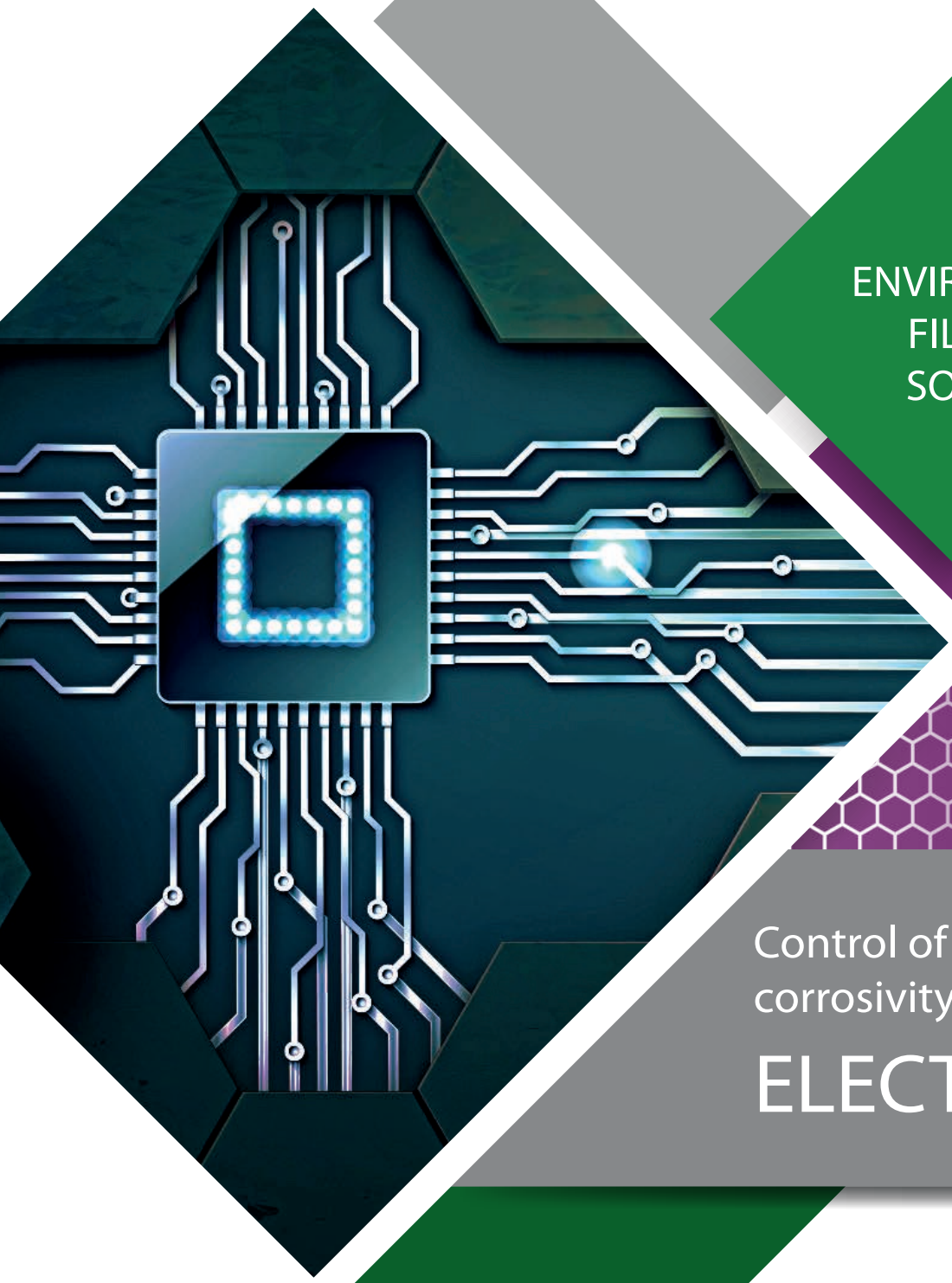
ALPHACHEM®
GAS PHASE FILTRATION



ENVIRONMENTAL
FILTRATION
SOLUTIONS

Control of environmental
corrosivity attacking

ELECTRONICS

Green Keeper

www.alphachem.es

GreenKeeper

WHO WE ARE

Iberia

