

# Plate Heat Exchangers



## Sugar Industry

A refined campaign to save energy



# Concentrating on competence – for your benefit

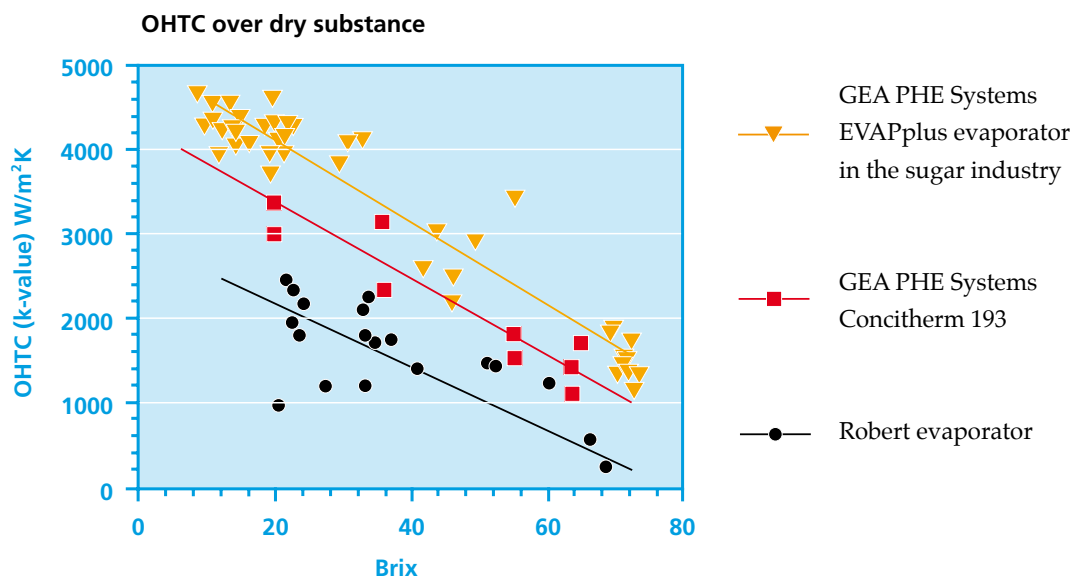
Within the GEA Process Equipment Division of the international GEA Group, GEA PHE Systems is responsible for plate heat exchanger technology. Strong individual companies: GEA Ecoflex, GEA ViEX, GEA WTT, GEA Ecobraze and GEA PHE Systems NA with production locations in Germany, Sweden, the USA, Canada and India produce gasketed, fully welded and brazed plate heat exchangers for worldwide distribution for use in almost all industrial applications. GEA EcoServe – the GEA PHE Systems service organisation – operates customer service centres in many countries to provide a rapid and competent maintenance and spare parts service, all around the world.

## Refinement of energy saving

Throughout the world the demand for sugar is increasing, allied to this, production costs are also escalating. This is the reason innovative engineering solutions are required in this market. Increasing the capacity in sugar production does not only radically change the energy balance of a factory, but also influences the quality of the product. GEA PHE Systems therefore offers you a state-of-the-art and carefully matched range of equipment for evaporation, condensation and general heating/cooling. Thus inputted energy can be fully exploited by using modern and powerful engineering!

## More efficiency for your energy balance

The energy requirements of sugar production are particularly high, waste exhaust vapours and condensates, for example, must be recycled several times. At the same time the sugar solution must be handled in all process stages with as much care as possible. This is why especially short residence times, high heat transfer rates and small temperature differences are called for in the manufacturing process. Using the latest plate technology from GEA PHE Systems you can easily achieve these goals. Because our plates ensure that multiple use of the energy guarantees low temperature differences and a reduction of the evaporation pressure without any problems, making the complete sugar manufacturing process more profitable from both energy and business management aspects.



