Air clear of SARS-CoV-2
BREATHE EASY

eco³ Air purifier

TESTED BY
Proven to be 99.7% effective

SGS Prevention and Environment division
Who are we?

Hispacold is a benchmark company in the air-conditioning sector with more than 40 years of expertise in supplying all types of passenger transport with specialised Heating, Ventilation and Air Conditioning (HVAC) equipment.

- Its systems are in operation in more than 100 countries across the five continents
- The systems work in all climate conditions
- Its (R&D) policy ensures Hispacold’s own technologies are built into products
- Close collaboration with technological institutes and universities
- Numerous registered patents
- Management system certified in Quality Control, Environment & Safety at Work

NEW AGE OF HVAC SYSTEMS
Innovative Hispacold

Ten years ago, concerned about the air quality inside vehicles, and as part of its firm commitment to R&D, Hispacold, developed an air purifier in response to market demand.
Indoor air quality without eco3

- Poor indoor air quality.
- High concentration of harmful germs, bacteria and viruses in passenger compartments and air conditioning ducts.
- Risk of catching respiratory infections and illnesses.
- Bad odours and stale environment.
- Fatigue due to lowered oxygen levels.
Indoor Air quality in vehicles equipped with eco3

The eco3 air purifier generates an environment free of harmful microbes, viruses, bacteria and dust by releasing positive and negative ions generated during the normal air recycling process of standard HVAC systems. During the ion-generation process, ozone is produced in a very low concentration (< 0,05 ppm) harmless to passengers, eliminating bad odours and increasing the amount of oxygen in the passenger compartments. This, in turn, reduces tiredness among passengers and drivers.
Device Use

- Compatible with all types of buses and coaches, including single and double deckers, vehicles of all lengths, articulated and multi-segmented vehicles.

- Modular Units: The greater the volume of air processed by the HVAC system, the greater the number of units needed.
  - One unit for buses < 7m
  - Two units for buses between 7m y 15m
  - Four for articulated vehicles/double deckers

- Electromagnetic compatibility certificate: R10

- Compatible with all fuel-types: petrol, diesel, electric, hybrid and hydrogen-powered vehicles. No impact on day-to-day operations.
Easy Fitting

1. Identify where the processed air leaves the air-conditioning system inside the vehicle.
2. Use the connection on the device to start it.
3. Hook up the electrical feed 24VdC to the connection included in the device.
4. In order to ensure the air travels at minimum speed through the eco3 in line with specified guidance, the electrical feed should only be connected when the evaporator blowers in the air conditioning system are running.
Air purifier

LOCATION

Bottom view: Air inlet area of the HVAC systems inside the vehicle.

HVAC Air inlet area

HVAC Heat exchangers

POSITION

Recommended position:

CHECKING

Green LED light = OK.

LED light on = Working OK.
Technical features

**DATA SHEET**

- Voltage: 24 VDC
- Consumption: 40 mA
- Weight: 230 g
- Temperature Range: from -10 °C to +65 °C
- Life operation: 20,000 h
- Minimum air speed: 0.3 m/s
- EMC according to ECE R10 Regulation
- Generation of negative ions/unit: $3 \times 10^9$ ions/cm$^3$
- Generation of Ozone: < 0.05 ppm

**MAINTENANCE-FREE**

- Ensure min. air speed through eco3 device is 0.3 m/s
- Check that the Green LED is on.
How it works
How it works?

**eco3** functions by generating a high concentration of ions drawn from air circulated through the air conditioning system and by releasing low amounts of ozone which keeps the air inside the vehicle healthy, clean and oxygenated, while also eliminating bad odours.
The Effects of OH- free radicals in the disinfection of air bioaerosols
A high production and concentration of OH radicals is necessary to quickly destroy pathogens in the atmosphere.