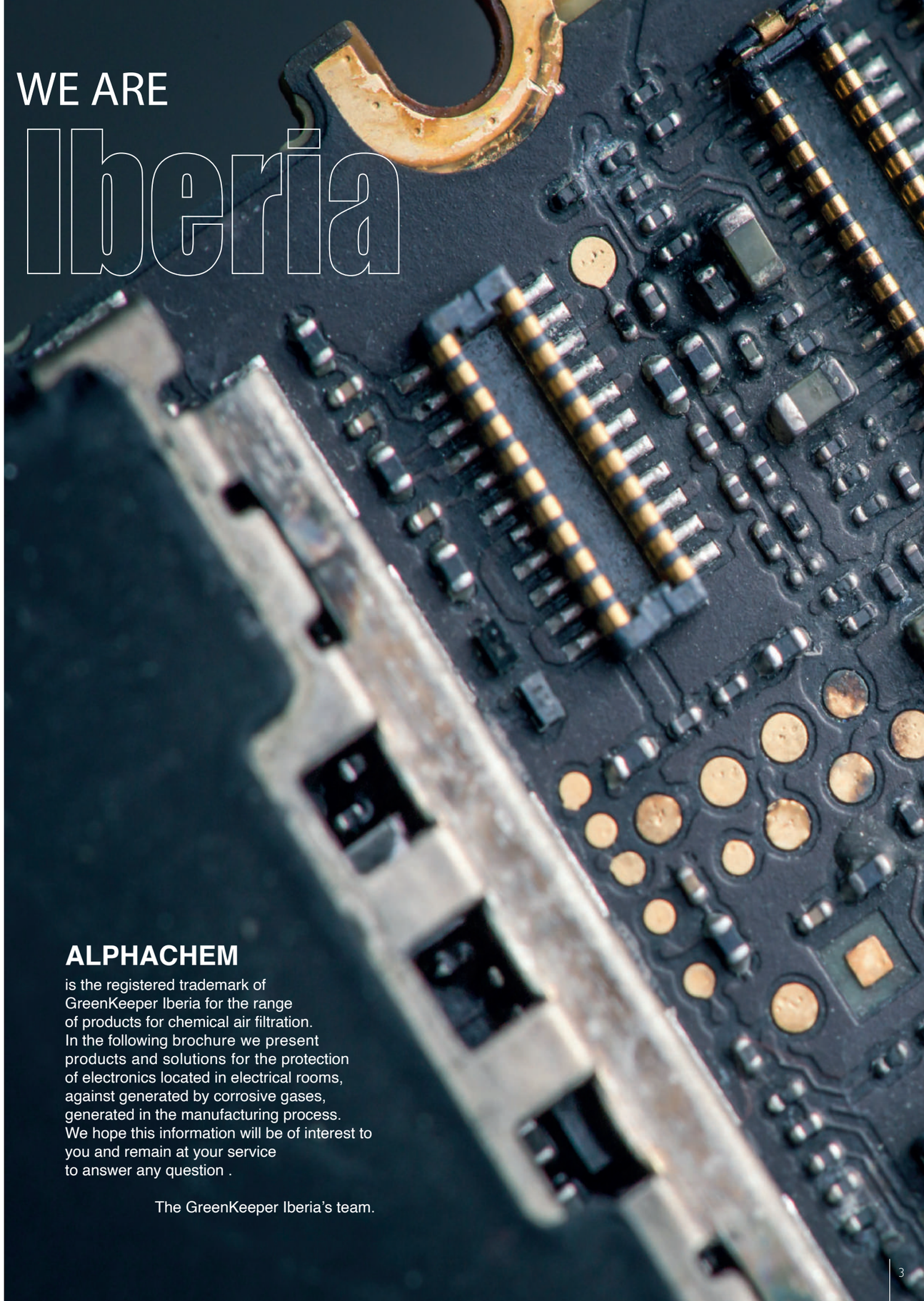
GREENKEEPER IBERIA is a Spanish company, formed by professionals with extensive experience in the industry. With its own factory, it designs, manufactures and markets filter media for air/gases, with distribution in the five continents.