# Tailor-made solutions

The range of GEA PHE Systems products for the sugar industry includes:

## Plate heat exchangers:

- Varitherm and NT Series for syrup, molasses, concentrated juice, filtered thin juice, extraction water
- Free Flow for raw juice and limed juice as well as for unfiltered juices

## Plate evaporators:

- Concitherm as booster for Robert evaporator or complete stage
- EVAPplus as retrofit solution or complete stage

## Direct contact condensers:

- VAPORplus as retrofit solution or complete unit

## Engineering – consulting:

- Heat balance of evaporation stations
- Consulting for all evaporator types
- Design of condensers
- Design of condensate cigars

## GEA EcoServe:

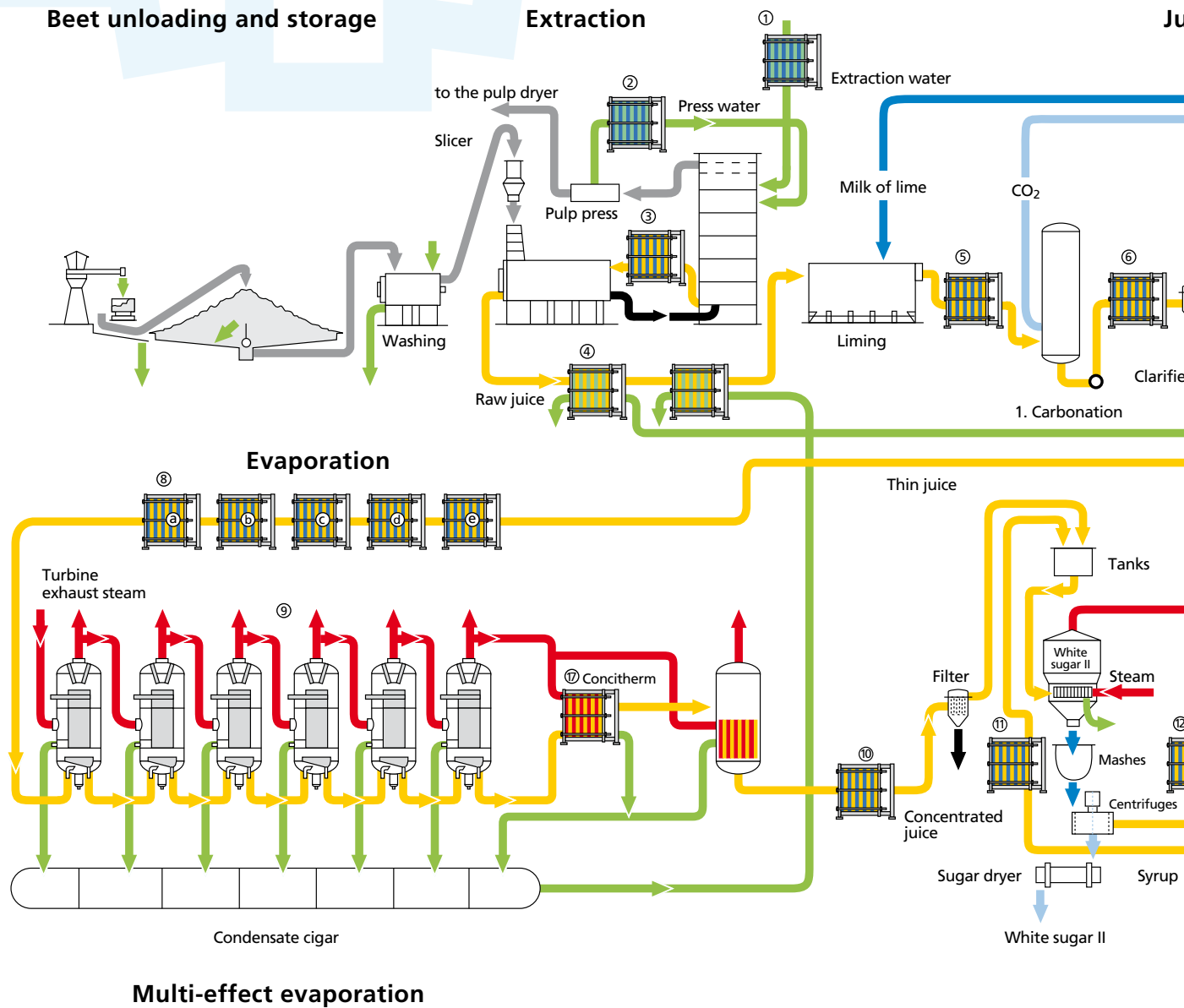
GEA EcoServe – the service organisation of GEA PHE Systems – offers you an extensive international service network. Whether you use products by GEA PHE Systems or by another manufacturer – at GEA EcoServe you receive complete service from a single source, whenever and wherever you need us. For maintenance and repair we use high-quality spare parts exclusively for all makes. This guarantees reliable seating, optimum function and a long service life.



