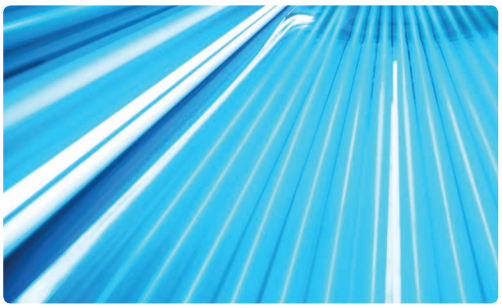
COVID-19 is caused by the SARS-CoV-2 virus, one of the ways of its spreading is through airborne and aerosol transmission of infection between people in closed and poorly ventilated rooms: offices, restaurants, fitness clubs, nightclubs.
Most of humanity needs to have protection from the environmental impacts, especially in climatic zones with significant temperature variations.
Therefore, the need for a long or frequent stay of people in closed rooms, mainly in areas with temperate and cold climate makes special requirements for the quality of the indoor air environment, its disinfection.

AIR DISINFECTION METHODS

A known method of disinfection is the use of electromagnetic radiation in the ultraviolet range. Ultraviolet light with a wavelength of about 263 nm has the most pronounced bactericidal properties.

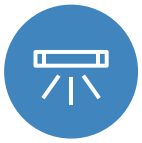
Disinfection takes place by destroying the bonds in DNA and RNA molecules by photons, destroying microorganisms or depriving them of their ability to reproduce.

This principle is used in bactericidal irradiators, which are based on high and low pressure mercury lamps, pulsed xenon and excimer lamps, and LED lamps.



TYPES OF IRRADIATORS

Open-type irradiators



In the absence of people in the room the open-type UV irradiators can be used.

Disinfection by direct irradiation with ultraviolet rays occurs in places where waves directly hit the surface.

Since the rays do not have penetrating power, microbes or viruses located under a grease film or dust, as well as located on the back of the surface, can remain viable.

A more or less acceptable level of disinfection of surfaces and objects in the room can be achieved by moving several irradiators over the treated area, although complete coverage, the so-called ‘dead zones’, still can not be achieved.

These devices are also ineffective for air disinfection in cases of possible transmission of infection by aerosols.

It is acceptable to use them when finishing cleaning small rooms in order to create sterile conditions on the objects’ surfaces, for example, in medical treatment rooms.

Shielded irradiators

Shielded irradiators can be used in the presence of people.
Directing the radiation with the screen into the upper sphere of the room ensures safety for the eyes of those present.
The disinfection process is ensured by convection, namely the process of natural replacement of the disinfected upper layers of the air environment by the lower ones.
The presence of light-coloured wall and ceiling coatings with high UV reflection coefficients are the limiting conditions for their use.
The use of shielded irradiators for disinfection is warranted in rooms with high ceilings and walls of light colours, lack of effective supply and exhaust ventilation, with a high risk of airborne infection transmission.

Air sanitizers

Sanitizers disinfect the air while passing inside the device casing.
The air flow, forced from the outside, passes in the area of the mercury lamp with a uviol glass bulb.
Uviol glass lamps have a limited lifespan, after which they may physically fail or lose their disinfectant properties.
Disinfection with closed irradiators is effective only within the range of UV rays.
Since the natural circulation of air in closed rooms does not result in qualitative changes in the air environment parameters, it remains practically unchanged outside the enclosure.
In such cases, an effective change of used air volume, described by the concept of air exchange rate, is required: at least 6 times the air exchange rate with air cleaning in 46 minutes, and better yet, 12 times the air cleaning in 23 minutes.
With the use of air sanitizers under conditions of natural air exchange, the disinfection time is much longer, while the parameters of the air quality are worse.
To reduce the spread of coronavirus infection indoors, it is recommended to use air sanitizers along with general ventilation.

REDUCTION OF COVID-19 SPREAD BY MEANS OF GENERAL VENTILATION

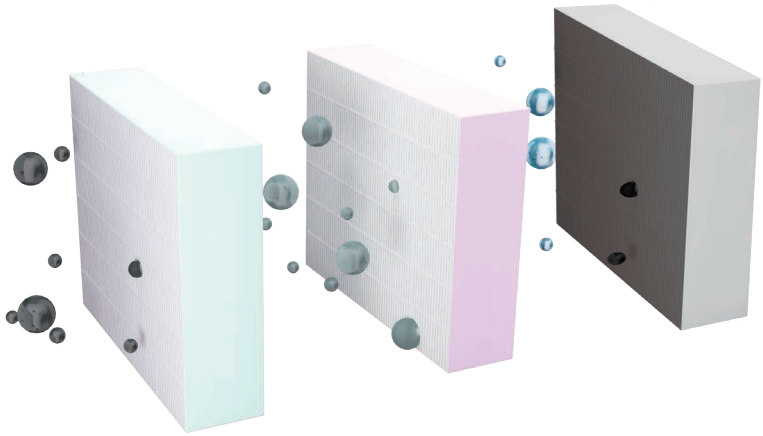
The World Health Organization names the main ways to successfully reduce the spread of coronavirus infection indoors:

- improving the efficiency of closed rooms ventilation by increasing the rate of air exchange
- reducing of air recirculation (reintroduction of exhaust air into the room)
- increasing the supply of outside air, especially when there are a large number of people present

The airborne viruses transmission can be eliminated by separating the extract and supply air flows.
The combination of air ducts in one casing allows the transfer of thermal energy from one air flow to another with almost no losses.
Such devices are called heat exchangers.

