GIG KARASEK
A Member of Dr. Aichhorn Group

Evaporation Technology

Evaporation

Sustainable production with thermal separation technology

Sophisticated systems for continuous value creation

In the thermal separation technology plants are used to concentrate liquids, which can be present as solutions, suspensions and emulsions.
In addition to the wastewater minimization with subsequent thermal or commercial utilization of the final products, the production of intermediate and end products may be the task of these plants.
This not only leads to increased profitability of the overall process, but also to the optimization of corporate metrics such as energy costs or productivity and sustainable environmental protection, which is required today by laws and standards.

GIG Karasek has already developed and manufactured numerous customized process systems in the following areas:

- *Evaporation*
- *Distillation*

Depending on the service area, valuable materials can be recovered for further use, processes can be optimized or environmental requirements can be met.

Applications

- *Product separation*
-
- *Solvent recovery*
-
- *(By-) product concentration*




Personal Service - From the advice about engineering to the overall concept

An experienced team accompanies you through all stages of the project, from the concept through technical trials to production and final commissioning, and is available to answer any questions you may have. In this way, we ensure tailor-made solutions that exactly match the needs of each individual customer and are not available on the market in this specific form.

The integration of the plant into the existing conditions and processes as well as the adaptation to customer standards and requirement profiles are just as natural as the optimal energy consumption, resource conservation, process reliability and the simple handling of the plants.

From the development and implementation of a special overall concept to the pure consulting and engineering services that we also offer in our portfolio, we work with you to develop a clear objective that significantly supports your production and enables increased performance.

Various applications

- *Pulp & fiber*
- *Starch*
- *Solvent recovery*
- *Wastewater & Recycling*
- *Inorganic chemistry*
- *Biodiesel & alternative fuels*
- *Food industry*
- *Oleochemicals*
- *Organic chemistry*
- *Petrochemistry*
- *Pharma*
- *Polymers & plastics*




Evaporation

Concentrated intelligence

Evaporation plays a significant role in GIG Karasek's range of services. From classic application areas to new challenges, we have been supporting a wide range of industries for years in the implementation of new plants and the optimization of existing processes.
At the heart of this fundamental technology is the evaporation, concentration and recovery of products.
Expertise in design guarantees high process quality, resource conservation and the lowest possible operating costs.
Our activities focus on the construction of new plants and the optimization of existing plants and processes. Through clever planning, we exploit optimization potential for you and realize it in high-performance results.

Optimization, conversion & expansion: use untapped opportunities

Your plants no longer provide the desired capacity? Your energy consumption is in no relation to the performance? New laws force you to stricter environmental precautions? Often adjustments or expansions for your company can achieve a noticeable increase in performance.

Put on lead by experience

Evaporation technologies meet numerous production industry goals, even under complex conditions. In order to optimize the necessary energy expenditure, GIG Karasek offers its customers a high potential for savings through ingenious plant design.
Taking into account your requirements, we develop a balanced concept that brings investment costs and operating costs into an efficient balance.

Design Options

- Multi-level interconnections
- Several liquid paths in the evaporator (optimal use of the heating surface)
- Mechanical / thermal vapor compression
- Integrated vapor condensate stripping

Evaporation in use

In the course of our decades of activity in evaporation numerous new systems and optimizations could be realized - among others in the following areas:

Potato tube liquor as compound fertilizer

By-product utilization and fulfillment of environmental requirements

Potato tube liquor, which is obtained in the starch production, is a very good nutrient for agricultural crops. If the untreated potato tube liquor may no longer be applied to agricultural land due to legal requirements or too high logistics costs make this unprofitable, can be produced by evaporation a storable fertilizer concentrate with high nutrient content.

Country: Germany
GIG Karasek Equipment:
4 tubular film evaporators (pipe length up to 26m), each with a mechanical vapor compressor
Service:
Feasibility study, engineering, manufacturing, assembly, commissioning

From timber to pulp

Increase the evaporation rate while reducing the specific live steam consumption

During pulp extraction, the wood shredded in wood chips is mixed with chemicals in pressure vessels and heated. Under the influence of pressure, high temperature and cooking chemicals, cellulose fibers (pulp) are split off from hemicelluloses and lignin.
Subsequently, the pulp fibers are separated washed several times and bleached if necessary. The resulting thin liquor is separated by means of filters from the remaining pulp and evaporated. The resulting thick liquor is then burned for energy and chemical recovery.
In order to meet the increasing demand for pulp on the market, an existing evaporation plant was expanded for the customer by two additional evaporator stages (plate falling film evaporator). Thus, the goal of increasing the evaporation rate could be achieved while reducing the specific live steam consumption.

