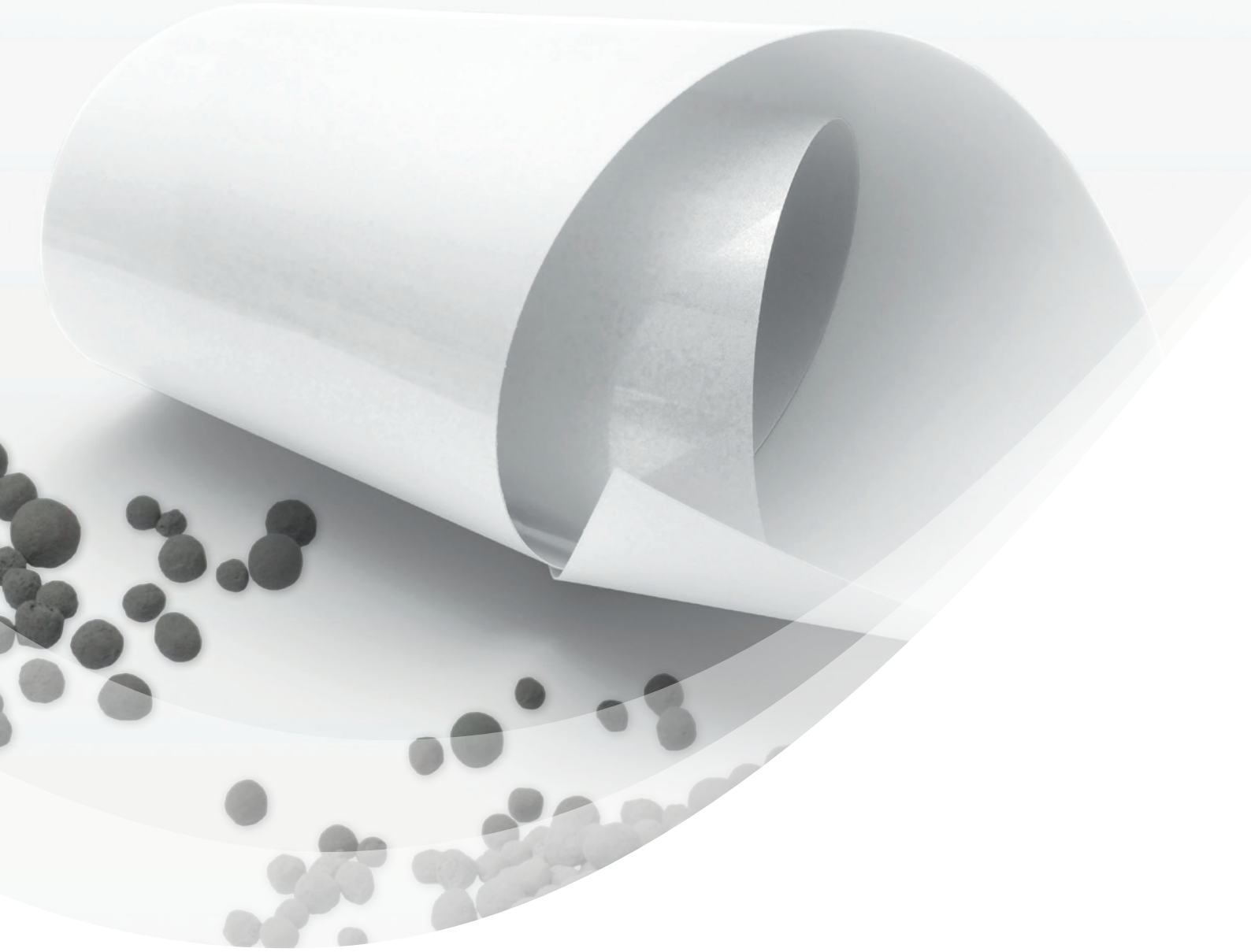


viledon®

INCREASE OPERATIONAL SAFETY – PROTECT AGAINST CORROSION

GAS PHASE FILTRATION FOR THE PULP AND PAPER INDUSTRY

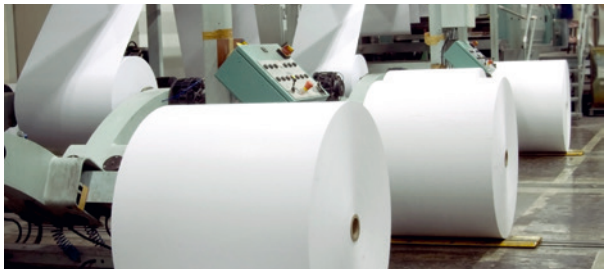
FREUDENBERG
FILTRATION TECHNOLOGIES

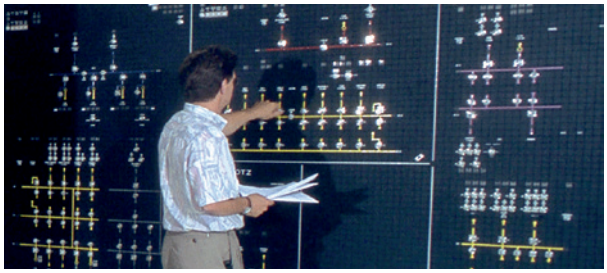
FREUDENBERG
INNOVATING TOGETHER

THE PRODUCTION OF PAPER RELEASES CONTAMINANT GASES

WE PROTECT SENSITIVE EQUIPMENT FROM CORROSION

Creating paper out of wood or pulp involves several complex processing steps in which the raw materials are chemically treated. This produces gases that have the potential to cause corrosive damage to the surrounding machinery and equipment. That is why they are classed as contaminant gases. Particularly at risk are sensitive areas such as electronic equipment, control rooms, process control systems and compressors. The negative effects of the corrosion of the copper and silver components of these devices include a loss of process efficiency, additional maintenance costs, expensive repairs and unplanned downtime.





Freudenberg Filtration Technologies develops customized solutions specifically for the needs of the pulp and paper industry. These ensure effective and efficient gas-phase filtration to permanently remove contaminant corrosive gases from the air. We offer everything from a single source: from on-site pollutant analysis to the selection of filter media and filter units or permanent ongoing monitoring.

We provide reliable protection against corrosion by contaminant gases that are released during the main process steps in papermaking:

- **Lignin removal**
- **Bleaching**
- **Wastewater treatment**

This brochure provides a brief overview of our services. We are certain to be able to find individual solutions for your requirements for reliable protection from the negative effects of contaminant gases.

Please contact us:

+49 (0) 6201 80-6264

viledon-gasphase@freudenberg-filter.com

YOU REMOVE LIGNIN FROM THE RAW MATERIALS

WE REMOVE CONTAMINANT GASES FROM THE AIR

The technical removal of lignin is a key processing step during the manufacture of pulp. In chemical processes, the lignin needs to be dissolved from the lignocellulose and subsequently removed from the production process. Two methods have been established and are particularly important in pulp production: the sulphate and sulphite processes (see below). Depending on the procedure, various contaminant gases are released. Using different filtration media, we remove these from the air and prevent the corrosion of sensitive equipment.