Sugar Factory in Belgium  
Evaporation station with 8 effects

# Proven in sugar beet campaigns

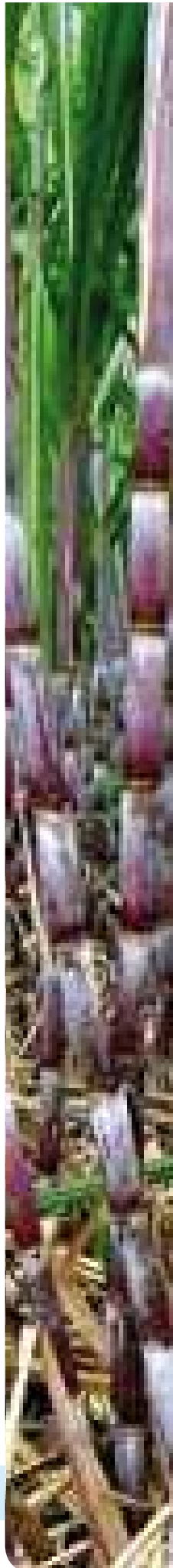
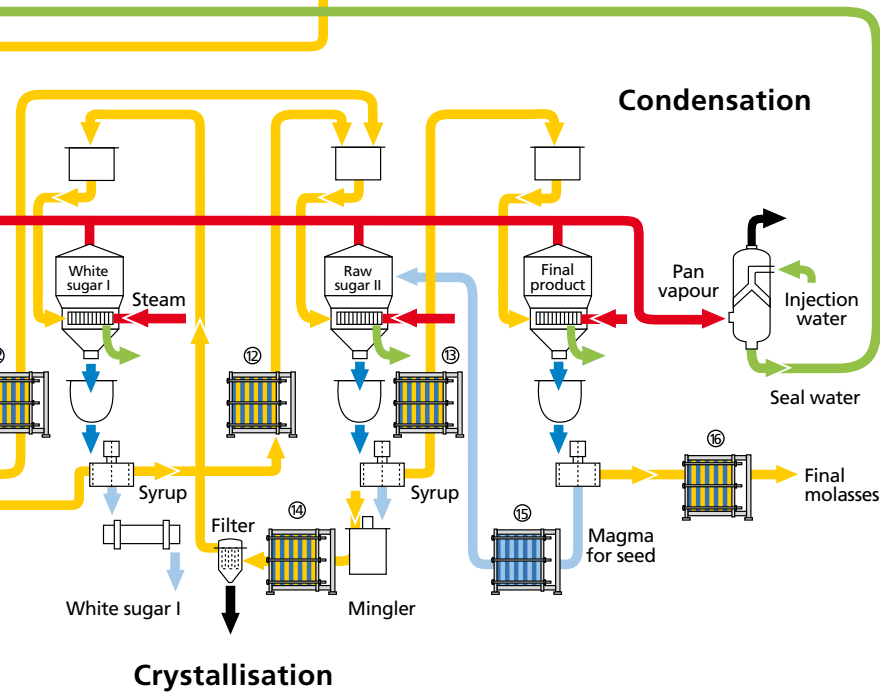
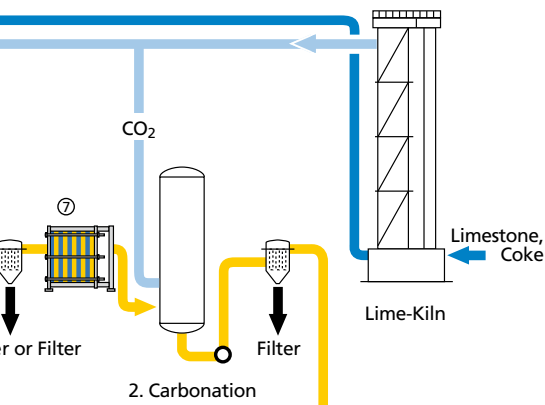
GEA PHE Systems is able to cater for the complete range of thermal processes arising in the sugar beet campaign – with EVAPplus falling film evaporators and Varitherm, NT Series, Free Flow and Concitherm plate heat exchangers. These special system components are integrated into the individual process stages.