Country: Czech Republic
GIG Karasek Equipment:
Plate falling film evaporator with mechanical vapor compression
Service:
Feasibility study, engineering, manufacturing, assembly, commissioning

Evaporation technology

Complete evaporator systems

We plan and deliver evaporator systems specifically adapted to process and customer needs with multiple use of heat energy and / or heat recovery with vapor compression, matched to infrastructure, resources and investment budget. We also pay attention to a perfect interaction with the upstream and downstream systems as well as an optimal consumption of operating resources. Thanks to many years of experience and the know-how acquired in practice, our experts can find the right solution. and gladly take over the commissioning as well as the training of the staff for you.

Plant and process concepts from traditional to innovative

We support you with comprehensive advice and detailed test options in our technical center to work out the ideal system and process concept for your requirements. Falling film evaporators are particularly suitable for gentle evaporation and evaporation of temperature-sensitive media. Due to their good heat transfer behavior and because the liquid begins to boil without overheating by pure surface evaporation, only a small driving temperature difference between the heating medium and the product is necessary. Even with media that would tend to caking at higher wall temperatures, the use of falling film evaporators is suitable. This can reduce fouling on the product side.

Special types of evaporators

GIG Karasek plans and manufactures special apparatuses for special challenges in addition to the classic, often used types of evaporators:

- *Thin Film Evaporator*
- *Short Path Evaporator*

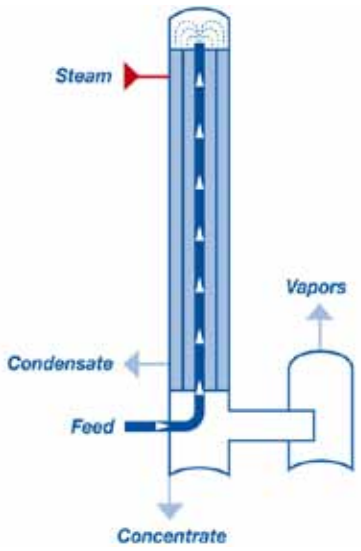


PLate Falling Film Evaporator

Functionality:

In the plate falling film evaporator, heat exchanger plate packs are used as the heating element. These are spot-welded plates made of corrosion-resistant materials, which are hydraulically pressed into their final shape after welding. The heating medium is thereby guided in the plates, while the product to be evaporated runs down the outside of the plates and partially evaporated. Due to the large distances between the plates and the cylindrical jacket of the evaporator, the resulting vapor has a lot of room to spread and escapes in countercurrent upward through a mist eliminator in the evaporator head. Due to the resulting low vapor velocities, droplet infiltration is largely limited.

The plate falling film evaporator is also characterized by its excellent cleaning properties. The film-forming media are guided here on the outside of the plate elements, resulting in a pronounced self-cleaning behavior. A temporary rinse with cleaning medium complements this property optimally. By the possibility of using different operating and cleaning temperatures and the resulting different thermal expansion deposits can also be chipped. The large plate gaps also allow mechanical cleaning of the plates.

Applications:

- Evaporation of waste liquors from the pulp boiling
- Evaporation of production wastewater
- Evaporation of temperature-sensitive organic substances
- Evaporation process in the food industry
- Bottom evaporators and condensers in vacuum columns

Tube Falling Film Evaporator

Functionality:

The tube falling film evaporator is a tube bundle heat exchanger with a vertical tube bundle. The heating medium is guided here around the pipes in the jacket. At the head of the heat exchanger, the product is introduced via a distributor system in the individual tubes and runs as a thin, mostly turbulent film on the inner walls of the tubes down from. Due to the external heating of the tubes, the liquid film begins to boil and evaporates partially.

The evaporator can be equipped with one or more fluid paths. At high evaporation rates, the liquid is recirculated to ensure a sufficient supply of liquid.

Applications:

- Process water from the starch industry
- Solvent recovery
- Temperature sensitive products
- Liquids with low solids content
- Liquids with low viscosity
- Liquids with low tendency to fouling (deposit formation)

Forced Circulation Evaporator

Functionality:

In the forced circulation evaporator, the solution to be evaporated circulates by means of a circulating pump via a radiator. To reduce the steam costs, especially at high evaporation rates, circulation evaporators are also designed in multiple stages.

Distillation

Separate liquids, recover valuable materials

Distillation is a thermal separation process used to separate liquids due to their different boiling points. At GIG Karasek you will receive not only pure engineering services for distillation, but above all solutions from a single source. Thanks to our combination of process know-how and expertise in plant construction, we can implement the most efficient design as well as complete plant including process control and commissioning. Comprehensive expertise from the beginning is provided by the GIG Karasek Technical Center.