It is divided into three main sectors:

GREENKEEPER IBERIA
World leader in the ethylene market for fruit preservation.

GREENKEEPER DESSICANTS
Manufacture and marketing of desiccants
for transport and storage of products.

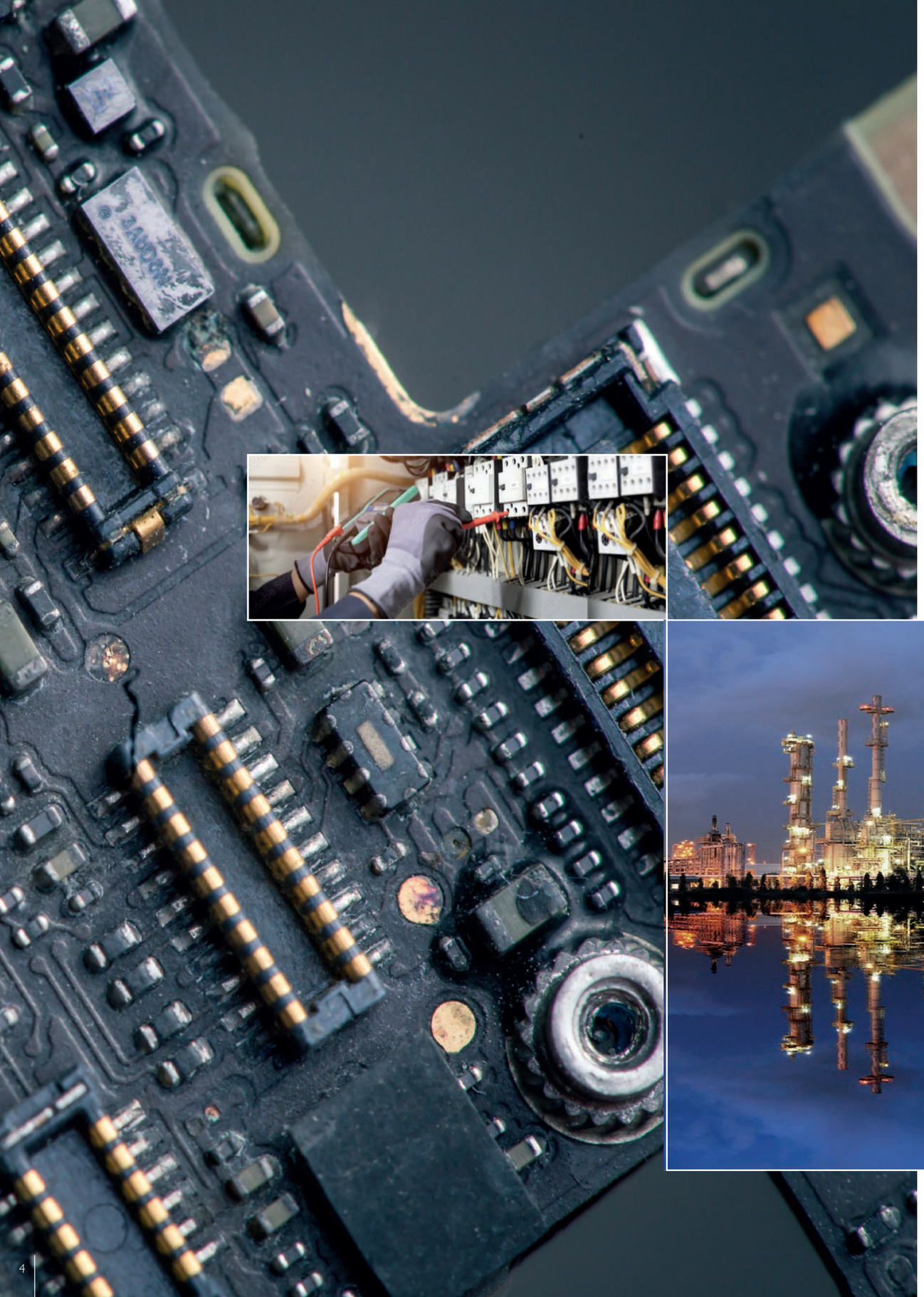
ALPHACHEM
Design, manufacture and marketing of filter media and equipment for chemical air filtration, for all markets where pure and odourless air is required.



