

CRYSTALL AIR QUALITY



INDOOR AIR QUALITY GUARANTEED



SABIANA
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ENVIRONMENTAL WELLBEING

What is it that gives us a feeling of wellbeing when we are in a confined environment, whether our home, an office or a meeting place for having fun?

A definition of wellbeing, **or better yet environmental comfort**, that is pertinent not only to these places, could be: "Subjective sensation of a pleasant material life, where the expression 'state of wellbeing', in the science of environmental control, refers to the ideal levels of factors that influence the livability of a confined space, such as: air temperature, radiant temperatures of surfaces, relative humidity in the air at ambient temperature, concentrations of pollutants present, air speed, etc."

These factors must fall within preset limits, so that the people inside a given space for a reasonably long period of time (in general, over one hour) can feel comfortable, without any negative sensations of heat, cold, unpleasant odors or the presence of substances considered hazardous to health.

Naturally, the sensation of environmental comfort has changed over time. A few decades ago, the primary, and at times the only requirement, was to stay in a heated environment during the winter months, and it was not important what source of heat was used or where it was situated.

Over time these aspects were improved through the introduction of heat sources that were not dangerous, or positioned in dedicated spaces, reducing ventilation with external air to a minimum in order to remove or dilute the harmful substances produced inside of inhabited areas.

Not so long ago, the need to cool these same areas during the summer months to improve the sensation of wellbeing for the entire span of the year, as opposed to only during the winter months, also emerged.

The market has continued to develop ever more complex, high performing equipment to respond to the new demands of the public, and the simple term "heating" has evolved to become the more complex expressions "climatizing or conditioning".

Over the last several years, another fundamental need has arisen, one that was taken for granted and underestimated in the past – the need for air quality inside of confined spaces.

This new demand stems from the need to avoid inhabiting spaces where the presence of hazardous substances dispersed in the air could cause risks to human health.

This is why some of today's air conditioning machines are built or installed in combination with innovative filtering systems, designed to improve air quality by drastically reducing harmful substances and pollutants, thus also reducing health risks and further improving the sensation of wellbeing for the inhabitants.

THE CRYSTALL ELECTRONIC AIR FILTER

The **Crystall electronic air filter** was specifically designed to improve indoor air quality and to protect the health of the inhabitants.

Today the filter **is manufactured by Sabiana** and is applied to many air conditioning devices and terminals, integrating and completing them with this very valuable function, without any reduction in thermal performance. Very soon, many devices will be fitted with electronic air filtering systems designed to improve environmental wellbeing and healthy living conditions, in light of the fact that human health will continue to be a need that cannot be overlooked.

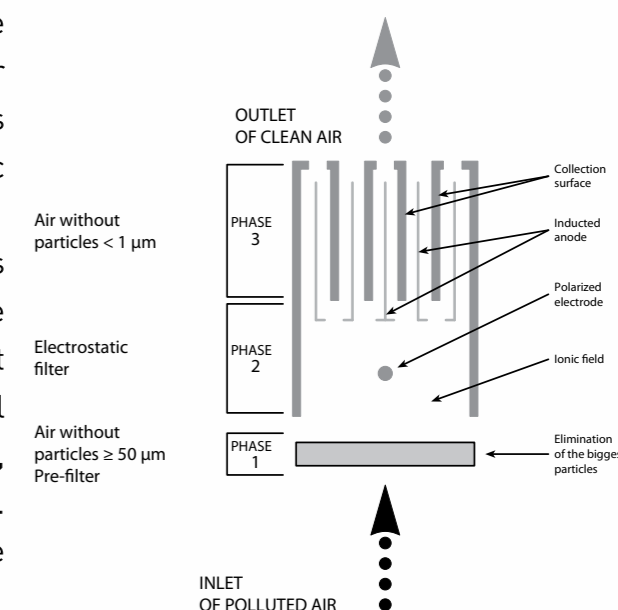


HOW IT WORKS

The Crystall electronic air filter is based on the principle of separation of particles in the air through electric polarization of the particles and subsequent capture on opposing metallic surfaces with opposite polarity.

The filter is composed of thin metallic blades tapered together, forming multiple intense electric fields. The pollutant particles that transit through the blades, get charged by a special electrode and are attracted as if by tiny magnets, and then trapped on the opposing blade surfaces. The energy consumption of this process is quite marginal, about 4/7 W per 1,000 m³ of air.

The electronic air filter is constructed in metallic materials and is easy to clean using water and common detergents, giving it significant durability.



THERMAL MACHINES THAT ARE FITTED WITH THE CRYSTALL ELECTRONIC AIR FILTER

The fan coil units

All models and versions of the **Carisma** and **SkyStar** fan coil units are available with the exclusive patented Crystall electronic air filter. The adoption of an electronic air filter is based on the need to combine air conditioning and air purification functions in a single device. In particular, the following pollutants are eliminated from the air: cigarette smoke, dust, fibers, microbiological substances including bacteria, fungi, etc., all hazardous to human health.

Improved indoor air quality also reduces the need for rooms to be aired, resulting in lower consumption.

Choosing to purify the air with a Crystall air filter will not have any impact on the size of the living space, because the dimensions of the fan coil unit remain basically unchanged (only 8 cm more in height for Carisma and 3 cm for SkyStar).



