



***Thin Film Evaporators
& Short Path Evaporators***



About our company

GIG Karasek is a leading European supplier of system design and turnkey plant construction in the field of process evaporation, thermal separation technology and equipment and machinery for the chemical, pharmaceutical, food ingredients, pulp & paper, petrochemical, and related allied industries.

The advantage for our customers is our ability to be your Single Source Partner for all critical project stages - from basic engineering through manufacturing of key components and final assembly and erection of the entire plant - thus assuring successful implementation and economic execution within a tight project schedule.

What this means is that improvements and alterations in scope of supply are accomplished in the shortest time span and with minimal cost impact. The close working relationship of our engineers and production experts with clients means that further refinements remain consistently a matter of course.

GIG Karasek draws on its extensive experience and expertise over decades in the design and production of Falling-film, Force circulation, Thin-film and Short-path Evaporators.

As a client you will tap into the resources of a dynamic and lean organizational structure comprised of highly skilled technical experts who remain a pleasure to work with and can guarantee efficient realization of your projects. The wealth of experience and in-depth competence of our people in process engineering and successful plant construction are the foundation of a company which never loses sight of the future.

***Maximize
your yield with
the best!***



Range of Supply Program

All of our evaporators and machines are fabricated under stringent quality control standards in our own workshops.

Thin Film Evaporators / Dryers

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Short Path Evaporators

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Package Units

page 13

Pilot Plants

page 15





Applications

Fine Chemicals:

- ☛ Separation of nitric acid from organic high boiling liquids
- ☛ Separation of butane (butyne) diol from high boiling liquids
- ☛ Recovery of methanol from high boiling liquids
- ☛ Recovery of xylene (dimethylphenol) from a purification solution
- ☛ Removal of hexane from PP and PE waxes
- ☛ Drying of salt via the evaporation of water and solvent
- ☛ Separation of phenol from bituminous coal pitch
- ☛ Distillation of starting products for the production of insecticides
- ☛ Separation of byproducts in the production synthetic fibers

Polymers:

- ☛ Distillation of TDI, HDI and MDI (isocyanates)
- ☛ Final removal of toluene from epoxy resin
- ☛ Separation of THF from polymers
- ☛ Distillation of trimethylpropane from high-boiling liquids
- ☛ Recovery of solvents from synthetic resin production
- ☛ Lactic acid, starch and sugar:

Lactic acid, starch and sugar:

- ☛ Upgrading and distillation of lactic acid
- ☛ Upgrading of tartaric acid derivatives
- ☛ Concentration of sweetening agents
- ☛ Concentration of modified starch

Pharmaceuticals:

- ☛ Concentration of active ingredient solutions
- ☛ Distillation of pharmaceutical substances
- ☛ Upgrading of substances for artificial feeding

Oleochemicals, Fatty acids, Biodiesel:

- ☛ Separation of dioxin from surfactants
- ☛ Removal of free fatty acids from mono-, di- and triglycerides
- ☛ Distillation of monoglycerides
- ☛ Distillation of fatty acids from tall oil
- ☛ Distillation of fatty acid methyl esters
- ☛ Separation of residual glycerine from residues in biodiesel production (glycerine dryer)

Miscellaneous:

- ☛ Drying of industrial sludge
- ☛ Drying & pre-concentration of municipal sewage sludge
- ☛ Drying of hydroxide sludge
- ☛ Drying of inorganic salt solutions
- ☛ Drying of preliminary and intermediate products from chemical industry
- ☛ Drying of suspensions, pastes and moist solids into powder
- ☛ Drying of lubricants for forging industry