ALPHACHEM

is the registered trademark of
GreenKeeper Iberia for the range
of products for chemical air filtration.
In the following brochure we present
products and solutions for the protection
of electronics located in electrical rooms,
against generated by corrosive gases,
generated in the manufacturing process.
We hope this information will be of interest to
you and remain at your service
to answer any question .

The GreenKeeper Iberia's team.



THE ENEMIES OF ELECTRONICS

Temperature, humidity and corrosion are enemies of electronics outside the circuitry itself. Most pulp and paper mills, oil refineries and petrochemical industries, and increasingly sewage treatment plants and waste treatment plants, protect electronic equipment from the potential hazards of temperature and humidity, but sometimes they forget one of the most damaging factors, which is environmental corrosiveness.

In the production process, several acid and/or corrosive gases are produced, such as hydrogen sulfide, sulfur dioxide, ozone, nitrous oxides, mercaptans, etc. These gases penetrate into the electrical rooms through doors, ventilation holes, cable glands, etc., creating a highly corrosive environment inside the rooms, which affects the control instrumentation. The more humidity there is in the environment, the more danger there is that these gases form an acid layer around the electronic components causing failures.

solution

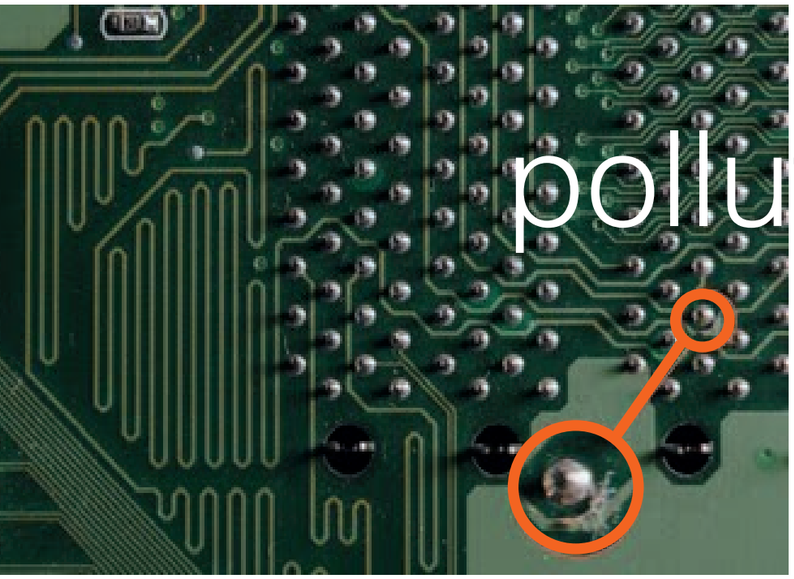
The solution to avoid these failure factors is the pressurization of the rooms with chemically filtered air.