We offer you either an engineering including core equipment or a complete system, on request including commissioning and training. Computer simulations and validation in the pilot plant are part of our services. The optimal design leads to improved column performance, higher capacity and reduced energy consumption.

From wastewater to reusable recyclable material

Recovery & environmental protection in a sweeping environment

Industrial process and waste water harms the environment and involves both disposal costs and the loss of recyclable materials. GIG Karasek counteracts these weak points with individual distillation plants, with the help of which valuable substances can be recovered, processed and in turn fed to production processes.
On the basis of this objective, GIG Karasek realized the conversion and extension of an existing plant for a solvent producer. In addition, the energy consumption for the process was additionally optimized with a multi-stage principle.

Country: Germany
GIG Karasek Equipment:
Two-stage distillation unit, separate stripping column, thermal vapor recompression
Service:
Feasibility study, engineering, manufacturing

Our portfolio includes evaporators and columns in different designs - from single-stage to multi-stage systems:

- Rectification
- Reactive distillation
- Molecular distillation
- Special vaporizers and columns for special distillation requirements

Based on an in-depth analysis of your requirements, our process specialists develop the right solution.

Realize savings potential

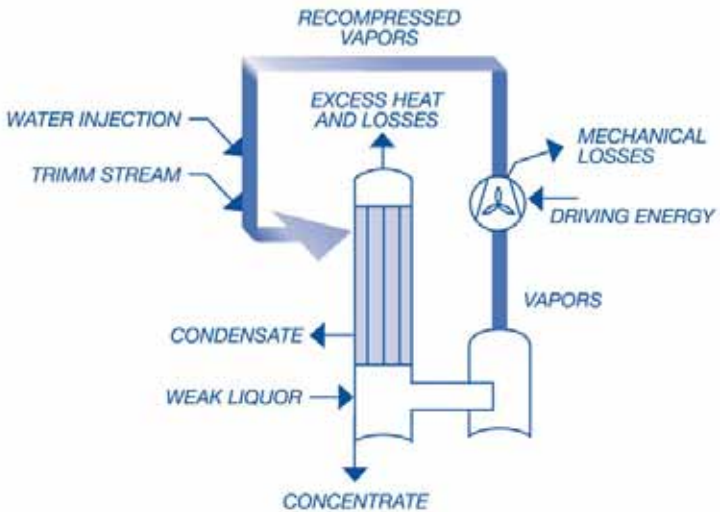
Professional design counts:

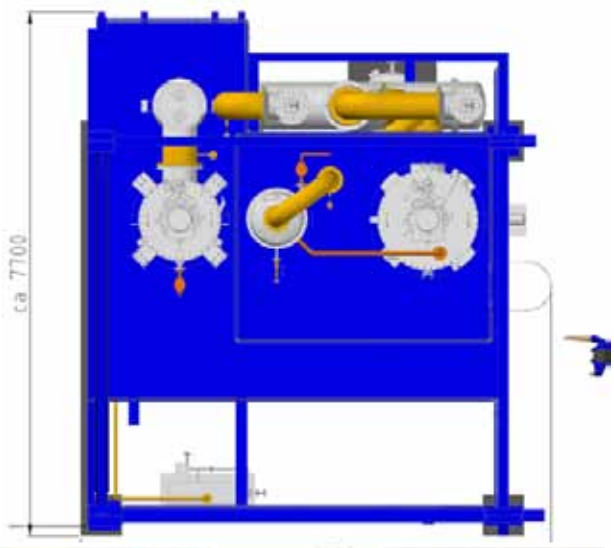
In order to fully exploit the savings potential of various methods according to your individual requirements, we use our many years of design know-how.
Especially with existing concepts, unforeseen chances of saving are often broken, which can be implemented quickly and achieve a cost reduction from the first day after commissioning.

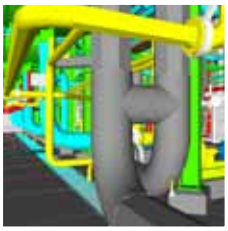
Mechanical Vapor Recompression (MVR)

Use already used energy again sensibly for processes.

In the mechanical vapor recompression, the vapors are compressed by an electrically operated compressor and used again to heat the evaporator. Depending on the application (boiling point increase, heat transfer), one- or two-stage turbo-ventilators or turbo-compressors are used as heat pumps.