The use of energy-saving heat exchangers makes it possible both to maintain efficient air exchange and to significantly reduce the costs due to the special design of the device.

Air handling units with near-silent operation in heat-insulated casing with air flow up to 690 m^3/h and recovery efficiency up to 93 %.
These complete heat recovery ventilation units are used for ventilation of apartments and cottages.
Stale contaminated air and fresh clean air are passed through a plate enthalpy heat exchanger, which reduces the energy costs of supply and exhaust ventilation.
Supply and exhaust air flows pass through panel filters, which provides a high degree of air purification.



G4 filter F8/H13 filter Carbon filter

Electronically commutated EC motors with an external rotor and a centrifugal impeller with backward-curved blades are characterized by high performance and optimum control with smooth speed variation over the entire speed range.
Modern EC motors can achieve efficiency up to 90 %. Built-in automation allows the unit to be integrated into modern household management systems.
The condensate formed in the cold season during heat transfer is collected in a plastic drain pan and then discharged into the sewage system.
Heat exchange between the extract and supply air flows can significantly reduce the load on heating devices or air conditioning (depending on the season and ambient temperature).

VENTS VUT/VUE V(B) EC

Air handling units with air flow up to 690 m^3/h in sound- and heat-insulated casing.
Heat recovery efficiency – up to 93 %.

Special requirements are imposed on the quality of the air environment in rooms with a large number of people, characterized by increased physical activity, which is typical for pre-school and school educational institutions.
This is caused by a more active increase in humidity, the concentration of carbon dioxide in the air, and a decrease in oxygen levels.

These factors have a negative impact on the mucous membranes, reduce attention, boost fatigue, which negatively affects both health and the level of information perception by children.
Air exchange in playrooms or classrooms without stationary supply-exhaust ventilation devices through short-term opening of windows and doors does not radically improve the air environment quality and prevent the viral infections spread, including COVID-19.

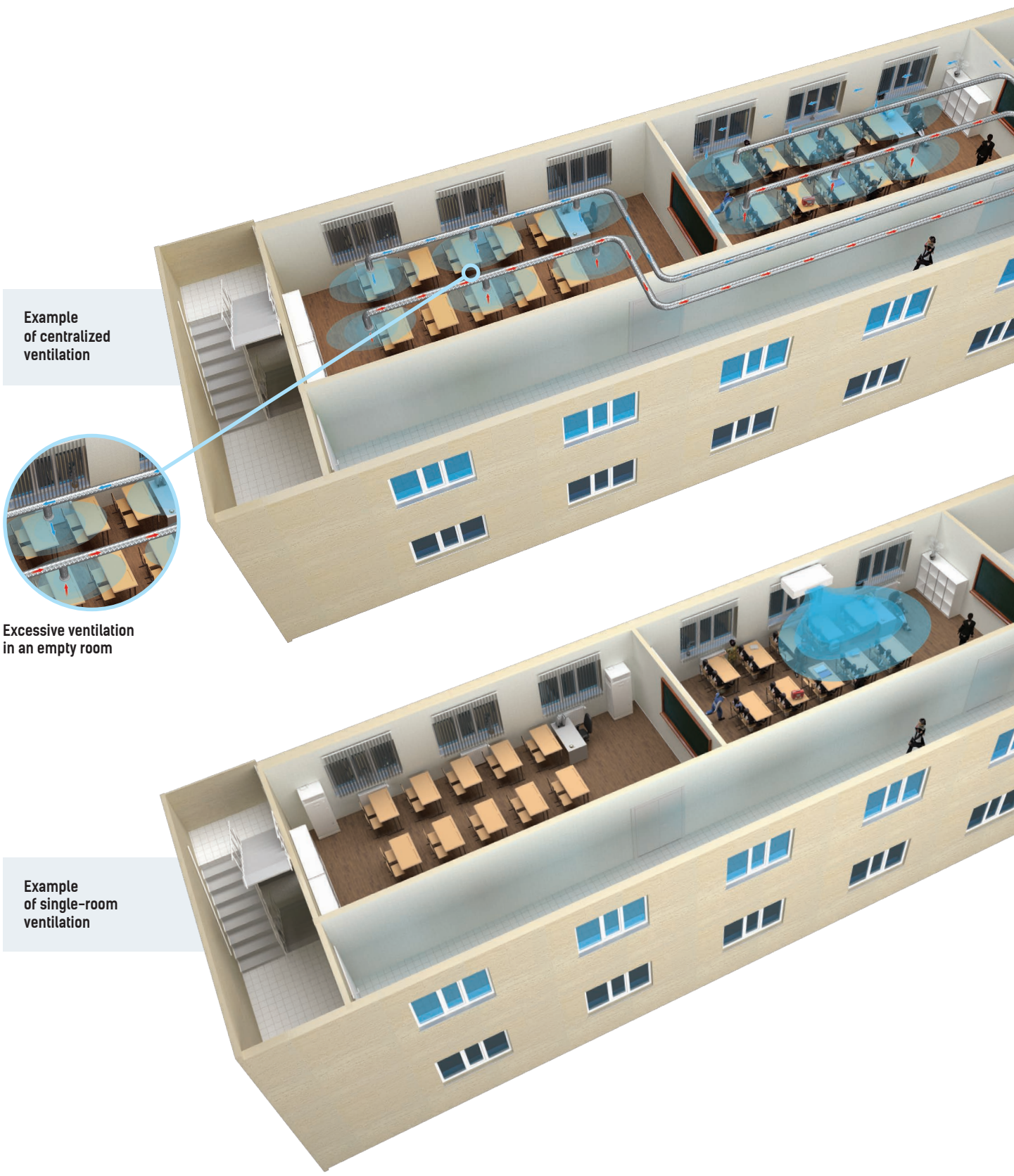
On the contrary, due to a sharp decrease in temperature and the formation of draughts, the incoming air mass contributes to a decrease in the protective properties of the human body.
This procedure of updating the air environment leads not only to a dramatic change in the stable indicators of the room atmosphere, but also to significant heat loss due to the warming of the air from outside during the cold season.