ISA 71.04-2013

In order to assess the degree of environmental corrosivity that exists in an electrical room, the International Society of Automation (ISA) developed standards to analyze and classify the environment of a room, according to its potential corrosivity on electronics. These standards are based on measuring by electrochemical analysis the corrosion in Angstroms that accumulate on a copper and a silver plate, which remains in the room for a period of 30 days. According to the accumulated corrosion, four categories are distinguished:

Classification	Copper (Angstroms 30 days)	Silver (Angstroms 30 days)	Reliability	GAS CONCENTRATIONS (ppb v)	H_2S	SO_2 SO_3	Cl_2	NO_x	HF	NH_3	O_3
G1: Mild	0 - 299	0 - 199	Sufficiently well controlled		≤ 3	≤ 10	≤ 1	≤ 50	≤ 1	≤ 500	≤ 2
G-2: Moderate	300 - 999	200 - 999	Effects of corrosion are measurable		≤ 10	≤ 100	≤ 2	≤ 125	≤ 2	≤ 10000	≤ 25
G3: Harsh	1000 - 1999	1000 - 1999	High probability that corrosive attack will occur		≤ 50	≤ 300	≤ 10	≤ 1250	≤ 10	≤ 25000	≤ 100
Gx: Severe	> 1999	> 1999	Only specially designed and packaged equipment would be expected to survive		> 50	>300	>10	>1250	>10	>25000	>100

This table is based on a Relative Humidity of 50%. For every 10% increase in R.H. the corrosion level rises to the next class.



pollution

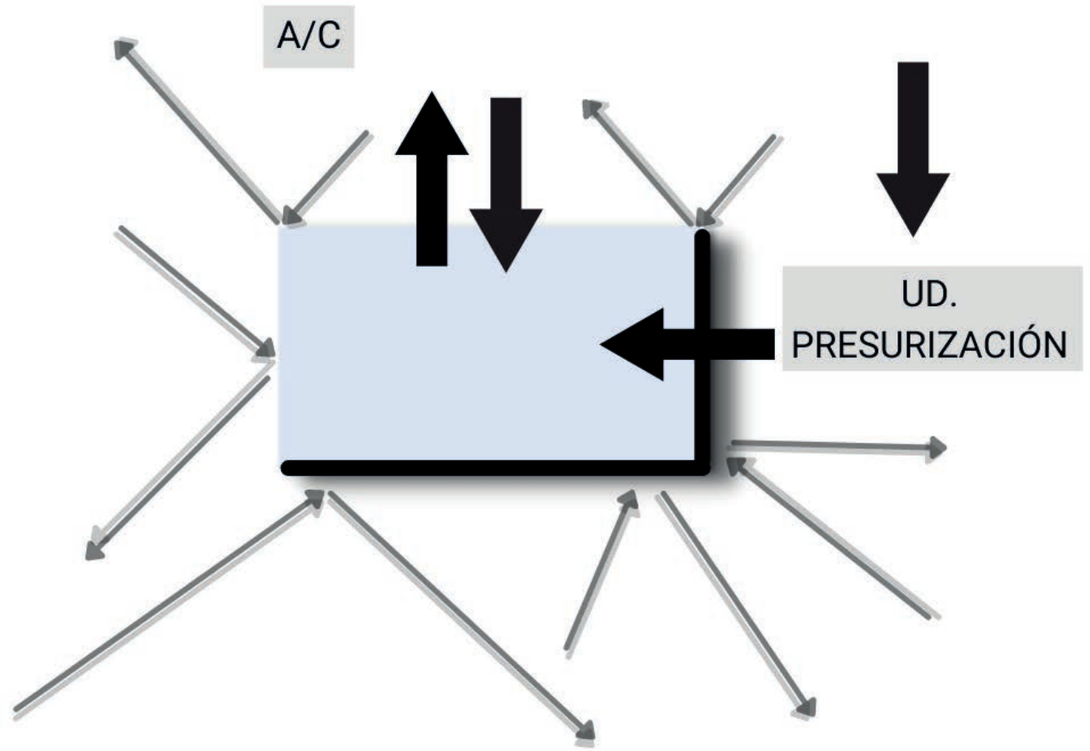
Although industrial electronics are becoming more and more protected, their increasingly compact integration makes them very sensitive to the presence of corrosive gases.

Together with the humidity and the passage of current through the circuit, an electrolytic microcell is generated forming a very weak conductive film, but enough to cause failures or malfunctions.