Sulfate process

This alkaline process is currently dominant in pulp production and is used for both hardwood and softwood. The removal of lignin is caused by hydrogen sulfide ions (HS–) in a caustic medium. Within this process, both sodium hydroxide (NaOH) and sodium sulfide (Na_2S) are used, which in turn produce hydrogen sulfide (H_2S) and mercaptans. Once released, the H_2S causes corrosion and must be filtered out of the air.

Sulfite process

Comparatively rarely employed, this acidic method is used in the digestion of spruce, beech and eucalyptus. The removal of lignin is achieved by a sulfonation. Via sulfur dioxide, lignosulfonates are produced (salts of lignin). The flue gas containing sulfur dioxide (SO_2) represents a particular risk to machines and processes. We reliably remove this gas from the air using special media.

BLEACHING PROTECTS PAPER AGAINST YELLOWING

GAS PHASE FILTRATION PROTECTS EQUIPMENT AGAINST CORROSION

Whether using wood pulp, pulp or waste paper: bleaching is an essential process step in paper production to remove unwanted stains. Because lignin is responsible for the yellowing of paper, it needs to be removed during the bleaching process. This ensures that the paper stays white. Bleaching is achieved via a technical process involving mainly chlorine bleach or a bleach with oxygen, chlorine dioxide, hydrogen peroxide or ozone. Depending on the chemical substances involved, this leads to the creation of various contaminant gases that need to be removed from the air.

Bleaching of wood pulp

Sodium sulfite (Na_2SO_3) is often used in the bleaching of wood pulps. This produces sulfur dioxide, which is responsible for the corrosion of nearby electronic devices.

Bleaching of pulp

Among other chemicals, chlorine (Cl_2), chlorine oxide (CLO_X) and ozone (O_3) are used for the bleaching of pulp. Chlorine-free bleaching with ozone is more environmentally friendly, but leads also to the release of a corrosive and toxic gas.

Bleaching of waste paper

Dithionite is usually used in the bleaching of waste paper. This in turn releases sulfur gases that should be seen as the cause of corrosion.