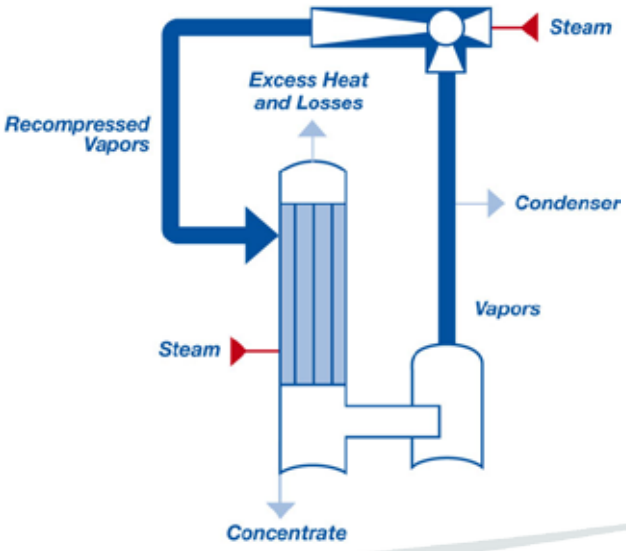




Thermal vapor recompression (TVR)

Use valuable energy intelligently & multiply

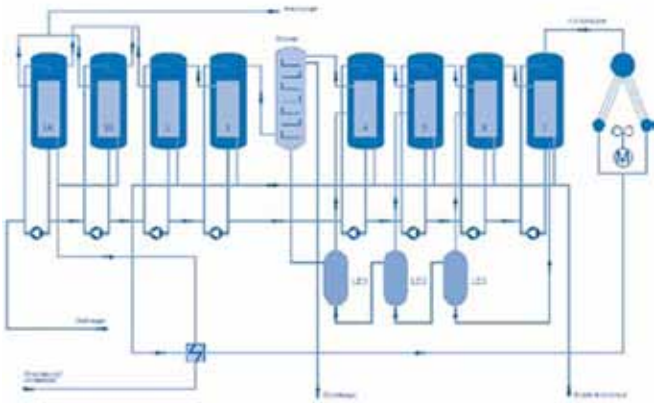
The thermal vapor recompression builds on the same principle as the mechanical alternative, but uses only a portion of the resulting vapor for heating the system. The compression of the steam for heat recovery
takes place in a steam jet pump. This is usually designed for a specific operating point and works on the jet pump principle.
The resulting energy savings correspond in many cases in about an additional evaporator stage.



Multi Stage Evaporation

Level by level halved energy requirement

The system consists of several stages, which are connected in series so that the vapors of the respective upstream stage heat the next stage. This saves you about 50% of the steam requirement from the second stage. The more levels, the higher the energy savings.



Pilot Plants / Technical Center

Leading because of innovation

Get to know and convince yourself from new methods of innovative approaches: Our technical team will initiate you into the secrets of pioneering process technology or developed new process steps as tailor-made special solution explicitly for your challenges. Only long-term and sustainably managed research and innovation provides the necessary results in order to optimize the processes of our customers in the future.
- Laboratory tests
- Pilot tests
- Test reports including Scale Up

Extensive testing with our own test infrastructure

To realize every customers requirement - from the individual apparatus to complete systems - the GIG Karasek Technical Center was launched. An extensive infrastructure with all GIG Karasek systems is avaiable for trials purposes. Under perfect adapted conditions your own sample materials meaningful laboratory and pilot tests can be subjected by our proven specialists.

Full data transparency and availability

... are prerequisites for GIG Karasek:
Our systems work with SPS and you receive after your attempts, all data in the form of a comprehensive test report for your further use.
The essential areas of our business activities are
- Process Simulation
- Experimental Procedure
- Cleaning of the system
- Detailed test report
- Attempt accompanied by GIG Karasek process engineer
- Sample quantities

„GIG Karasek developes technology for the world of tomorrow. To meet every customers needs and different requirements, our experts realize tailor-made process solutions that can be flexibly adapted to the most individual specifications."

High quality service, flexible care

Under perfect adapted conditions your own sample materials can be sujected of proven specialists in meaningful laboratory and pilot tests. All systems are designed for great flexibility, interconnected with each other and, as required for a variety of tasks can be configured and combined. High quality of service accompanies all services at the GIG Karasek Technical Center: We respond flexibly to your wishes and our experts will accompany you from concept to key issues such as investment decisions.
Our testing team consecrates the secrets of pioneering process technology. Only long-term and sustainably managed research and innovation provides the necessary results in order to optimize the processes of our customers in the future.

