



Take the Best - Separate the Rest

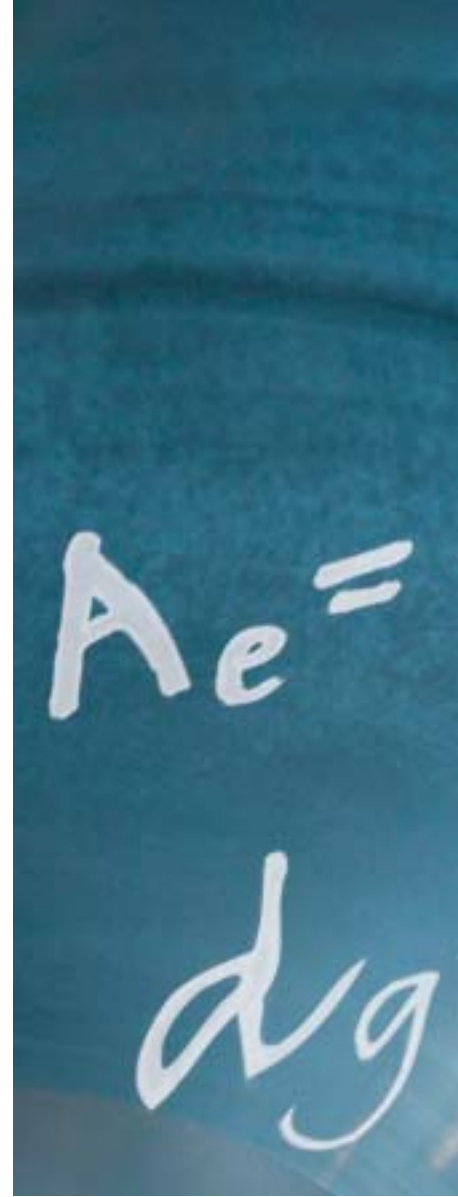
Components, Systems,
Installations

**Chemicals,
Pharmaceuticals,
Biotechnology**



A wide range of tasks

Individual solutions



Mechanical separating processes are a key component in many processes in the chemical and pharmaceutical industry as well as biotechnology. The quality of the separating process is of vital importance for the quality of the end product and the cost-effectiveness and environmentally-sound nature of the process. With their constantly high separating efficiencies, separators and decanters from

Westfalia Separator are able to meet this requirement.

The comprehensive range of products from Westfalia Separator enables centrifuges to be used in a wide range of applications and in all process stages involving phase separation. Our systems are ideal for separating micro-organisms and their fragments in the processing of fermentation products, such as vaccines, amino acids, enzymes and starter cultures, and they are also ideal for isolating and purifying cell proteins, extracting active agents for recovering antibiotics, alkaloids and hormones, human blood plasma fractionation, purification of polymers, sulphuric acid or the extraction of minerals. Westfalia Separator has always kept up in advance with new developments in the sector in advance by way of constant co-operation with universities, research institutes and industry.



*Ulrich Meier, Head of Business Unit
Chemicals, Pharmaceuticals,
Biotechnology
Westfalia Separator Industry*

$$r = \frac{\pi}{12 \cdot g} \cdot w^2 \cdot \tan(\alpha) \cdot z \cdot (D^3 - d^3)$$
$$r = \sqrt{\frac{18 \cdot Q \cdot V \cdot P}{g \cdot \Delta P} \cdot \frac{1}{A_e}}$$



The company is accordingly able to provide a customised and rapid response to current customer requirements at any time. With individual machines or complete process lines which guarantee a high valuable substance yield and which operate efficiently and cost-effectively without any problems over a long period. You are assisted by suitably qualified personnel who provide you with intensive support from the initial product analysis right through to after-sales service.

