CLAUDIUS PETERS

ETA Cooler 4.0

Clinker Cooler

TECHNIK

We know how

Clinker Cooler technik

About

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Since its founding in 1906, Claudius Peters has become one of the world's most respected engineering houses and an innovative world leader. Its German engineering excellence continues to set benchmarks for the design, manufacture and commissioning of materials handling and processing systems for the gypsum, cement, coal, alumina, steel and other bulk-handling industries.

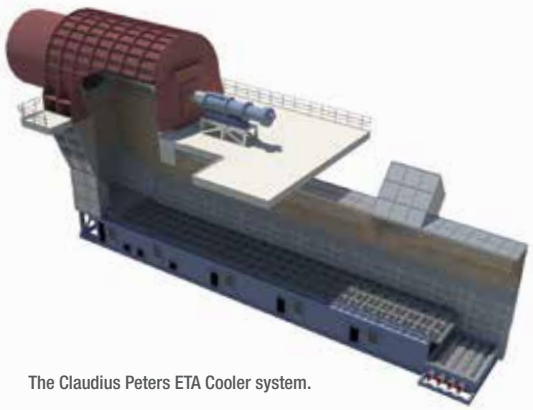
From conception and installation through to commissioning and after-sales support, Claudius Peters provides world-class service to the world's biggest bulk materials producers.

The Claudius Peters Group GmbH is headquartered in Buxtehude near Hamburg, Germany, with regional offices in the Americas, Asia and Europe.

Claudius Peters' headquarters, Buxtehude, Germany.

Clinker Cooling

Claudius Peters' pioneering achievements in clinker cooling technology began in the early 1950s with its 10° sloped single grate cooler. Seventy years later, it continues to build on the experience gained from producing more than 850 clinker coolers (4th Qrt. 2022), with its highly efficient ETA Cooler. Integrating the well-proven Claudius Peters HE-Module and Hydraulic Drive into its moving floor technology, the ETA Cooler represents the next evolution in clinker cooling.



The Claudius Peters ETA Cooler system.

Sustainability

Sustainability by design

The ETA 4.0 is the latest version of the renowned Claudius Peters ETA Cooler and is focused on sustainability at every point in the clinker production line. Its elevated clinker bed height achieves the highest levels of thermal efficiency, while its self-protecting design helps prevent contamination from foreign matter introduced by alternative fuels. Minimal spare part requirements combined with reduced power demand for cooling and crushing make it our most advanced solution yet.

Save energy, save fuel and reduce CO_2 emissions with the ETA 4.0 clinker cooler

The ETA 4.0 is a moving floor cooler operating with a clinker bed height of up to 1,100mm. This ensures maximum retention time of the clinker inside the cooling process, resulting in the most impressive recuperation energy densities achievable in the market.

The self-protecting design of its moving floor not only protects the cooler's moving parts from thermal and mechanical wear, it also prevents access by foreign matter potentially introduced by alternative fuels, delivering guaranteed availabilities of 99.9%.

This latest ETA cooler design achieves all this at the same time as significantly reducing electrical energy use during the clinker cooling process.

Our experts understand the importance of sustainability in the economics of cement processing and have translated this into the ETA 4.0. It will save you energy and fuel and lower CO_2 emissions to make your cement production more competitive.

Meeting global challenges with greener solutions.

The ETA Cooler

The benefits of modular design

World beating capacities of 13,000 tonnes per day and beyond

The ETA Cooler's original modular design, involving self-contained, pre-erected modules shipped separately to the plant site, consists of a standard module with lanes supported by rollers, special drive and end modules plus a static inlet or HE module.

Modular design

The ETA Cooler's design makes it ideal for the replacement of existing coolers, with its pre-fabricated modules saving valuable erection time and enabling clinker production to be resumed within a few weeks.