**Advantages of the use of the hydroxyl radical (OH) as a disinfectant.**

- The hydroxyl radical, known as the 'detergent of the atmosphere', is indiscriminate in its ability to destroy all pathogens in low but lethal doses due to its extreme reactivity which enables it to oxidise most of the chemicals found in the troposphere.
- The hydroxyl radical has an oxidation potential of 2.8 V - only slightly smaller than the potential of Fluorine (F2) with a potential of 3.03 V.
- It has a very short processing time, reacting in only a few seconds as soon as it is formed.
- The speed of the chemical reaction is 107 times faster than other oxidants like O₃ (Ozone), H₂O₂ and O₂.
- They are green oxidants. They are environmentally benign.
- The OH radicals break down into H₂O and O₂ during the chemical reaction.
How does the eco3 device generate these free radicals?

During ionisation, oxygen and water vapour are released into the air through the generation of a strong electrical field.
The movement of electrons creates an irreversible alteration in the macromolecules (membrane proteins of DNA).

The hydroxyl radicals are unstable and to become stable they take hydrogen from any particle existing in the air or on surfaces, neutralising it and generating water vapour in the resultant chemical reaction which is released back into the air.

Positive Ions H⁺ \((H_2O)_n\)

Negative Ions O₂⁻ \((H_2O)_m\)
eco3 air purifier features
Laboratory Test Results on eco3

According to the Spanish quality standard UNE 100012: 2005 on air pollution, the maximum microbial count for indoor environments should be less than 800 CFU/m³. A higher mesophilic aerobic microorganism count (or aerobic colony count or Aerobic Plate Count (APC) or Mesophilic count) means corrective measures need to be taken. Studies made in collaboration with Sevilla University.

Air samples were taken from vehicles with, and without, the Eco3 air purifier. Following laboratory tests, the aerobic colony count (or Aerobic Plate Count (APC)/or Mesophilic count (CFU/m³) was reduced by 93% in the vehicles fitted with the Eco3 air purifier system.
Proben to be 99.7% effective by the National Institute of Aerospace Technology (INTA)

The eco3 air purifier of Hispacold has been tested in laboratories of the National Institute of Aerospace Technology (INTA), a Public Research Organisation (PRO), attached to the Defence Ministry of the Government of Spain dedicated to scientific research and the development of systems and prototypes, that it trials and field tests materials, components, equipment, systems and subsystems and certifies their effectiveness.

The trials were carried out inside a 15-meter long coach.
The virus used in the tests was MS2, a virus which needs ten times more energy to render it inactive than the energy needed to neutralise SARS Cov-2.
Trials carried in the Biological Defence area of the Defence Systems Department (CBN) of the National Institute of Aerospace Technology (INTA).
What are the advantages of the eco3 Air Purifier?

- It is always in operation and will work when there are passengers on board the vehicle.
- Maintenance manual.
- It works in any vehicle, not just those installed with Hispacold HVAC system.
- Guaranteed life time of 20,000 hours.
- Reduces the risk of infection and sickness among passengers.
- Prevents motion sickness and feelings of nausea.
- Can be fitted in vehicles already in operation.
- Acts to reduce airborne and surface particles.
- Eliminates chemical pollutants from the air.
Compatible with HVAC Hispacold and all brands

The eco3 air purifier can be fitted in all vehicles equipped with Hispacold ventilation systems and equally, in those using other HVAC system brands.

Its installation is straightforward, quick and clean, with simple assembly instructions.
Easy installation and maintenance manual

Hispacold guarantees the operating life of the eco3 will last 20,000 hours without any need for maintenance.

can be fitted easily in all types of vehicles including buses and coaches between 5 metres and up to 18 metres in length, and in articulated buses comprising of two or more sections.

can also be fitted easily in all types of vehicles including underground and overground trains and trams.
Identity sticker for vehicles equipped with eco3

We offer transport operators who install the eco3 purifier in their vehicle an identification sticker to put on their glass windows or windscreens.
Intensively market tested

More than 10,000 eco³ units have been fitted and are disinfecting, cleaning and purifying the air inside buses and coaches in more than 20 countries.

+10,000 eco³ systems fitted to date
For all enquiries please contact

Verónica Mesa.

vmesa@hispacold.es

+34 651 87 51 27
Air purifier

hispacold.es