PRESSURIZATION THE SOLUTION

The solution widely applied in industries that emit corrosive gases is to pressurize the room with chemically filtered air, in addition to keeping the temperature and humidity of the room under control.

It is also recommended to improve the airtightness of the room. The better the sealing (doors, windows, false floors...), the lower the flow of filtered air required to achieve a certain pressurisation. Overpressure indicates that the incoming filtered air does not allow the free entry of outside gases, expelling them to the outside of the room.



protection

To purify the pressurized air, GreenKeeper Iberia, under the Alphachem brand, has a range of Air HandlingUnits specifically engineered for this application. In addition, as a manufacturer of filtering media, it has developed new products for gas filtration with a higher reaction velocity and capacity, which allow working with very short contact times and thus, minimizing the size of the Air Handling Units and energy consumption.

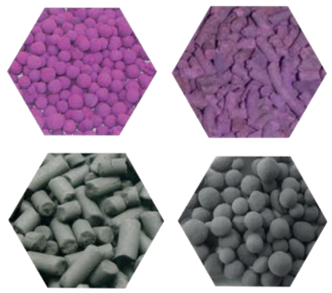
CHEMICAL FILTERING MEDIA

GREENKEEPER IBERIA is one of the few manufacturers of Chemical Filtering Media in Europe. Its constant investment in Research and Development in new products makes it one of the best considered suppliers among its customers for this range of products.

The objective of its developments is to maximize filtration capacity and velocity of reaction while minimizing, as much as possible, the carbon footprint of its finished products. By using local raw materials, it is able to maintain a price stability impossible to achieve with products from distant sources.

The wide range of Chemical Filtering Media is based on the use of adsorbents such as virgin activated carbons, activated aluminas and zeolites, which are impregnated and processed as a unit or together. These filter media are agglomerations in the form of pellets or spheres, to meet all the needs of customers and cover the reduction of a wide spectrum of harmful gases. Packaged in bulk or in modules.

Depending on the manufacturing process, the presentation of the chemical filter media can be in pellets or spheres. Pellets are basically composed of activated carbon / Zeolites. The spheres are mainly composed of activated alumina. The pellets that GreenKeeper has developed for the corrosion market are shorter than the usual ones so that their pressure drop is as close as possible to that offered by the spheres. Their capacities and reaction rates are very similar to each other. Although there are customers who specify activated alumina spheres, the use of zeolites allows lowering the carbon footprint of the filter media and having better and more stable prices, by using local raw materials.



ALPHACHEM 8 / 8P

Filtering media based on activated alumina spheres or zeolite pellets, impregnated at 8% with potassium permanganate, to remove sulfur oxides, nitrogen oxides, hydrogen sulfide, ethylene and oxidizable gases in general.

ALPHACHEM 15 / 15P

Filtering media based on activated alumina spheres or zeolite pellets, caustically impregnated with a capacity of more than 35% by weight for H_2S. It is used to remove acid gases in general. Its main characteristic is its high reaction speed, ideal when VPack M-12 or M18 modules are required and the concentrations are somewhat high.

ALPHACHEM BLEND 8A / 8PA

Mixture of ALPHACHEM 8 / 8P and virgin activated carbon to remove a wide range of gases. Its use is widespread in all markets where there are problems with a wide coexistence of gases.

Alphachem Filtering Medias are supplied in bulk or in VPack M-12, VPack M-18 modules, or custom-made trays compatible with all existing machines on the market for this application.

PRESSURIZATION UNITS

Electronics are even more sensitive than the human body. As seen in the ISA table, concentrations above 0.05 ppm hydrogen sulfide is already an environment where electronics will inevitably fail.

For proper pressurization, as the chemical media, it is important that Air Handling Units (AHU) are designed specifically for this purpose. The worst enemy of these units is Bypass. Only that a small part of the air to be filtered does not pass through the chemical media, the concentration of certain harmful gases will already exceed the limits set to maintain a G1 environment.