YOU ENSURE CLEAN WATER

WE ENSURE CLEAN AIR

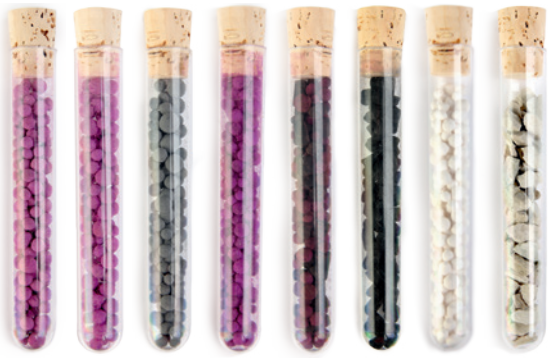
At the end of the papermaking process comes the treatment of wastewater. This involves removing the polluting elements from the wastewater to restore its natural quality.

On the way from the dischargers to the sewage treatment plant, water purification is achieved through targeted chemical additives and biological processes. In the anaerobic environment, contaminant gases such as hydrogen sulfide (H_2S) are created. This gas has the characteristic pungent odor of rotten eggs. Even more problematic than the smell, however, are the effects it has on humans and sensitive electronic components. Using special pellets and individual filtration concepts, we reliably remove hydrogen sulfide from the air.

POLLUTANT GASES IN THE PULP AND PAPER INDUSTRY		
POLLUTANT GASES	**PROCESS**	**VILEDON CHEMCONTROL PELLETS**
Hydrogen sulfide (H_2S)	Lignin removal (sulfite process) wastewater treatment	CCP 104, CCP 108, CCP 210, CCP 310, CCP 810
Mercaptans	Lignin removal (sulfite process)	CCP 104, CCP 108, CCP 210
Sulfur dioxide (SO_2)	Lignin removal (sulfite process)	CCP 104, CCP 108, CCP 210, CCP 310, CCP 810
Sulfur oxide	Bleaching of waste paper Bleaching of wood pulp	CCP 104, CCP 108, CCP 210, CCP 310
Chlorine (Cl_2)	Bleaching of pulp	CCP 310, CCP 510, CCP 610
Chlorine oxide (ClO_x)	Bleaching of pulp	CCP 310, CCP 510, CCP 610
Ozone (O_3)	Bleaching of pulp	CCP 310, CCP 610

A GLOBALLY UNIQUE PORTFOLIO

PELLETS, MODULES, SYSTEMS AND SERVICES



Viledon® ChemControl Pellets

The quality of the ChemControl pellets in our systems forms the basis of our services. We offer a wide range of pellets that reliably eliminate the most contaminant gases.

Viledon® ChemControl modules

Viledon® ChemControl modules provide a robust plastic housing for our pellets. Their practical design makes them easy to handle and exchange. Viledon® ChemControl modules are available pre-filled directly from the manufacturer, or can be easily filled using the simple filler cap. The design of your system will determine which module size you need. Like all Viledon® products, Viledon® ChemControl modules also enable excellent air flow at a low pressure drop.

Viledon® ChemControl filtration systems

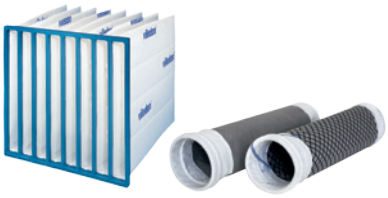
We develop and deliver exactly the filtration units that you need, ensuring that you achieve maximum profitability from your system. Viledon® filtration systems are best suited for the gas and particle filtration of exhaust air. They protect components against contaminant gases that cause corrosion.

Gas phase filtration services

Viledon® gas phase filtration services are essential for the constant protection of process control equipment. Our wide range of services includes Viledon® ChemDetect corrosion analysis, residual capacity analysis, ChemWatch online monitoring and our well-known filterCair management system.

Complete air filtration systems

We have combined our expertise in gas phase filtration with our expertise in air filtration to offer a unique range of services. Our extensive portfolio of filtration system solutions ensures optimum process reliability.



Air filtration

Liquid filtration

FREUDENBERG FILTRATION TECHNOLOGIES

Your partner for comprehensive filtration

Freudenberg Filtration Technologies is part of the Freudenberg Group. With over 1,700 employees, we are the technology leader in the filtration of air and liquids.

Thanks to the way we combine our knowledge of gas phase filtration with our expertise in air filtration, we are able to develop optimized complete systems for our customers: from system specification through product manufacturing to a complete design and installation program for the upgrading and construction of air filtration plants, including ongoing operational support.

You can find more information on our website:

www www.freudenberg-filter.com

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The most commonly used ChemControl pellets in the pulp and paper industry: CCP 310.

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