- Chemicals
- Mineral processing
- Pharmaceuticals/biotechnology



The chemistry must be right

Chemicals

Organic and inorganic chemicals

- Acids
- Aldehydes/alcohols
- Barium sulphate
- Catalysts
- Cellulose and derivatives
- Fluorescent substances
- Lyes
- Nitrite compounds
- Organic pigments
- Peroxides
- Pesticides
- Plant extracts
- Process liquids
- Salt solutions
- Solvents
- Tensides
- Varnishes/resins

Petrochemicals and plastics production

- Plastic suspensions
(e. g. PVC, polyethylene,
polypropylene, polyacetate)
- Polycarbonate
- Terephthalic acids



The requirements for separators and decanters in the chemical industry are particularly stringent. Concentrated acid and caustic compounds, high temperatures and high pressures pose extremely stringent demands on the material. The safety of production processes accordingly enjoys the utmost priority. Our installations comply with all relevant stipulations and also provide absolute cost-effectiveness and efficiency in the process.

There are good reasons why all international market leaders use separators from the TA and TC series for instance for the nitration of aromatic substances or the production of polycarbonate. The comprehensive product programme covers





the entire range of throughput capacities. Westfalia Separator has already installed the machines in many more than 100 process installations. In addition, almost 300 Westfalia separators throughout the world are also used in the production of plastics. The arguments are self-evident: All machines have been designed to meet the most stringent safety and quality requirements and feature the necessary special equipment depending on the particular application. Depending on the product and temperature, all components which come in contact with product are made from special steels, such as Incoloy, which offers the benefits of high strength and corrosion resistance. Special ring bore holes in the bowl of TC separators ensure that no acid residues are left behind dur-

ing the cleaning process, and this means that it is no longer possible for an operator to come into contact with critical substances. The motors and electrical components featuring explosion-protected design are essential for the operator. And of course, all seals are designed to cope with the aggressive media. For specific application in the polymer field and for recovering catalyst residues, Westfalia Separator supplies special decanters which are able to withstand high pressures. Nor is it any problem for gas-tight machines to be delivered if required. Our centrifuges also demonstrate their strength in the clarification of phosphoric acid, the recovery of Xanthan and in many other chemical processes.

Mineral processing

- Inorganic pigments, e. g.
 - Calcium carbonate
 - Kaolin
 - Mica
 - Talcum
 - Titanium dioxide
- Metal extraction

Inorganic pigments such as calcium carbonate, kaolin and titanium dioxide, which are extracted from natural minerals such as marble and ilmenite, are used in a wide range of applications as additives for papers and plastics and also as pigments for dispersion paints, varnishes and much more besides. Absolutely specialist machines are required for classifying, sorting and dewatering the pigments. This is another area in which the intelligent processing technology of Westfalia Separator enables the company to offer its customers the corresponding engineering and process know-how.

Decanters and separators supplied by Westfalia Separator are used in a wide range of applications for the production of inorganic pigments: Corresponding nozzle-type separators and decanters are available for dewatering the slurry in which the processed pigments occur. Powerful decanters are used for extremely efficient dewatering of the slurry. With these machines, a slurry can be dewatered to a point close to the physical limit of being classified as dry. Optimum utilisation of raw materials is always guaranteed.



Cost-effective production of calcium carbonate

Calcium carbonate is much in demand as a primary material (filler and coating) for the paper, plastics and pigment industries. More than 100 centrifuges of Westfalia Separator are in use throughout the world for classifying and dewatering calcium carbonate. And there are good reasons why that is the case: Large volumes of extremely fine particles with high densities can be processed without any problem. In order to ensure that they can cope with the extreme demands, the machines have been equipped with special wear protection and special coatings, and they are also designed to resist high torque loads. A dewatering process using decanters takes place continuously without any

interruption, and provides a high degree of flexibility in terms of designing the process.

New generation of centrifuges with even higher yields

The advantage in terms of capacity provided by installations from Westfalia Separator is also evident in the field of recovering kaolin for the plastics and paper industries. Much higher yields can be achieved with the new generation of separators and decanters. As a result of their continuous method of operation, they also guarantee constant yields even in conjunction with fluctuating throughputs, and thus make a major contribution to the stability of the entire production process.



