Energizing pharma

Efficient and secure:
Vaccine Production with GEA pharma separators

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CHEMICAL & PHARMA
GEA at a Glance

"GEA is one of the world’s largest systems suppliers for the food, beverage and pharmaceutical sectors. A major focus is on continuously enhancing the sustainability and efficiency of customers’ production processes. GEA plants, processes and components help achieve significant reductions in carbon emissions, plastic use and food waste in production worldwide. In this way, GEA makes a decisive contribution toward a sustainable future, fully in line with its corporate philosophy of "engineering for a better world.”

GEA is listed on the German MDAX and the STOXX® Europe 600 Index and also included in the DAX 50 ESG and MSCI Global Sustainability indexes.

<table>
<thead>
<tr>
<th>FY 2020</th>
<th>Order intake</th>
<th>Revenue</th>
<th>EBITDA before restructuring measures</th>
<th>EBITDA before restructuring measures</th>
<th>Dividend proposal</th>
<th>Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4,703 EUR million</td>
<td>4,635 EUR million</td>
<td>532 EUR million</td>
<td>11.5 percent of revenue</td>
<td>0.85 EUR per share</td>
<td>18,232 full-time equivalents</td>
</tr>
</tbody>
</table>
Local presence worldwide

GEA locations
(sales offices, service branch or other GEA sites)
Separation solutions in human vaccines

**Non-Live vaccines**
- Influenza
- Cholera
- Bubonic plague
- Hepatitis A or hepatitis B
- Whooping cough (pertussis)
- Tetanus
- Diphtheria
- Pneumococcal bug

**Live vaccines**
- Measles
- Mumps
- Rubella
- Yellow fever
- Chickenpox
- BCG (= tuberculosis vaccine)
- Typhus
- Human rotaviruses
- Whooping cough (pertussis)

Culture media ➞ Valuable phase

Culture media ➞ Waste
The new GEA Pharma separator lines aseptic & pure

- GEA Pharma Separator aseptic
- GEA Pharma Separator pure

Key features:
- 2 full separator lines
- Multifunctional machine by GEA flexChange concept
- ASME BPE compliant design
- Optimized Bowl concept including the NEW GEA flexicon nozzle separator
- Utmost variability (flexibility)
- Skid configurator
- Integrated Direct Drive concept
### Selection process (Customer requirements)

Cleanability, surface texture and documentation always adaptable to your needs

<table>
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<tr>
<th>Hygienic Design</th>
<th>Sanitizing</th>
<th>Qualification document</th>
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<tbody>
<tr>
<td>ASME BPE design</td>
<td>Automatic SIP</td>
<td>Complete GMP documentation included</td>
</tr>
<tr>
<td>GEA Ribo design</td>
<td>Automatic CIP Process</td>
<td>Additional certificates for surface, materials and weldings</td>
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**GEA Pharma Separator aseptic**

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<td>Free steaming at &lt; 0.5 bar</td>
<td>Complete GMP documentation available</td>
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<tr>
<td>GEA Ribo design</td>
<td>Automatic CIP Process</td>
<td>Additional certificates for surface, materials and weldings</td>
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**GEA Pharma Separator pure**

- Included
- Adaption options
Let’s get into technical details
Maximum yield thanks to high precision desludging

GEA self-desludging centrifuges

**Typical feed conditions in vaccine productions:**
3-5 % solids in volume, depending on vaccine
30 -1000 l/h, up to 7000 l/h possible for larger machines
Gentle product handling, higher viability of cells, more efficient clearification

Hydrohermetic Feed patented by GEA Westfalia Separator Group

Common Feed
Product accelerated freely

Hydrohermetic Feed –
Product accelerated within the liquid, underneath the disk

No turbulences, no splashes, no shear forces
Cleanability – CIP and SIP

Total bowl ejections – possible with hydrohermetic feed system

Spray Nozzles

Steam Sterilization
The next level of pharmaceutical cleanability: Patented gap-free welded disc spacers

GEA's **patented laser-welded** disk spacers lead you to the next level of pharmaceutical cleanability.

**Perfectly clean:**
**High quality laser-welded spacers**
Maximum welding precision leaves no dead spaces in the disk stack, providing the basis for a highly effective CIP and SIP cleaning.

Optionally available for GEA pharma separator pure.
Unique: GEA Pharma test bay for pre-qualification

Pre-qualification of separator centrifuge skids

Flexibly and safely on the GEA pharma test bay.
Reference Customers Human Vaccines

Sold 172 package units

Until 2021

>50 customers
EVOLUTION NOW
Single-use
GEA kytero® Separator

All our competence –
in an easy-to-operate
single use skid
GEA kytero® Separator:  
1 new design –  
3 × benefits for you

Easy and time-saving operating concept

Maximum-purity GEA breezeDrive® revolution

Proven high-yield disk stack technology
I am happy to answer your questions:

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