The deterioration in air performance is also due to the presence of volatile organic compounds in the air, which are emitted from furniture, protective coatings and materials.
High levels of humidity in the absence of supply and exhaust ventilation contribute to the growth of mould and microbes, which often cause allergic diseases.
The elimination of the above factors in modern conditions is achieved by the use of centralized supply and exhaust ventilation systems, the parameters of which are set at the stage of building design.

However, at present there are frequent cases of using previously constructed buildings in which there is no stationary ventilation system and its integration into existing structures is problematic or too costly.

In such cases, single-room ventilation can be used.
The advantages of this technical solution are:

- **the possibility of placing individual ventilation units in different rooms, taking into account their characteristics**
- **no need to install ductwork reduces the cost of ventilation. The flow of intake air through a short duct in the wall and the automatic system of air flow control optimize losses due to the network resistance**
- **no need to install fire dampers since there is no spread of flames from one room to another via the ventilation duct**



Example of centralized ventilation

Excessive ventilation in an empty room

Example of single-room ventilation

Heat exchangers with enthalpy membranes are used for ventilation systems of private houses.
Electric preheaters or reheaters are available, depending on the climatic conditions of the environment.
Near-silent operation with sound levels of 25 up to 35 dB is ensured by EC motors with low power consumption.
During the cold season as warm stale extract air flows through the heat exchanger, it gives off its heat through the duct wall to the intake air stream.
Air purity is ensured by the use of fine exhaust and supply filters.
Automatic air dampers eliminate drafts when the unit is off.
Single-room ventilation units with heat/energy recovery are controlled by the controller in automatic mode and are equipped with a wall-mounted touch control panel with LED indication.
The ability to integrate the unit into modern Smart Home systems allows remote control via Wi-Fi.
The use of suspended and floor-mounted single-room air handling units in heat- and sound-insulated casings makes it possible to achieve heat recovery efficiency up to 96 % with an air flow up to 1240 m^3/h.
Examples of such units are the DVUT HB EC, DVUE HB EC, DVUT PB EC heat exchangers, manufactured in series by Vents company.

DVUT HB EC
DVUE HB EC

Floor-mounted single-room air handling units in heat- and sound-insulated casing

DVUT PB EC

Suspended single-room air handling units in heat- and sound-insulated casing

AIRTECHNIC
www.airtechnic.gr
Air-Conditioning & Ventilation Components & Systems

VENTS

CONCLUSION

Under conditions of airborne coronavirus infection in crowded places, the operation of ultraviolet air disinfection devices is insufficient.
The use of energy-saving supply and exhaust ventilation with filtration plays a leading role in reducing the load and spread of viral pathogens indoors.

GUIDANCE ON GENERAL VENTILATION DURING COVID-19

AIRTECHNIC
www.airtechnic.gr
Air-Conditioning & Ventilation Components & Systems

Μιχαήλ Καραολή 19, τκ 143 43, Ν. Χαλκηδόνα, Αθήνα
Τηλ: 211 - 70.55.500 & 210 - 21.30.051, Fax: 210 - 22.23.283

Guidance on general ventilation during COVID-19. The catalogue information is for reference only.

2021-04