Quality in pure form

Pharmaceuticals and biotechnology

- Alkaloids
- Antibiotics
- Aromatics
- Enzymes
- Extracts from organs
- Extracts from plants
- Extraction of bio-products from genetically modified micro-organisms
- Hormones
- Human blood
- Insulin
- Morphine
- Rose oil
- Scents
- Starter cultures
- Synthetic pharmaceutical products
- Vaccines
- Vegetable-based medical products
- Vitamins

Millions have been invested in human health, and it nowadays frequently takes more than ten years for a new drug to be developed. The quality of the separating process is of vital importance for the quality of the final product and for the cost-effectiveness of the process. The installations of Westfalia Separator are used in the production of starter cultures, the processing of vaccines and genetically modified micro-organisms and human blood fractionation, and they guarantee a safe, efficient and cost-effective process. Sterile conditions are frequently absolutely essential.

More and more products are therefore being manufactured under special clean-room conditions. The installations of Westfalia Separator have been designed entirely to meet these needs.

High solid concentration under sterile conditions

The separators of Westfalia Separator provide a service of inestimable value for fractionating human blood. The completely new concepts of the hyperconcentrator HyCon is an example in this respect. This machine meets the extremely stringent sanitary and hygienic requirements of a GMP installation. The advantage: The drive part and process chamber (bowl and solids discharge) can be isolated completely from each other by means of





the intelligent two-chamber concept. This means that the drive technology is not able to produce any contamination. The required gentle product treatment is achieved by means of a hermetic inlet as well as the gentle bowl discharge facility at reduced speed. In order to avoid even the smallest blind corners, the machine has special surface polishing as required and can be sterilised in place (SIP – sterilisation in place) and also cleaned in place (CIP – cleaning in place). Absolutely enclosed machine and installation concepts guarantee bio-containment – definitely.



A successful start

Starter cultures are the subject of lively discussion. These useful micro-organisms are used in a wide range of applications in the food industry, and are also used as a pro-biotic food supplement. After the cultures have been grown in fermenters, the process of separation imposes high demands on machines and human operators. Sterility, particularly gentle treatment

of the living micro-organisms and a high degree of separating efficiency are essential criteria for cost-effective, safe and efficient processing. For these cases for instance, Westfalia Separator offers the nozzle-type separators of the type HFA with steam-sterilisable design; these machines are equipped with a hydrohermetic product feed, which minimises shearing forces at the point at which the product enters the bowl. Gentle product treatment à la Westfalia Separator.

Catalysts in industry

Enzymes are complicated organic protein compounds and act as catalysts in organic reactions. In this function, they are able to break down starch, protein, fat or sugar. These valuable proteins are recognised as useful assistants in industry. With self-cleaning separators, Westfalia Separator ensures that the intra- or extracellular enzymes can be precipitated without being damaged and in high concentrations.



Extraction

Pharmaceuticals and biotechnology

- Antibiotics
- Aromatic substances
- Ethereal oils
- Extracts from organs
- Extracts from plants
- Scents
- Vegetable-based medical products

Extraction is extremely important in many technical applications of the pharmaceutical, biotechnology and food industries. It is used to recover and concentrate valuable substances from fermentation solutions. This also includes the production of food and medical products on the basis of vegetable extracts, the extraction of scents and aromatic substances for the cosmetics industry and also the production of antibiotics.

Specifically for the process of extracting active substances, Westfalia Separator has succeeded in developing an extraction decanter which combines the two essential process stages of mixing and separating in one machine. The direct extraction decanter of Westfalia Separator is ideal

for all areas in which particularly sensitive valuable substances have to be extracted. More than 100 installations of this system are already in use, and mean that Westfalia Separator is also the technology leader in this field.