Features:

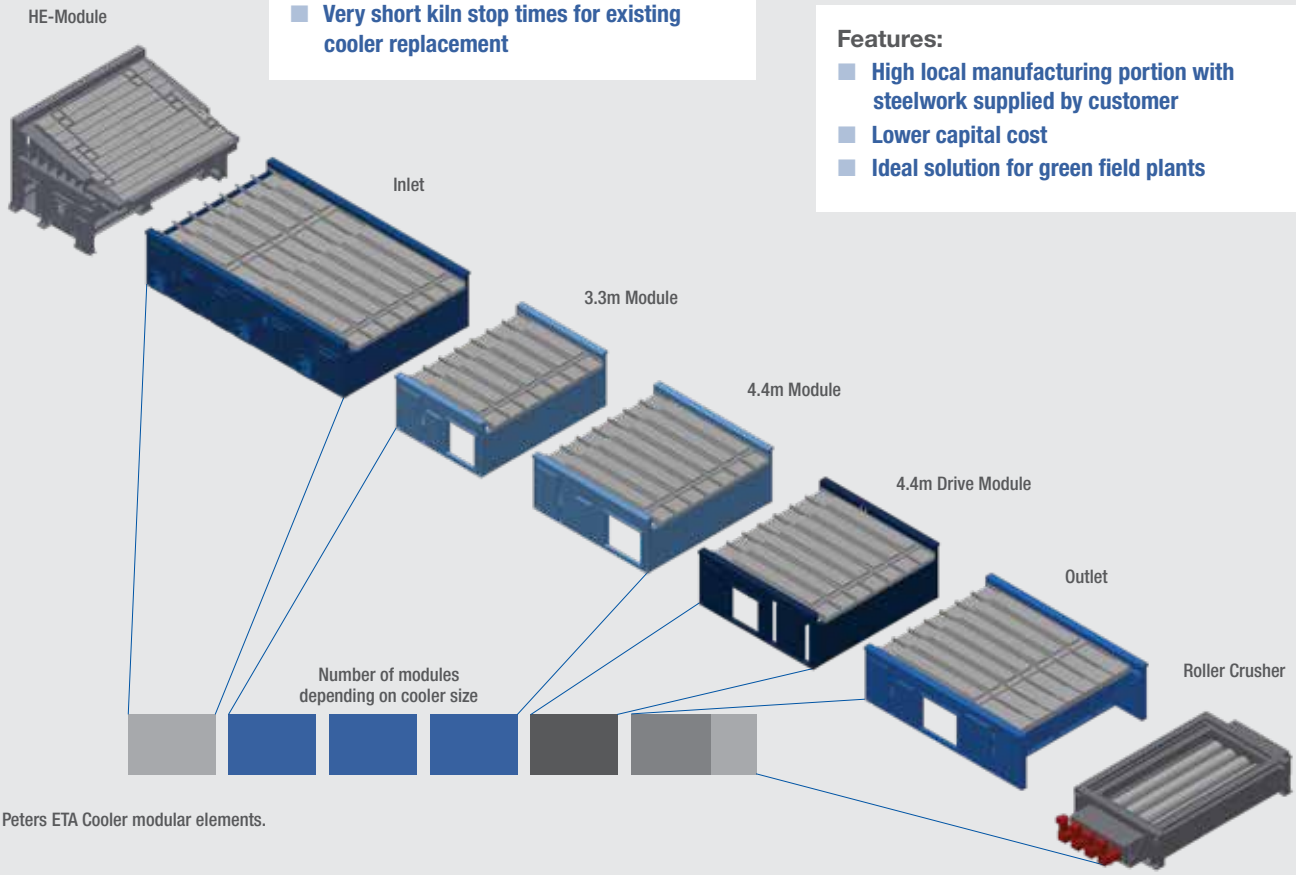
- **High local manufacturing portion with steelwork supplied by customer**
- **Complete, pre-manufactured modules**
- **Very short kiln stop times for existing cooler replacement**

Semi-Modular design

Claudius Peters offers a semi-modular design for green field projects allowing a greater scope of local manufacturing. In this design, core parts such as lanes, sealings, rollers and hydraulic systems are delivered by Claudius Peters as loose parts to site. Although a semi-modular design involves lower capital expenditure, actual work on site is longer when compared with the modular ETA Cooler.

Features:

- **High local manufacturing portion with steelwork supplied by customer**
- **Lower capital cost**
- **Ideal solution for green field plants**



The Claudius Peters ETA Cooler modular elements.

Cooler replacement, the smart way

To increase the efficiency or capacity of an existing kiln line, Claudius Peters can evaluate the impact of upgrading an existing cooler with the latest ETA Cooler design. Our experts partner with customers to audit the existing cooler, evaluate the economics and manage a replacement fitted to meet your needs.