Available Systems

- Thin Film Evaporator
- Short Path Evaporator
- Falling Film Evaporator
- Forced Circulation Evaporator
- Plate Molecular Evaporator
- Thin Film Dryer
  (Vertical and horizontal)
- Rectification column
- Laboratory glass-flash Evaporator
- Rotovap, batch distillery
- Miniplants

Optimization of operating data and systems

As efficient basis for the development of individual devices to complete systems, the GIG Karasek Technical Center was launched, which can now point to hundreds of successful trials. Thanks to its extensive test infrastructure and the expertise of highly experienced staff optimizing operational data as well as systems are in focus.

Main Components

- Feed tank
- Preheater
- Flash container
- Capacitor
- Discharge pump and weighing tank for residue and distillate
- Vacuum pump with cold trap
- Degasser
- Cold trap for dry ice or liquid nitrogen filling
- Setter
- Circulation pump
- Demister
- Concentrate measuring container
- Distillate measuring tank
- Feed pump
- Radiator, boiler
- Circulation
- Packings, mass transfer trays
- Mobile operator control and monitoring panel

All systems in EX version and able to interconnect them.

Research & Development

Customer-oriented R&D for the separation technology of the future

Expertise and know-how provide the basis of our services. Our Technical Center provides the technological lead for long term performance systems. On the basis of intensive trials, simulations and the development of new approaches, we generate the necessary input for your customized solution. In our Technical Center the entire evaporation process can be carried out by the thin solution through to the bone-dry residue.

Advice and support from the beginning

Experimental projects with GIG Karasek start already early, to accompany and advise you from the beginning:
Before the test, careful planning and the simulation of the concentration or distillation process in pilot scale takes place in cooperation with the customer.
The necessary for the scale-up process data are determined here. Because of many years of expierence and methods operations can be carried out in excess of the scale-up factor 2000.

- Pre - Experiments in the laboratory
- Experiment accompanied by process engineer
- Pilot-scale trials
- Determination of the optimal process parameters and performance limits
- Plant optimization
- Preparation of product samples, small quantities, sample quantities
- Test report
- Design of large systems (scale-up)

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Our Portfolio

Evaporation Technology

- Falling film evaporator
- Forced Circulation evaporator
- Optimization, conversions and expansion
- Detection of possible energy-saving potential

Thin Film-/Short Path Technology

- Evaporation technology
  - Thin Film Evaporator
  - Short Path Evaporator
- Drying
  - Horizontal Thin Film Dryer
  - Vertical Thin Film Dryer
- Evaporation plants

Other Equipment

- Special constructions including performance guarantees
- Processing of special materials
- Heat exchangers, columns, tanks, reactors
- Pharmaceutical containers and vessels, fermenters, tanks with and without agitator
- etc.

Our Service

- Advice and analysis of problems and development of new technologies
- Creation of profitability and feasibility studies
- Conducting laboratory pilot tests
- Procedural process design
  incl. EMSR
- Full implementation including:
  - Basic & Detail Engineering
  - Own production, including heating and cooling units
  - Qualification for the entire project management
  - Delivery and apparatus, pipeline and EMSR installation
  - Commissioning and personnel training
  - Maintenance, service and performance guarantee

Approvals and Standards

For all information regarding our approvals, certificates, etc., please visit our website.
www.gigkarasek.com.

Highest Quality is our Standard!

Equipment for the world of tomorrow.

We are your first contact for demanding process solutions and plant projects. For decades, we support our international customers in the fields: chemical, paper & pulp, food and pharmaceutical industries. Our specialty of expertise are in the fields of distillation, evaporation and drying. We also manufacture according to customer requirements and needs special process equipment for different procedural applications. With our own laboratory / technical center we offer our customers full service support. Because of our laboratory we remain constantly on the pulse of time and develop new technologies.

Our Edge - Experts with experience and manufacturing expertise

We know what industrial production processes benefit and create custom (Complete-)solutions from A to Z, which are tailored to the specific customer requirements. We offer our customers our expertise in consulting, lab and pilot testing, planning, engineering, production and commissioning of functional units or complete process steps for the most diverse applications. We support independent in complete systems from the scope of the project as well as in the sustainable optimization, conversions and extensions.

For GIG Karasek, tradition and the optimal use of many years of knowledge are among the essential corporate values. We fully exploit the economic potential of thermal separation technology in the areas of evaporation and distillation. Not only for new plants, but also for efficiency-increasing attachments and conversions of existing processes. Our goal is systems that completely close the value chain and, depending on customer requirements, implement objectives such as increasing productivity, recovering materials or reducing energy costs.

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Contact us

Evaporation Technology

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