**For all these applications:**

1. Heating extraction water, Varitherm/NT Series
2. Heating press water, Free Flow (with solids)
3. Heating circulation juice, Free Flow
4. Heating raw juice, Free Flow
5. Heating limed juice, Free Flow
6. Heating carbonation juice, Free Flow
7. Heating clarified juice, Varitherm/NT Series or Free Flow
8. Heating thin juice, Varitherm/NT Series
9. Multi-effect evaporation, EVAPplus
10. Heating concentrated juice, Varitherm/NT Series
11. Heating syrup, Varitherm/NT Series
12. Heating syrup, Varitherm/NT Series
13. Heating syrup, Varitherm/NT Series
14. Heating clearing liquor or remelt, Varitherm/NT Series (without solids), Free Flow (with solids)
15. Heating magma for seed, Free Flow (with crystals)
16. Cooling of molasses with Varitherm/NT Series or Free Flow
17. Booster with Plate Evaporator Concitherm 193

**Juice clarification**



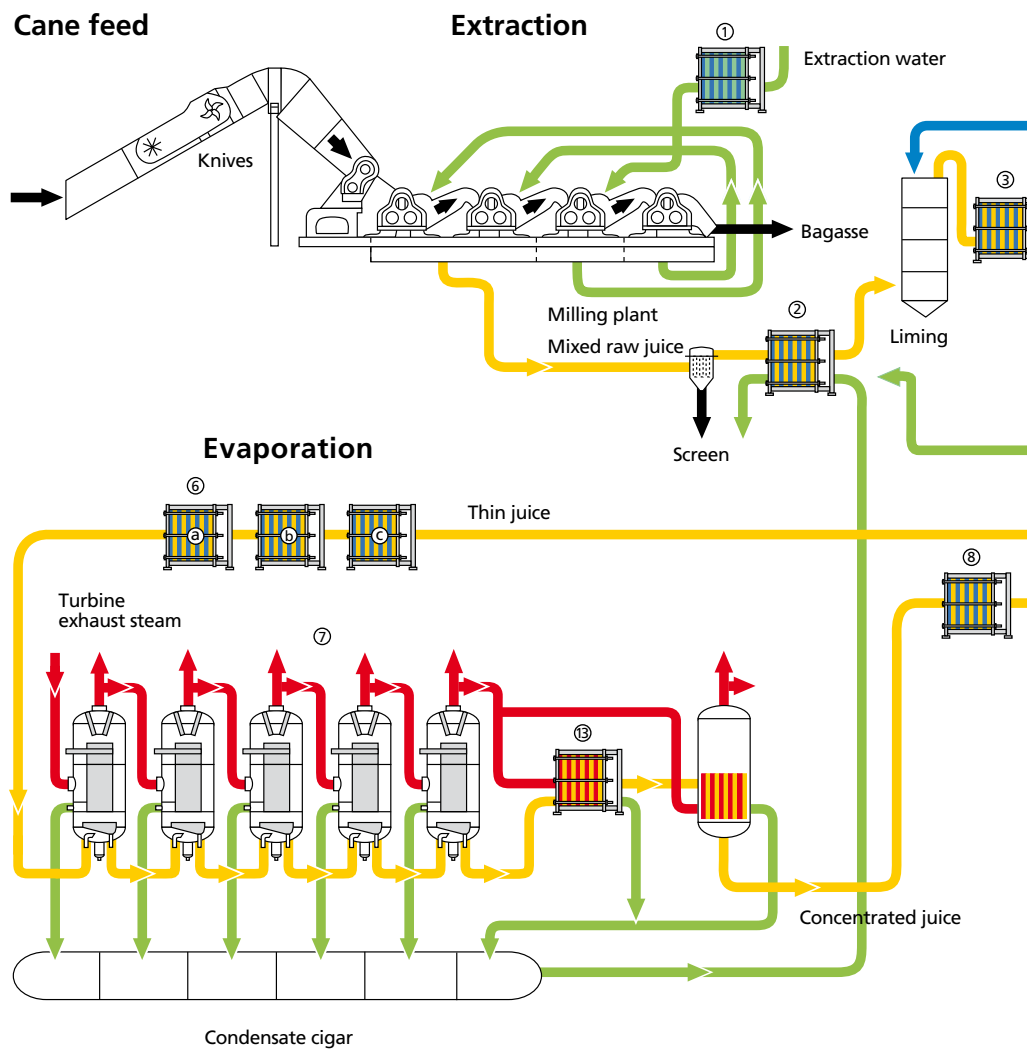


# Reliable in sugar cane processing

GEA PHE Systems plate heat exchangers have proven to be highly flexible across the full range of applications in the sugar industry. Whether beet, cane or other starchy products, the components work reliably and offer complete operational safety – even under extreme conditions.