Maximize pre-assembly – shorten down time

The ETA cooler enables the utilization of standardized parts for brown field modifications while offering a tailored solution for individual customer requirements. Core parts are Made in Germany and guarantee the highest availability in the market. The tailored design is focused on adapting the project-specific interfaces of the existing surroundings to the core machine. The design challenges for the replacement of a grate cooler or other clinker cooler types by an ETA replacement, are similar.

Each erection step in the clinker cooler replacement process needs to be considered by the erection experts in close cooperation with the customer, taking into account the complexity of the overall modification job. Maximizing the pre-erection scope is the key to minimal turnaround times. Claudius Peters has a variety of matured pre-erection concepts optimized to the specific site conditions, drawing on more than 100 modification projects.

A further option is to only replace those parts which are essential for guaranteeing a quick turnaround time as well as the operational quality of the clinker cooler. This is a key pillar for the project economics as well as a good ROI.

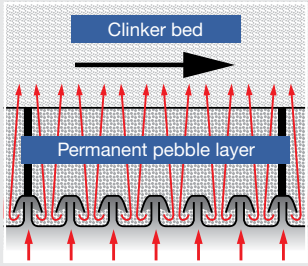
Once installed, the ideal clinker cooler setup for an individual plant's requirements is easily established via the setup possibilities of the ETA Cooler. The ETA cooler design has no dead zones between the static inlet and the moving grate. This allows for an automatic cooler control which is utilized during start up as well during normal operation and which can also automatically prevent overflow, for instance, during kiln upset. These required parameters are available to the plant's process experts, enabling them to adjust the ETA cooler for each individual process with the ability to change the cooler's operational settings for process optimization.

Walking floor made in Germany.

Installation of Cooler Modules.

Scan to watch the Reference Installation movie:

Highly customizable 3-step transportation system



Lane aeration.

Hydraulic drive system.

HE-Module

The static cooler inlet, HE Module, consists of slot plates placed on an air vessel that enables air to be distributed to small areas with individual air ports, thus ensuring air is guided to the drop zone. To combat 'snowman' formations, air cannon nozzles are installed in the refractory above the module. Operating lifetime of the HE-Module plates is guaranteed at five years.

Aerated Lanes

The aerated lanes, supported on rollers are rectangular frames with aeration inserts filled with sieved pebbles to protect the air inlet from heat and wear. Operating lifetime is guaranteed at five years.

A longitudinal sealing between the lanes helps avoid clinker riddling. This sealing is mechanically closed and protects against foreign material from secondary fuels that may have a negative impact on the sealing.

Features:

- **No dust removal system required**
- **Pebbles protect air inlet from wear & heat**
- **Hard faced lane edges ensure long life cycle**
- **Five year lifetime guarantee on HE-Module plates, aerated lanes and support rollers**

Hydraulic Aggregate

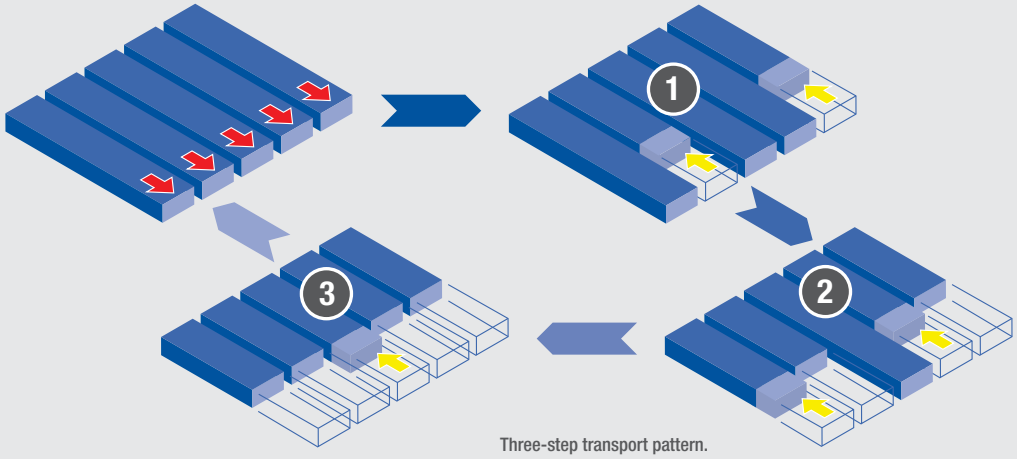
Each aerated lane is moved by one or two hydraulic cylinders. Each cylinder has its own proportional valve and up to three valves connected to one pump. Pumps are located on the hydraulic aggregate, where also the oil is conditioned. The entire system is controlled by an EMC^2 control panel to enable adjustment of the stroke length and velocity.