GREENKEEPER IBERIA, through its brand ALPHACHEM has pressurization units specifically designed to treat electrical rooms and keep them in a G1 or G2 environment at most, as long as the room maintains an appreciable level of airtightness. The units that are basically used for pressurization are the SFM, SPV and PBS units.

SFM UNITS

The SFM (Modular Filtration System) are air handling units where the flow is horizontal. They consist of a fan; pre-filter to prevent dust from reaching the filtering media; one to four beds of VPack-M12 or M18 modules and a final filter that prevents any particle from entering the electrical room. With flow rates ranging from 200 to 40,000 m3/hr. These units are recommended for pressurizing rooms where the concentration to be filtered does not exceed 0.5 ppm of corrosive gases. They incorporate a frequency variator that allows adjusting the flow rate to achieve the desired pressurization.

SPV UNITS

The SPV (Vertical Pressurization System) is one of the most used AHUs inside control rooms, as it fulfills a double function: through the upper part of the unit it is connected to a duct coming from outside the room and mixes this outside air with the inside air, sucked in through the upper grille, filtering both air currents, in a downward flow and expelling the air through the lower grilles.

This double function of pressurization and recirculation makes it very suitable for electrical rooms where there is frequent entry and exit of personnel and where there is the danger of dirty air entering the room every time someone enters through the door.

They consist of two filter beds which are loaded with VPackM-12 modules, in addition to the prefilter, final filter, fan with frequency converter, depending on the required flow rate, there are models that filter from 300 to 4,000 m3/hr.

PBS UNITS

PBS (Packed Bed Scrubber) are AHUs in which the filtering media is loaded in bulk. With two to four chemical beds, these AHUs are used to pressurize rooms when gas concentrations exceed 0.5 ppm and are equipped with a prefilter, final filter and fan with frequency converter, they are one of the most robust among the pressurization units. Design flow rates range from 500 to 8,000 m3/hr. They can be configured with one or two recurring fans.

ANALYSIS SERVICES

GreenKeeper Iberia offers its customers the possibility of sending the filter media they are using to their laboratories to check, free of charge, their remaining life. In this way, the change forecast is facilitated, so that the rooms are not left unprotected at any time.

COUPONS are the elements approved by the ISA (International Society of Automation), for the classification of indoor air in rooms. They consist of a copper plate and a silver plate, of approved measures and mounted on a plastic support, which are placed for a period of thirty days in the room to be controled and then, are analyzed according to the system developed by the laboratories of Bell Telephone Systems and Battelle Columbus Laboratories. GreenKeeper Iberia has in its laboratory several equipment for the evaluation of coupons, which will allow customers to know the initial state of their rooms, to determine the need of installing filtration equipment, as well as once installed, to monitor the status of their rooms to verify that the electronics are safeguarded from the effects of environmental corrosion. These subsequent studies are very convenient because, even with the filtration units working properly, maintenance work or malpractice by workers leaving the doors open causes the rooms not to remain pressurized and corrosive gases can enter inside.

The analysis of the coupons provides a picture of the environmental corrosiveness in the room where they are installed and at the same time an indication of the gases present and responsible for the possible corrosion of the metals of the electronic boards.

Another alternative offered by Alphachem is the use of the **AIRCHECK**.

The AirCheck is an electronic device designed entirely by GreenKeeper, which allows to know in real time the indoor air quality of the room. Its copper, silver, temperature, humidity and overpressure manometer sensors accumulate data on a memory card, on the one hand, and show at the same time on the screen, the levels of environmental corrosivity in the room according to ISA guidelines. Their sensitivity is 1 Angstrom of accuracy for corrosion that accumulates on their microbalances.

The AirCheck is currently the most stable sensor on the market in terms of its readings against changes in humidity and temperature. Its use in electrical rooms ensures that the required environmental conditions are met at all times so that the room does not present corrosion problems. Its use provides a dynamic film of the environmental status of the room at all times.

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