Advantage Westfalia Separator

With around 13 % of total consumption of medical products, antibiotics are the most significant component on the overall medical product market. In the past, it was usual for penicillin to be extracted in a liquid-liquid counterstream extraction arrangement with upstream filtration on vacuum filters for removing fungal mycelium and impurities. The pharmaceutical industry nowadays increasingly uses extraction decanters for extraction because





of the significant process improvements and the excellent cost-effectiveness of these machines. Suspensions with high levels of solid content can be processed without any problem, and continuous direct extraction means that filtration is no longer necessary. Losses of valuable substances are avoided, and a higher total yield of up to 98 % is achieved. Because the fermentation broth is not diluted by the filter wash water, the risk of infection and also the solution requirement are reduced. And an aspect which is important for the environment: The waste water load and waste water volume are reduced. And safety has also been taken into consideration. All extraction

decanters feature gas-tight design. They operate in conjunction with inert gas blanketing in order to guarantee explosion protection when solvents are used. This closed system is a further advantage compared with the filtration methods, and also prevents risks of infection. Separators with solid-wall bowls, separators with self-cleaning bowls or decanters of varying capacities are available for liquid-liquid extraction depending on the solid content. Clarifiers with self-cleaning bowls or clarifier decanters with flat or steep cone bowls are available for solid-liquid separation. The product and solvent can either be mixed externally or directly in the centrifuge in a single step.

Clear customer orientation with high benefit

Life cycle benefit

- Added value
- Cost-effectiveness
- Low operating costs
- Product quality
- Safety



What are the real benefits provided by a new machine? What does the installation cost over its entire service life? What operating costs will be incurred? In the short term and over the entire service life of the machine? The answer to these questions form the basis for an intelligent investment: The life cycle benefit strategy.

What counts is an intelligent perception of the big picture, viewed today, tomorrow and over the entire service life of the machine. From installation planning, installation and commissioning right through to future-oriented service and intelligent concepts for taking back machines. Life cycle benefit at Westfalia Separator is the sum of many parameters which are the fundamental criteria for ensuring that an investment is cost-effective. Optimum flexibility in the production process by way of simple process

integration. High cost-effectiveness for operation and service. And of course also maximum consideration given to the environment and resources.

Low operating costs

Westfalia Separator designs and builds separators and decanters in such a way that the user is able to expect maximum availability, cost-effectiveness and overall operating costs that are calculable. Service costs for maintenance and spare parts as well as the energy and water consumption of a centrifuge are all factors which are taken into consideration in the calculation.

Product quality

As a result of patented feed and discharge systems, the separators of Westfalia Separator operate with a low feed pressure. The product receives very gentle treat-



ment. This results in premium products which meet extremely stringent quality requirements and which offer vital competitive advantages.

Cost-effectiveness

Intelligent modular machine concepts enable the machines to be adapted precisely to meet the individual needs of customers. For instance, the most powerful separator in the world has arisen from a light-weight construction concept, with modular design and an innovative gear-free drive. What are the specific advantages for the customer: Weight reduced by up to 40 %, less space requirement, but with a considerable improvement in throughput capacity.

Added value

Innovative products and systems for modern centrifugal separation technology

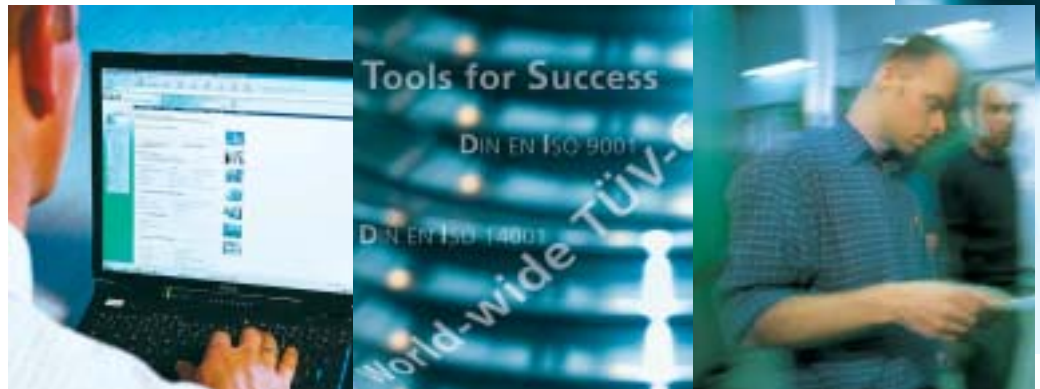
guarantee an optimum stream of added value for our customers. The best example in this respect is our company's patented **VariPond®** system, with which the pond depth can be adjusted while the machine is still operating. Decanters from Westfalia Separator are the right choice wherever constant concentration for downstream processes is necessary.