The hydraulic cylinders are being flushed with oil taken from the pressure side. This ensures the high pressure seal remains free from contamination and the oil in front of the piston is exchanged.

The hydraulic system also allows for a proven three-step cooler transport pattern (shown below). Setting different stroke lengths for individual lanes allows the operator to adjust the amount of time the clinker remains in the cooler.

Features:

- **Continuous position control of cylinders**
- **Independent stroke length of individual lanes**
- **Completely modular hydraulic system using standard spare parts**
- **Flushing of cylinders for longer lifetime**



Three-step transport pattern.

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Measuring and Control Systems

The recuperation of gas temperature is a vital part of the cooling process. The Claudius Peters gas temperature measuring technology incorporates an infrared sensor for quick and accurate measuring of gas temperature.

Features:

- **Quick reaction time of 3°C per second**
- **Measuring range of up to 1500°C**
- **Minimal maintenance requirements**

Clinker bed height is measured with the level radar system or the weighted chamber pressure of several fans. The pressure system acts as a fall-back.

Features:

- **Continuous measurement of bed height**
- **Optimum automatic control of the transport velocity, resulting in stable recuperation of air temperature and smooth kiln operation**
- **Installation in kiln hood or cooler roof**

Process Technology

Clinker coolers must take clinker from ca. 1400°C to ca. 100°C, with maximum possible heat going back to the kiln. Because kiln rotation separates fine and coarse grains across the kiln and because each require different air pressures for cooling, traditional grate coolers produce 'red rivers' of hot, fluidised clinker that flow to the back of the cooler.

The ETA Cooler's controlled side aeration (via longitudinal side chambers with a separate cooling fan) combined with independent lane movement, enables operators to actively influence the behaviour of the cooler and thereby eliminate problems such as 'red river'. Its smart design means that it can operate in normal operation with a clinker bed height of between 800mm and 1,100mm.

Features

- **Size of the aeration areas follows the clinker cooling curve**
- **Controlled side aeration and independent lane movement avoid red river**
- **High clinker bed possible due to intelligent design**

Maximum control through controlled side aeration and independent lane movement

Hydraulic aggregate.

Traditional grate coolers produce 'red rivers'.

Claudius Peters – more efficient crushing with longer machine life and minimal maintenance

Claudius Peters Roller Crusher.

Roller Crusher

The Claudius Peters Roller Crusher is a non-impact crusher, suitable for all capacities, with parallel crushing rollers operating at a constant speed of 4 rpm.

The Roller Crusher produces even grain size over the whole lifetime, compared to a Hammer Crusher where grain size increases over time. If a larger lump cannot be broken at once, the rollers will reverse and after a delay resume crushing, ensuring that larger lumps are slowly eroded. The roller crusher is capable of handling large clinker balls up to 1.5m without stopping the kiln line.

The crusher's slow movement eliminates dynamic forces and ensures that no dust forms at the rear of the cooler. This slow movement also ensures that the operating lifetime of the partially hard-faced crushing rings is guaranteed at a minimum of three years.

The intermediate roller crusher within a stage cooler is air cooled, meaning that it can handle clinker temperatures of up to 800°C. It is available in 490mm and 610mm crushing ring designs, depending on the width of the cooler.

Features:

- **Low rotational speed, minimal wear**
- **Large lump crushing without kiln stop**
- **Minimum dust generation**
- **Uniform particle size reduction**

Hammer Crusher

The Claudius Peters Hammer Crusher is an impact crusher with a high speed rotor (280rpm & 330rpm – 1320mm DIA). Oversize material that does not pass the 35mm grizzly bars is thrown against the chain curtain until particles pass the grizzly or through the gap between the tip of the hammers and the grizzly bars.

Due to impact, the entire rear of the cooler must be protected with chain curtains and with protection plates fitted to the refractory sidewalls. The high speed of the Hammer Crusher generates considerable dust, which needs to be considered when positioning the cooler's exhaust air duct.

In case a big lump stalls the hammer crusher the turbo coupling protects the equipment.