## Advantages

- Compact, lightweight apparatus
- Large selection of materials
- Proven plate design
- Reliable functioning
- Easy to clean and maintain
- Low space requirements

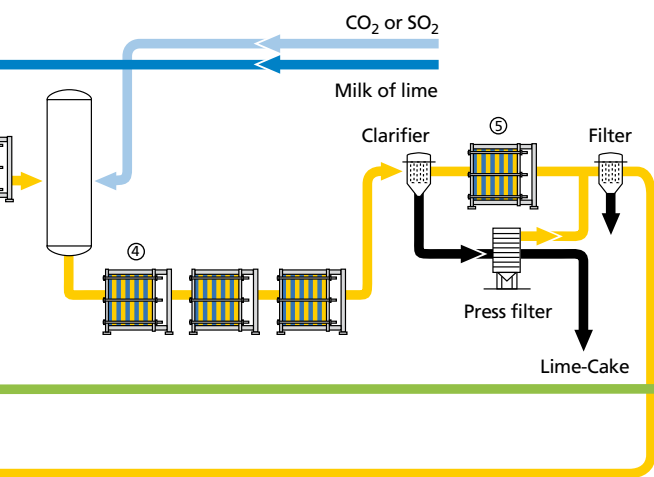


## Multi-effect evaporation

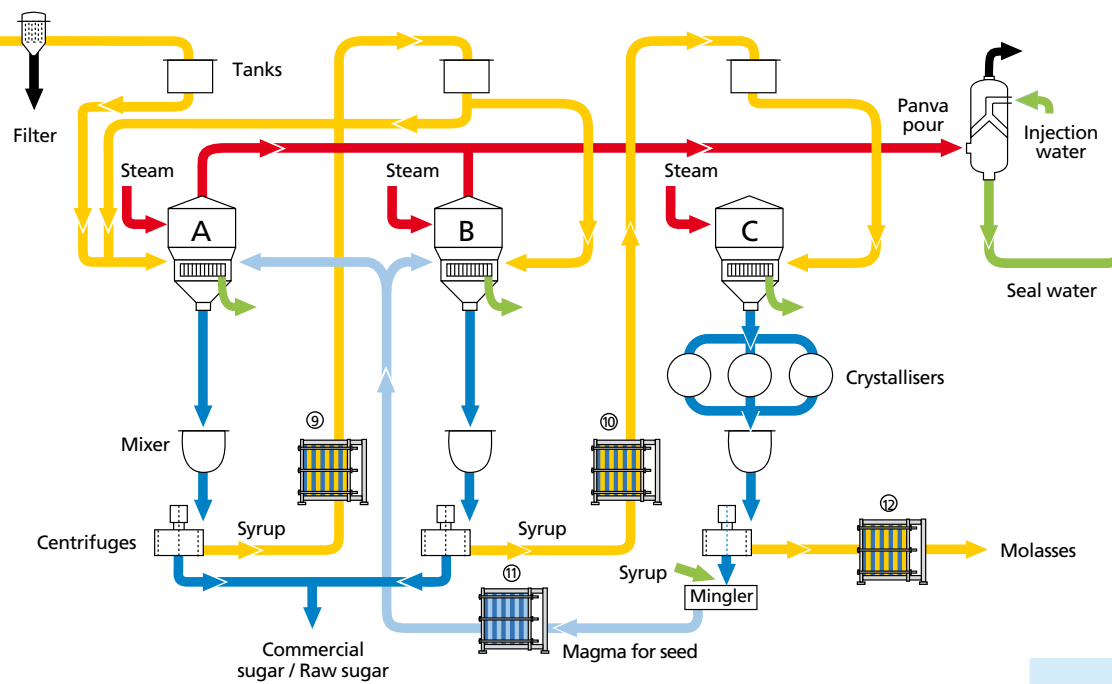
**For all these applications:**

1. Heating extraction water, Varitherm/NT Series
2. Heating raw juice, Free Flow
3. Heating limed juice, Free Flow
4. Heating carbonatation juice, Free Flow
5. Heating clarified juice, Free Flow
6. Heating thin juice, Varitherm/NT Series
7. Multi-effect evaporation, EVAPplus
8. Heating concentrated juice, Varitherm/NT Series
9. Heating syrup, Varitherm/NT Series
10. Heating syrup, Varitherm/NT Series
11. Heating magma for seed, Free Flow
12. Cooling of molasses with Varitherm/NT Series or Free Flow
13. Booster with Plate Evaporator Concitherm 193

**Juice clarification**



**Condensation**



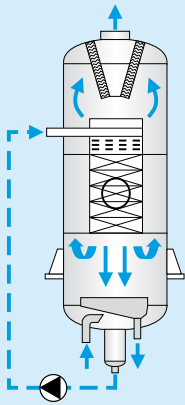
**Crystallisation**

# EVAPplus for your economic success

State-of-the-art technology, functionality and operational safety, these are qualities typified by the EVAPplus falling film evaporators from GEA PHE Systems. This powerful plate evaporator is fully welded and therefore offers total product integrity. These plate evaporators have been increasingly and successfully used in the beet and cane sugar processing industry for more than 10 years.