Thin Film Evaporator / Thin Film Dryer

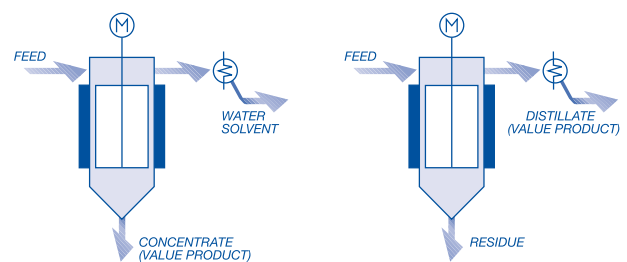
Thin Film Evaporation Technology

Mode of operation:

The feed product is distributed by the rotor and its wipers evenly over the heating surface forming a thin liquid film of uniform thickness. Highly turbulent swirls are produced at the tip of the rotor blades and wipers with intensive mixing and agitation of the product as it comes into contact with the heating surface. These assure excellent heat transfer combined with constant renewal of the product film, thereby providing for an even heating and short residence time of the product through the heated zone.

Versatile efficiency and application diversity

The thin film evaporator can be used to concentrate, refine or recover a value product through distillation or similar thermal separation processes. Due to its inherent design features, it is ideal for thermal treatment of viscous media and heat sensitive products where reduced operating temperatures and vacuum operating pressures are desirable.



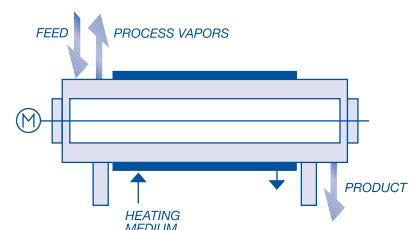
Thin Film Drying Technology - Horizontal / Vertical