Features:

- **Impact crusher with ca. 300rpm**
- **Hydraulic turbo coupling safety plug**
- **Simple and sturdy design**

Claudius Peters Hammer Crusher.

Operation Costs

The main test for any cooler is always its operating cost and in this respect the ETA Cooler clearly outperforms the traditional grate cooler.

The lanes are filled with a layer of pebbles; this protects the air inlet from direct clinker contact and gives very fine aeration as well as very favorable heat exchange. The ETA Cooler's high clinker bed and the intelligent aeration scheme deliver optimum recuperation efficiency, resulting in less fuel required to fire the kiln.

The maintenance costs are lower than they would be with a grate cooler, with substantial reduction in wear parts as well. Thus, in terms of overall operation costs, the ETA Cooler has set a new industry benchmark.

Features

- **High availability, no kiln stoppages**
- **High cooler efficiency which results in low fuel cost on the kiln**
- **Low maintenance cost due to protected pebble layer**

Aeration lane pebble bed.

References

The ETA Cooler's efficiency and low operating costs have resulted in the sale of more than 130 ETA Coolers to date (4th Qrt. 2022).

ETA Cooler customers are leaders in the cement industry and include such names as Holcim, Lafarge, Heidelberg Cement, Italcementi, Titan Group, CRH, Anhui Conch, Taiwan Cement Corporation and Buzzi Unicem.

Claudius Peters offers flat coolers and stage coolers for operation in wet or dry kilns, for green field plants and as replacements for satellite and other coolers. For green field plants and cooler replacements, the ETA Cooler is the obvious choice.

ETA Cooler installation.

Highly evolved technology, delivering maximum capacity, lower operation costs and highest reliability

Customer Service

Combining flexibility and expertise

ETA Cooler's robust design, with its pre-erection capability, provides the perfect solution

Our Customer Services team is available 24/7 as your complete support resource. Part of the Claudius Peters global support network, the engineers in our Spare Parts core team are cooler specialists drawing on up to 40 years' cooler experience and their work covers all generations of coolers.

Continuous support for your system incorporates visits from our Customer Services Manager. We offer remote support for the operation and process analysis of your cooler and are always very happy to work with you in developing modernization concepts to increase the efficiency of your plant.

The ETA Cooler's robust design requires minimal maintenance. With roller sections comprising over 2,500 parts and the clinker lane also comprising over 2,000 parts, the examples here show an installation from 2004 that has not required replacement parts in over 16 years of operation.

Rollers at start up.

Rollers after 20 years.

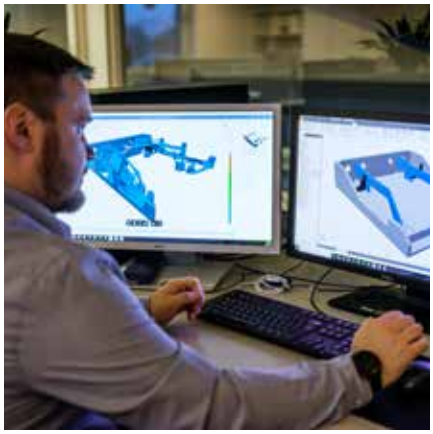
Lane installation.

Lane at start up.

Lane after 20 years.

Our experienced service engineers coordinate the assembly process and commissioning of new plants. They are also available to you for the annual revision and optimization of your systems.

Our customers receive regional support from local subsidiaries and detailed recommendations can be made in conjunction with an on-site visit from the Customer Support team.



Expert engineers oversee assembly and commissioning.

CP Live Support remote service.

Features:

- **Trained personnel to ensure continuous availability of your plant**
- **Fast, effective support in problem analysis and fault elimination**
- **Cooler audits carried out on site**
- **Customized service and maintenance contracts on request**
- **Fault and spare parts identification via CP Live Support remote service**
- **Individually tailored employee training and further education**
- **Remote support for operation and process analysis of your cooler**
- **Conversion kits for obsolescence management**
- **Claudius Peters Portal provides a clear overview of all the necessary technical documents, drawings and spare parts lists for your project**
- **Critical electronic and hydraulic components held in stock, to ensure short delivery times worldwide**

For further information visit the Claudius Peters website: **www.claudiuspeters.com**

A global network of help and support based on over 40 years' experience

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TURNKEY PROJECTS

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