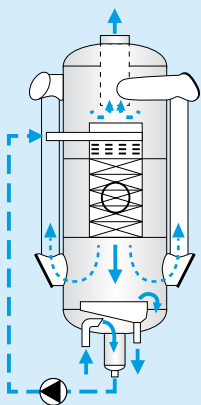
- With its special plate structure, high heat transfer values (caloric value) can be achieved at low temperature differences ( $\Delta t$ ).
- Due to the short residence time, the evaporation is kind to the product and thus reduces colour formation.
- The peripheral costs, e.g. of circulation pumps, and the electrical energy requirements are lower because of the reduced coverage (wetting of heating surface).
- The EVAPplus juice distribution is patented.
- Space requirements and weight are lower as compared to tube evaporators.
- With the modular design of the plates, erection and installation can be done quickly.
- Retrofitting is an easy process to increase the surface area and performance of existing Robert evaporators.
- Additional plate packs can significantly increase the heating surface and therefore the capacity even at a later date.

approx. 1,000 – 10,000 m<sup>2</sup>



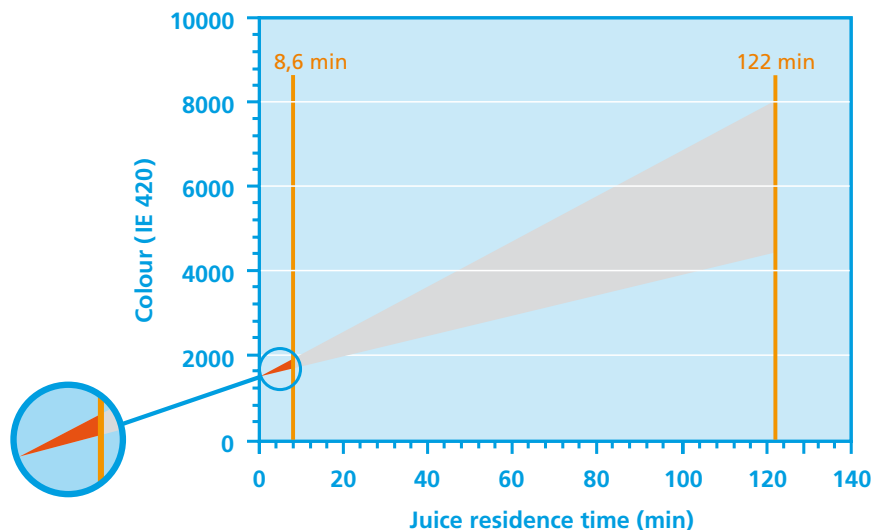
Unit with internal lamellar separators and internal vapour channels

approx. 1,000 – 10,000 m<sup>2</sup>



Unit with internal cyclone separators and external vapour channels

Juice-residence time



■ GEA PHE Systems plate falling film evaporator Colour formation

■ Robert Colour formation



# Full programme throughout the process

The range of GEA PHE Systems plate heat exchangers is as diverse as the production stages in the sugar industry. Our range includes a wide selection of both models and materials, i.e. the suitable component for every single stage of the process. Tailor-made for your specific needs and your specific plant.

## NT Series – the new plate generation

- Optimum design due to variable lengths and profiles
- Low investment due to maximum heat transfer
- Self-positioning plate package (anti-waving)

## Varitherm – for variable applications of any size

- variable in performance, design and material selection
- heat exchanger surfaces from 0.1 to 2,000 m<sup>2</sup> per unit
- throughput volumes up to 3,600 m<sup>3</sup>/h per unit
- nominal connection diameters up to DN 500