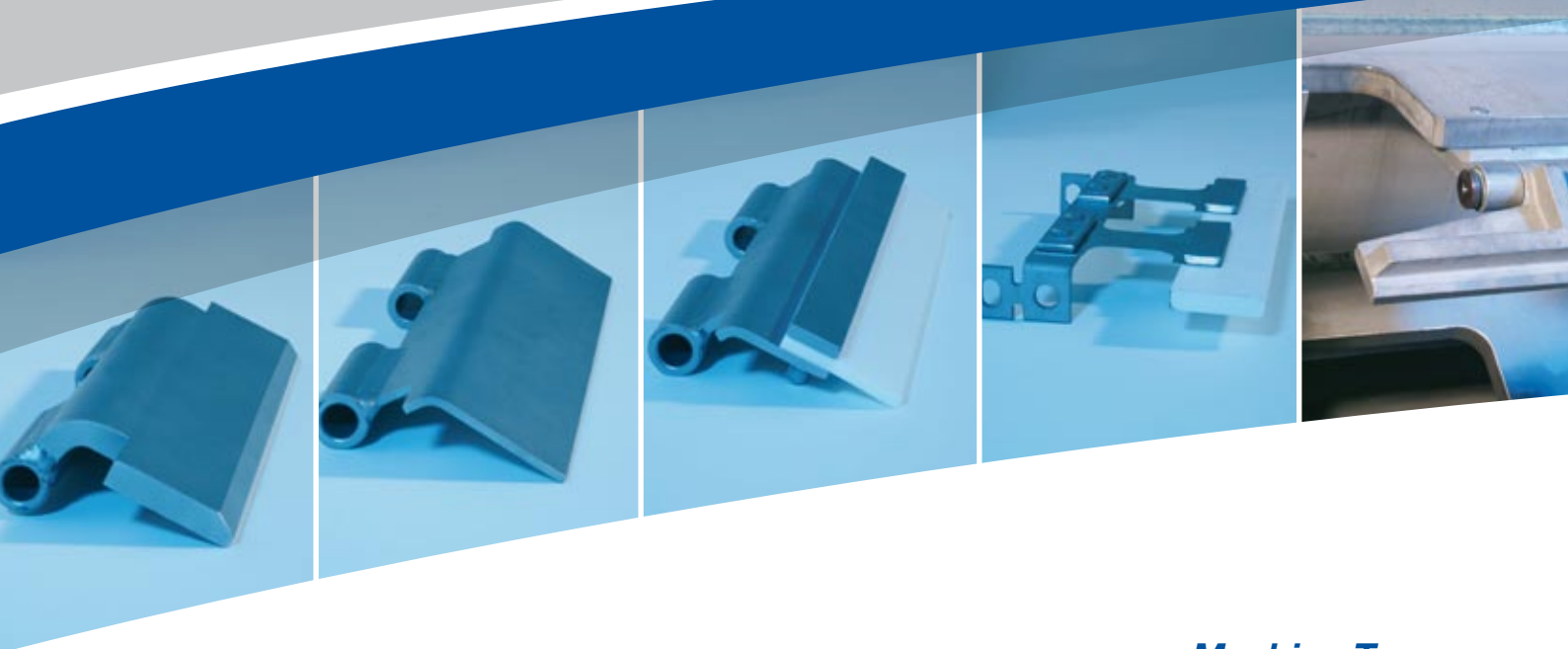
Thin Film Dryer

The thin film dryer is a special design of the thin film evaporator used in the chemical, pharmaceutical and related industries. There are two types of thin-film dryers, vertical and horizontal dryers.

Technology

The product to be dried is distributed in the form of a thin layer on the heating surface by means of a rotor. Depending on the design of the dryer, the rotor is equipped with different wiper elements.





Machine Types

◀ TFE

POWERFILM

Metal wipers of special geometry and shape

◀ Features / Properties

Most common high performance type; best dry running properties

ECOFILM

Metal wipers of standard geometry and shape

Economic / high performance type

ECOFILM P

Ecofilm with insert blade tips made of synthetic materials

Low wear / high performance type

SPRINGFILM

Spring-loaded Ecofilm wipers

For sticky media

DRYFILM

Pendulum type wiper blades

Suitable for drying products

PUREFILM

Rigid blade rotor

No impurities in bottoms product

PUREFILM S

Rigid blade rotor with reduced dead spaces

Can be completely cleaned & sterilized

ROLLERFILM

Roller type wipers

For simple distillation tasks

BLOCKFILM

Block wipers

For low residue

◀ Types of heating

Full jacket:

steam, hot oil, hot water

Half-pipe external coils:

steam, hot oil

Single embossed

pillow plate:

steam

◀ Drive:

gear drive motor with or without frequency converter

◀ Bearings:

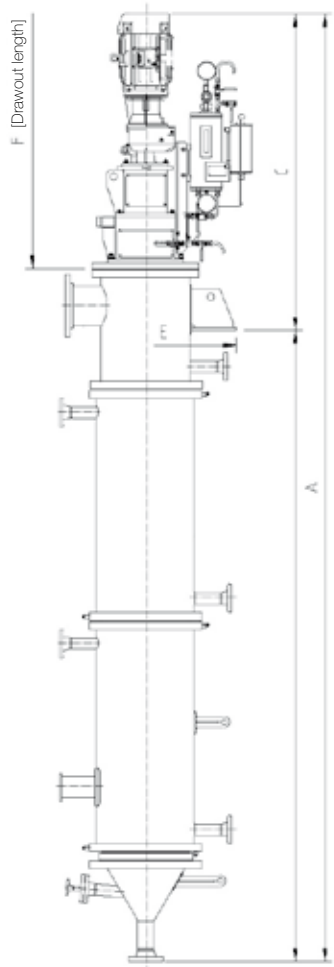
Powerfilm and Ecofilm possible without bottom bearing

◀ Shaft sealing:

Single & double mechanical seal, magnetic coupling



Overview of sizes



Heating area (m ²)	A (mm)	C (mm)	E (mm)	F (mm)	Weight, empty (kg)
0,1	1980	880	365	1500	300
0,2	2190	880	390	1700	350
0,4	2350	920	460	1800	400
0,7	2940	950	760	2400	450
1	3390	1090	810	2800	500
2	4000	1400	980	4000	850
3	4690	1450	1060	4600	1200
4	5450	1650	1220	5200	1700
5	5980	1700	1290	5600	2200
6	6440	2050	1360	5700	2700
7	6890	2050	1480	6100	3200
8	7350	2100	1480	6600	3800
9	7480	2100	1600	6600	4100
10	7890	2100	1600	7000	4500
12	8600	2300	1670	7500	5300
14	9220	2450	1730	8100	6300
16	9720	2450	1790	8500	8100
18	9880	2550	1860	8600	10000
20	10780	2850	2010	9100	12600
25	11760	2850	2130	10000	15800
30	12400	3000	2280	10600	18800
36	13400	3000	2490	11500	22000
40	13890	3000	2590	11900	26400
50	15840	4000	2700	13500	32000
60	17000	4000	2900	15000	38000

Other sizes and intermediate sizes are possible upon request

Dimensions are non-binding and subject to changes by GIG Karasek without notice.



Properties/Advantages

Advantages for you:

◀ High evaporation rates

Due to the highly turbulent film and large difference in temperature

◀ Gentle evaporation

Due to short residence times, rapid conveyance in the heated zone, and the constant product film renewal often combined with suppressed boiling points due to operation under vacuum

◀ Product-specific selection

Of rotor type

◀ No corrosion

All of the outside surfaces are made of stainless steel

◀ Reduced need for maintenance

Sophisticated bearings and shaft sealing parts

◀ No additional need for lubrication

Powerfilm and Ecofilm are operated without bottom bearing

◀ Shorter standstill and assembly time for maintenance and inspection

The machine is sufficiently fitted with auxiliaries facilitating assembly and disassembly