The position of the electrostatic filter permits simple and effective maintenance, and because it can easily be washed it will last virtually forever.

During the spring and autumn, when air conditioning and heating are not necessary, the device functions simply as an air purifier.

The Carisma fan coil unit with the Crystall electronic air filter is provided completely wired to be installed just like a traditional fan coil unit. For the ceiling mounted SkyStar fan coil unit, the filter is fitted as an accessory, and can therefore also be installed at a later time.

In both cases, the electronic air filter is easy to access for facilitated cleaning.

Based on efficiency tests carried out at the Polytechnic Institute of Turin, the filter was classified Class D according to UNI Standard 11254:2007, with performance similar to initial performance levels of a traditional mechanical filter certified Class F9 in accordance with UNI Standard 779:2012.



Carisma fan coil unit



SkyStar

Air diffusers and terminals

The **Crystall Duct System** and **Crystall Flex System** are innovative filtering systems that can be combined with air flow vents or inserted into ducts.

These systems were designed to reduce the passage of various types of pollutants present in the ducts of indoor air conditioning units.

They are therefore recommended for use in different types of environments, such as: schools, hospitals and clinics, nursing homes, hallways, waiting rooms, recovery rooms, medical offices, hotels and anywhere where it is necessary to improve the quality of indoor air.

The causes for the presence of pollutants in air ducts are many. The main reason is inadequate or poor cleaning and maintenance on the ducts, or lack of it all together, and other factors, including improper balancing and/or pressurization of the ducts, circulation of air between one space and another while the system is off, the lack of suitable filters or air bypassing the filtering cells in the air handling unit, as well as humidity, proliferation of bacteria, etc.



Crystall Duct System



Crystall Flex System

Even though it is possible to reduce pollution in the ducts through adequate periodic maintenance, the truth is that this rarely happens, due to the significant costs involved, difficulty of access or impossibility of stopping the system for a prolonged period of time.

One possible alternative solution for significantly reducing risks to human health and cutting maintenance costs for the ducts is the installation of electrostatic filtering barriers just before the air flows into the conditioned spaces.

It is well known that electronic filters are very effective in trapping particles, fibers, biological substances, etc., including those with very small diameters (less than a micron), with a modest flow resistance both initially (clean filter), as well as over time, or in the presence of dirt on its surfaces.

The germicide action of electronic filters prevents the proliferation of any biological substances (bacteria, mold, yeast, etc.) that may be present on the surface of the dust particles passing through the filter, even if these are not necessarily captured by the filter. Other types of filtering systems, such as mechanical ones, can facilitate the proliferation of biological substances. Electronic filtering systems are therefore effective, reliable and simple products with very low maintenance costs, since they do not require replacement and can be washed and sanitized using common detergents, without any reduction in their efficiency or durability.

Air handling units

Air handling units always require a high amount of electricity, mainly because they lose their initial efficiency, as a result of flow resistance in distribution ducts and filters. While little significant improvement can be expected in air ducts design any time soon, today's new filters can contribute significantly to reducing energy consumption. Limiting the discussion to the topic of the present article, that is filtration, it is evident that flow resistance is directly proportional to the efficiency of the installed filters. This efficiency is determined by the desired indoor air quality and by the quality of the available outdoor air, as well as by the amount of clogging in the filters themselves. It should be noted that the quality standards for indoor air are becoming more and more stringent, while the quality of outdoor air is constantly worrisome, with high concentrations of harmful airborne pollutants, especially in dense urban and industrialized areas. Therefore, there seem to be two apparently irreconcilable needs: the continuing demand for better filtration, and maximum containment of energy consumption in the systems.

The Crystall electronic air filter represents the first valid response capable of reconciling these two needs, as it can offer high efficiency and very low flow resistance, maintaining both features for its entire life. In mechanical filters, the dirt that builds up over time, causes increased flow resistance and reduced filter efficiency, resulting in increased electric power absorbed by the fan motors to guarantee the nominal air flow rate.

In the Crystall electronic air filter, the suspended particles are transported by the air flow and adhere to the collector plates, which are arranged along the same direction as the air flow.

Therefore, even large-sized deposits do not create significant obstacles for the air flow, thus ensuring consistently low flow resistance. The Crystall electronic air filter ensures real high efficiency in the system and considerable energy savings. Furthermore, since there is only a negligible difference in pressure drop between the clean filter and the dirty filter, there is no need to install dedicated devices to compensate for pressure drop and maintain the air flow rate within certain limits, simplifying installation as well as management of the system. This point should always be taken into consideration when comparing the economic aspects of different filtering solutions. The electric power absorbed by the fan in systems using mechanical filters will always be higher, because calculations for the latter must be made based on the maximum pressure drop allowed.



Ocean Unit



Vulcan Pro



Modular Crystall for AHU

POSSIBLE FUTURE APPLICATIONS

The Crystall electronic air filter could have many other applications for all situations where air filtration and low power consumption on a fan unit are necessary.

The Crystall electronic air filter could be used where noise levels and dimensions are fundamental factors for the adoption of an air filter.

The filter design could be modified, to a certain extent, to reflect the sizes required in specific installations.

Some possible applications which could be developed are:

- energy recovery units for domestic and tertiary applications;
- natural or forced outdoor air ventilation systems for domestic use;
- systems that require movement of air, both mechanical and natural.



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