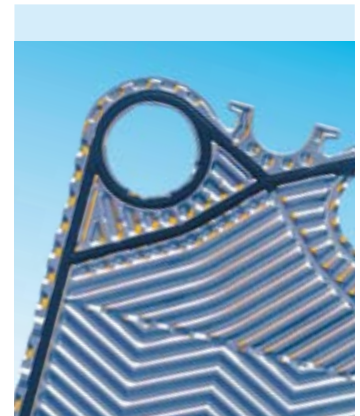
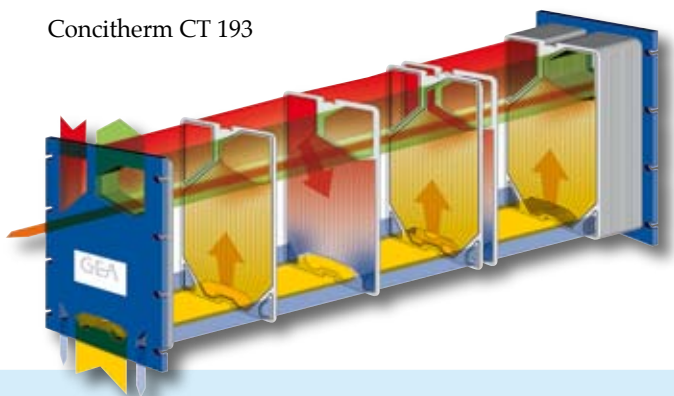
## Free Flow – easy treatment of difficult media

- designed for viscous, fibrous and solid-loaded media
- flow channels up to 12 mm plate spacing

## Concitherm – getting really steamed up

- concentrates liquids by evaporation
- 3 m<sup>2</sup> heating surface per laser-welded cassette
- nominal connection diameters up to DN 600
- free flow channels up to 7.5 mm plate spacing

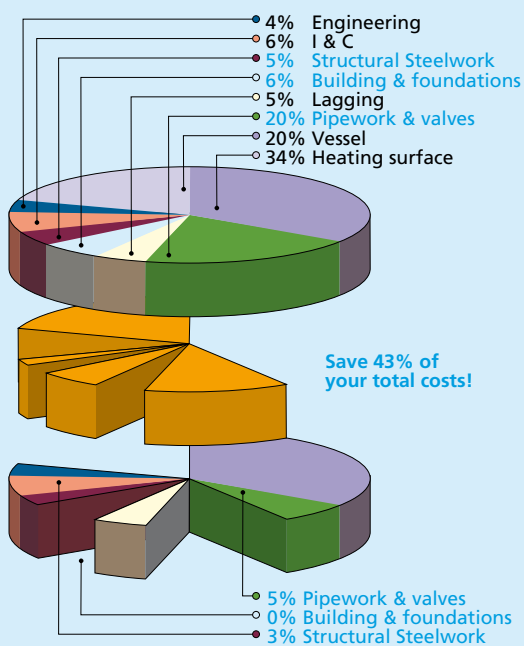
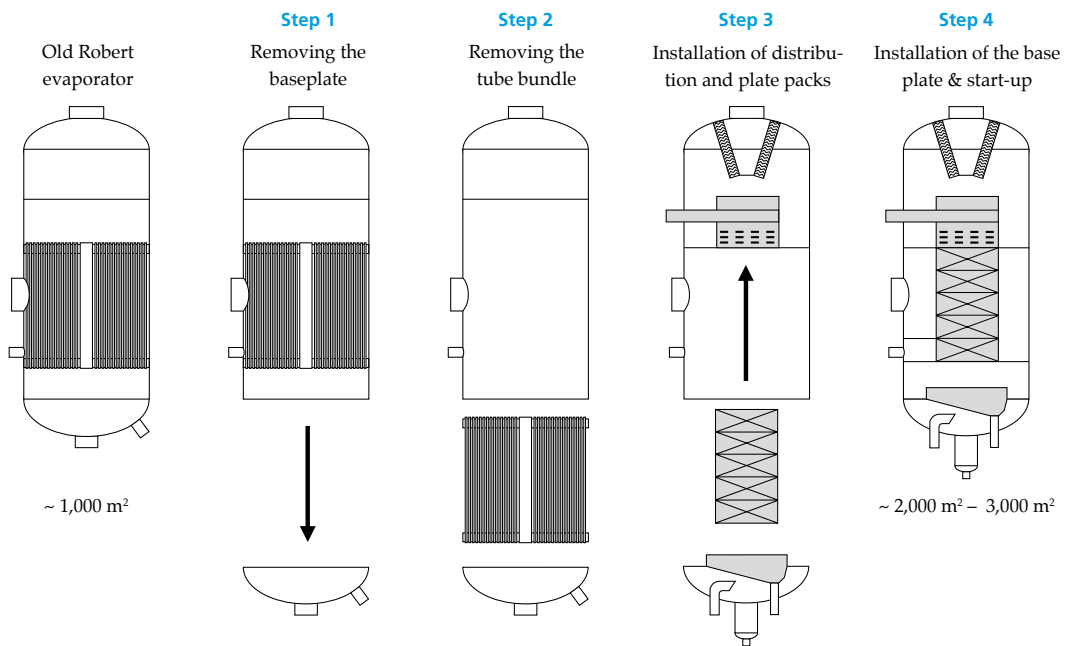
Concitherm CT 193