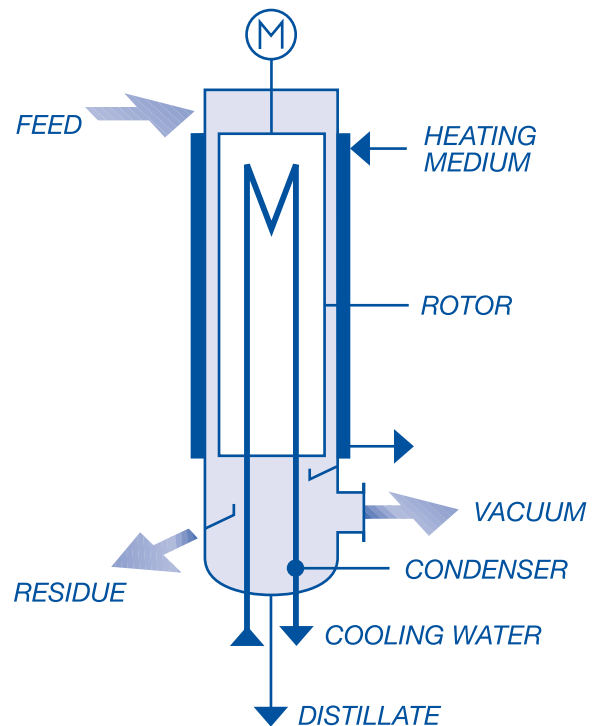


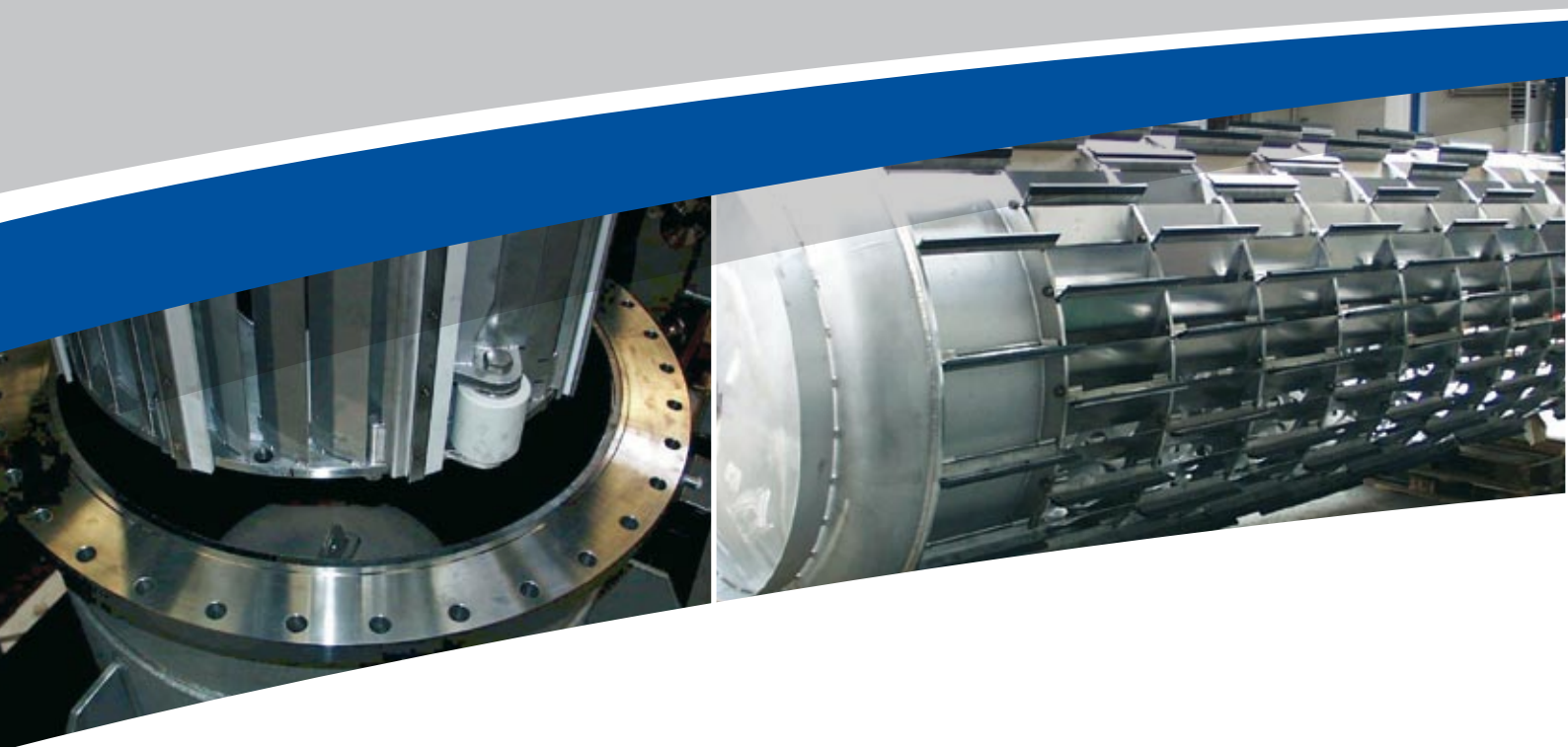
Short Path Evaporator

Technology

The Short Path Evaporator operates in principle similar to a high performance Thin Film Evaporator. The main difference is that the vapor chamber is additionally equipped with a built-in internal condenser, which results in an extremely short distance between the heating surface and the condensing surface, thus minimizing the pressure drop sustained during condensing duty.

Their usage covers a broad range of applications from high evaporation rates to fine vacuum distillation with operating pressures at the heating surface in the range down to 0.001 mbar.