Safety

Intelligent, status-oriented service concepts pay for themselves by way of preventive maintenance for the customer. The **WESERVE®** concept developed by Westfalia Separator provides customer-oriented solutions entirely in line with the life cycle benefit strategy.

Think global - act local

Always at your side



Oelde, headquarters of the internationally operating Westfalia Separator



Niederahr, decanter production plant

For Westfalia Separator, a world-wide presence has been a reality for decades. Whether in Europe, America, Asia, Africa or Australia – customers of Westfalia Separator everywhere receive optimum support tailored to meet their own specific requirements. This is guaranteed by the company's global presence with around 50 subsidiaries and service companies as well as additional sales companies in more than 60 countries.

Consistent quality throughout the world

Westfalia Separator customers are to be found in all regions of the world. However, the Westfalia Separator quality which is offered to them is the same everywhere. The global certification which has so far been awarded by TÜV Rheinland to only a small number of companies is the external manifestation of this stringent requirement. This certification ensures that the



Subsidiaries and service companies are present in the following countries:

high quality standard is not restricted only to the company's headquarters; it ensures that all subsidiaries are also included. Our customers are able to rely on this quality. Always and everywhere.

Quality is part of our programme

And of course, separators and decanters are used in areas of application other than the chemical, pharmaceutical or biotechnology industries. As one of the leading companies in the world in the field of mechanical separation technology, Westfalia Separator AG is to be found in numerous other areas. We would be pleased to supply you with information concerning processing systems used in application in the marine industry, oil field technology, power engineering, industry and environmental technology, beverage technology, vegetable oil processing, oils and fats recovery, starch technology or dairy technology.



Europe

Austria
Belgium
Bulgaria
Croatia
The Czech Republic
Denmark
Finland
France
Germany
Great Britain
Greece
Hungary
Iceland
Ireland
Italy
Lithuania
The Netherlands
Norway
Poland
Portugal
Romania
Russia (CIS)
Slovakia
Spain
Sweden
Switzerland
Turkey



North America

USA
Canada



South America

Argentina
Brazil
Chile
Mexico



Africa

South Africa


















Asia

China
India
Indonesia
Japan
Korea
Malaysia
The Philippines
Singapore
Thailand
United Arab Emirates



Australia

Australia
New Zealand

Beverage Technology			Environmental Technology
Dairy Technology			Marine
Oils and Fats Processing			Energy
Chemicals Pharmaceuticals Biotechnology			Oilfield
Oils and Fats Recovery			Industry
Starch Technology, Industrial Biotechnology			Engineering
Service			Second Hand Machinery
			Global Presence

GEA Westfalia Separator
Industry GmbH

Take the Best – Separate the Rest

A company of mg technologies group

Westfalia Separator Industry GmbH · Werner-Habig-Straße 1 · D-59302 Oelde (Germany)

Tel.: +49 (0) 25 22/77-0 · Fax: +49 (0) 25 22/77-28 28 · Internet: www.westfalia-separator-industry.com · E-mail: industry@gea-westfalia.de

The information contained in this brochure merely serves as a non-binding description of our products and is without guarantee.

Binding information, in particular relating to capacity data and suitability for specific applications, can only be provided within the framework of concrete inquiries.

Subject to modification

Printed in Germany