# Retrofit for low investment

Even existing plants can be optimised in their essential functions at favourable cost. Installation is carried out in 4 steps by converting existing Robert evaporators to EVAPplus falling film evaporators. This retrofitting process continues to use the existing vessels, resulting in high benefits at low investment.

## Four steps to new performance



- Doubling or tripling the heating surface in existing Robert evaporators
- Capacity increase of up to 300% with unchanged space requirements
- No reconstruction works necessary to foundations or buildings
- Existing pipework used to the greatest possible extent
- Higher quality thanks to the improved thermal properties
- Up to 40% savings in investment costs in comparison with installing a new evaporator

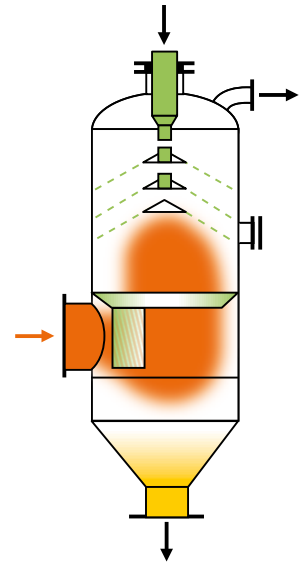




## VAPORplus – The difference is in the detail

Optimum energy exploitation also means making use of the vacuum exhaust vapours to heat up falling water for raw juice preheating. GEA PHE Systems offers either new supply or conversion of complete plants. VAPORplus-mixed condensers have been developed with specially designed distribution nozzles to achieve particularly thin water films. The large surface area guarantees intensive intermixing of waste vapours and cooling water, thus ensuring an extremely efficient condensation effect. VAPORplus offers more:

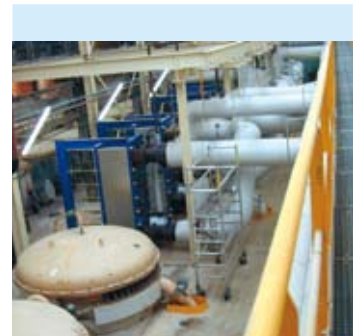
- Increased capacity
- Reduction of pressure drop
- Increase of falling water temperature
- Conversion of existing condensers is possible
- Optimum heat recovery



## Leading sugar factories rely on GEA PHE Systems

GEA PHE Systems combines modern evaporation engineering with advanced plate technology. What counts is our know-how: Over 70 EVAPplus units have been commissioned world-wide to date – equivalent to around 200,000 operating hours of experience with sugar. Exploit these assets for your campaign. A selection of current references:

- **Tirlemont Refinery, Wanze, Belgium**
- **Südzucker, Ochsenfurt, Germany**
- **Pfeifer & Langen, Könnern, Germany**
- **Amalgamated Sugar, USA**
- **Zillo Lorenzetti, Barra Grande, Brazil**
- **Jatitujuh, Indonesia**
- **Tableland, Australia**
- **Khanh Hoa, Vietnam**
- **Beghin Say, France**
- **Eridania Russi, Italy**
- **HSI Larissa, Greece**
- **Nordzucker, Klein Wanzleben, Germany**



European Sugar Factory



Südzucker, Ochsenfurt, Germany

## GEA PHE Systems Competence in Heat Transfer



With emphasis on the highest quality standards and constant innovations, GEA PHE Systems continues to expand its market position: Within the GEA Process Equipment Division, GEA Ecoflex together with GEA ViEX, GEA WTT, GEA Ecobraze, GEA PHE Systems NA and GEA EcoServe forms GEA PHE Systems, the Center of Competence and Service Center for gasketed, fully welded and brazed plate heat exchangers of GEA Group:

- HVAC
- refrigeration
- sugar
- chemical
- paper
- food
- life science
- marine
- power
- renewable energy



Contact details at:

[www.gea-phe.com](http://www.gea-phe.com)

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