Machine Types

◀ <i>SPE</i>	◀ <i>Short description</i>	◀ <i>Features / Properties</i>
POWERMOL	Solid metal wipers of special geometry and shape	Most common high performance type; best dry running properties
ECOMOL	Solid metal wipers of standard geometry and shape	Economic / high performance type
ECOMOL P	Ecofilm with insert blade tips made of synthetic materials	Low-wear high-performance type
ROLLERMOL	Roller-type wiper	For simple distillation tasks

◀ *Types of heating*

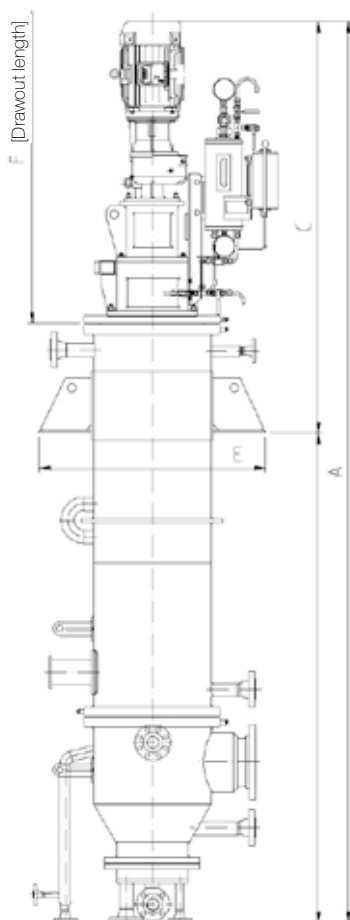
Full jacket:	steam, hot oil, hot water
Half-pipe external coils:	steam, hot oil
Single embossed pillow plate:	steam

◀ **Drive:** gear drive motor with or without frequency converter

◀ **Shaft sealing:** Single & double mechanical seal



Overview of sizes



Heating area (m ²)	A (mm)	C (mm)	E (mm)	F (mm)	Weight, empty (kg)
0,4	2220	1050	760	1700	450
1	2880	1300	980	3000	600
2	3650	1600	1220	3500	1000
3	4020	1600	1260	3800	1500
4	4550	1950	1360	3900	2100
5	5050	2000	1480	4400	2600
6	5510	2000	1600	4800	3200
7	5510	2000	1670	4800	3900
8	5610	2000	1730	4800	4500
9	6020	2000	1790	5200	4900
10	6020	2000	1860	5200	5400
12	6630	2100	2110	5600	6300
14	7140	2100	2130	6000	7500
16	7550	2100	2130	6400	9700
18	8060	2200	2200	6800	12000
20	8060	2200	2300	6800	15100
25	8680	2300	2600	7300	18900
30	9850	2900	2700	7800	22500
35	9950	3000	3100	7800	26400
40	10760	3000	3100	8600	31600
45	10860	3000	3350	8600	36000
50	11560	3200	3500	9000	40000
60	14500	4000	3700	11200	55000

Other sizes and intermediate sizes are possible upon request

Dimensions are non-binding and subject to changes by GIG Karasek without notice.



Properties / Advantages

◀ Low pressure drops at high evaporation rates

In fine vacuum range (0.001 to 1 mbar) and also in the medium vacuum range (1 to 10 mbar) the Short Path Evaporator offers advantages. The boiling point corresponds exactly to the pressure measured due to the negligible pressure drop of the vapor stream.

◀ Gentle evaporation

Since the built-in internal condenser can handle high vapor volumes, products whose boiling points at normal pressures are often higher than the temperature at which the product decomposes can be vaporized or distilled with a gentle thermal loading under very low vacuum pressures. A short path evaporator by its inherent design can distill heat sensitive products by its ability to operate reliably at pressures as low as 0.001 mbar. Under such conditions, short path distillation is a superior solution for thermal separation of products, which conventional thermal processes are unable to separate.

◀ Efficient separation of entrained droplets

Some products tend to splash due to localized and spontaneous vaporization. An efficient and dynamic droplet separator acting like a splash guard prevents such entrainments from reaching the condenser.

◀ Quasi-fractionated distillate removal

Condensate collection channels can be installed along the internal condenser tube bundle, hence, making it possible to remove distinct distillate fractions and thus obtain different product qualities.



Package Units

Range of services

The unique strength of GIG Karasek lies in its dynamic flexibility. A team of qualified engineers and highly motivated experts view the individual needs of each and every client as a new and exciting challenge. Custom-designed and precisely engineered plants and vessels are the fruit of this deliberate effort.

The advantage for GIG Karasek customers is the competent and personalized service that we provide:

- ◀ *A complete line pre-assembled in a modular steel structure including PLC*
- ◀ *Shortened erection and assembly times at the job site*
- ◀ *Only the transfer points and scope boundaries have to be defined*
- ◀ *Larger processing lines can be realized with ease due to the modular design*
- ◀ *Construction of line and building take place simultaneously*
- ◀ *Engineering with latest software based on data banks and 3-D layout presentations*
 - *Basic engineering*
 - *Detail engineering*
- ◀ *In-house production with documented quality surveillance of individual steps*
- ◀ *Certification throughout the entire project execution (DQ, IQ, OQ)*
- ◀ *Commissioning and start-up of complete lines*
- ◀ *Supervision and training of customer's staff*



Thin Film and Short Path Evaporation plants

The unique strength of GIG Karasek is the concentrated expertise from basic engineering, pilot tests and manufacturing of key equipment in our own workshop. GIG Karasek offers a service package comprising engineering and supply of the plant including control system, erection and start-up assistance. GIG Karasek offers also self-contained units in the range of thermal separation based on the following key components:

◀ *Evaporation*

Film Plate Evaporators, Tube and Shell Type Falling film and Forced circulation Evaporator with mechanical vapour recompression

◀ *Crystallization*

Magma - Evaporation - Cooling Crystallizer
cooling through Exchanger Surface and Vacuum flash cooling

◀ *Rectification*

Conventional and Multi-Effect Distillation Units

◀ *Thin Film Evaporator and Thin Film Drying Units*

A falling film for pre-evaporation, a Vertical and a Horizontal Thin Film Dryer are connected in series, can be considered as a typical arrangement for drying a wide range of products, starting from their liquid state

◀ *Short Path Units*

A falling film for pre-evaporation followed by a Thin Film and Short Path Evaporator can be regarded as a typical arrangement for a self-contained Short Path Unit



Pilot Plants

Range of services

We can perform the entire evaporation process from the thin liquid phase solution through to dust-dry solid phase residue in our pilot plants.

Process simulation and scale-up / Toll processing

Our forte:

Our focused approach to what we do is a major asset for you. The tests carried out at our pilot plant facilities provide you with production scale equipment specifically designed to meet your particular requirements.

For many products it is also necessary to observe their fouling behavior during the evaporation process and find the optimum operating parameters. In most cases the evaporation behavior differs even with regard to products of the “same kind” but which are of a different origin. The reason for this is the different upstream processes or potentially their different compositions. Evaporators for products with non-Newtonian viscosity behavior can only be designed through pilot testing.

Place your trust in GIG Karasek. We are specialists when it comes to your new products.

Pilot Plant Station - the Research Center of GIG Karasek

GIG Karasek's new Pilot Plant in Gloggnitz is the most comprehensive Evaporation and Molecular Distillation Center in the world.

The complete set of Unit Operations in the Pilot Plant includes Falling Film Evaporation, Forced Circulation Evaporation, Thin Film Evaporation, Wiped Film Evaporation, Short Path Evaporation and Drying Systems. For each Pilot Test a unique equipment set up and testing protocol is offered for customer review and approval prior to testing.

We can develop your process, generate real process operating data, optimize your design, and formulate your new products under GIG Karasek expert supervision. We can also generate samples for evaluation and testing, and can achieve complete demonstration of equipment. All this can be done before the expenditure of capital.

Overt the years, we have found that the experience of hundreds of test runs and the resulting results of these test runs have given our customers the information to make the right decision - **the decision to use the technology of GIG Karasek.**



Thin Film Evaporators & Short Path Evaporators

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