

Clinker crusher

certain size and shape, so that the available cross-section for the inflowing air changes with the plate position. As a reaction to changing pressure differentials across the flow regulator, the spring loaded plate moves to an equilibrium position at a certain height

within the cylinder. This position corresponds to a well defined opening in the cylinder shell. Hence, an increase of pressure drop above the flow regulator (e.g. within the clinker layer) will increase the cross-section for the inflowing cooling air, thus decreasing the pressure loss of this flow. Finally the pressure drop changes are exactly counter-balanced, so that the total pressure drop and air flow for the complete system consisting of the flow regulator, cassette, and clinker layer remains constant remove and so does the air flow! By modification of certain parameters such as spring force, plate diameter and the shape of the cylinder openings, specific response

characteristics of the flow regulator can be designed.

Clinker crusher

The **PYROFLOOR**[®] cooler can be equipped either with a hammer or roller crusher, in the end or intermediate position. Process-wise, the preferred solution is the intermediate roller crusher. The alternative arrangement of a hammer crusher at the end of the cooling grate involves lower investment costs.



Aeration of the **PYROFLOOR**[®] cooler is locally optimized

PYROFLOOR[®] grate cooler: State of the art modular concept

The modular concept

The mechanical design of the **PYROFLOOR**[®] clinker cooler is based on modular components. This approach ensures easy adaptation of client-specific needs and requirements. By using this modular ap-

proach, assembling and installing the cooler is very straightforward. This helps to keep down costs and enables easy upgrading.

Maintenance aspects

Reducing maintenance costs has been the most important requirement for the development of the new cooler. The whole concept has been designed with the objective of allowing for a period of at least two years without any maintenance work. Grate plates are no longer wear parts. There are no cast wear parts. Only sealing related parts are to be checked and eventually replaced.

Conclusion

From the beginning of the design phase to the first installation, it was

the outstanding ambition of the specialists at KHD to find new solutions for all of the requirements of a clinker cooler. The result is nothing less than a truly new concept in clinker cooler technology.

Clients' requirements, focusing on low maintenance and investment costs as well as sustained high recuperation efficiency and plant availability, are met with the **PYROFLOOR**[®] clinker cooler to a hitherto unrivalled degree.



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PYROFLOOR®

Innovative development of grate cooler technology

KHD Humboldt Wedag grate coolers for all capacities over have been successfully installed throughout the world. KHD Humboldt Wedag was granted the first grate cooler patent in 1936 and has since gained extensive know-how in the field of clinker cooler systems.

Now KHD Humboldt Wedag has developed PYROFLOOR® – a new clinker cooler, which is offering a new dimension for the cement industry.

This new cooler combines the best solutions for each of the two fundamental, mutually interacting functions a clinker cooler has to accomplish:

- **Clinker conveying** is based on the „walking floor“ principle and
- **Aeration** is controlled by self-regulating valves.

Advantages: Better than the others:

High heat recuperation:

- Decoupling of wear effects from aeration
- Wear – if any – will not influence aeration and heat transfer
- Self-regulating aeration
- Sudden changes within the clinker layer are compensated automatically
- No more fountains – optimum aeration on the whole grate

Low wear:

- No more perpendicular pushing surfaces that would be subject to wear
- (Almost) no more relative movement between clinker granules and metal parts
- No cast wear parts

Easy maintenance:

- No maintenance during the production year
- No exchange of spare and wear parts for at least two years

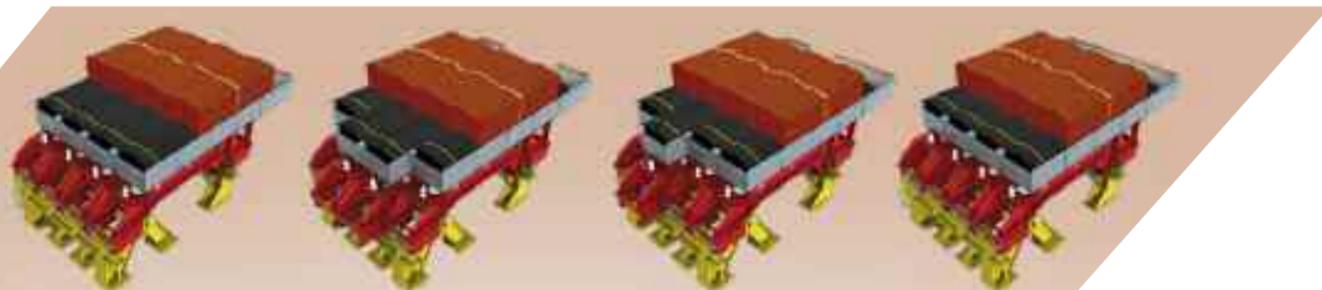


Basic principles:

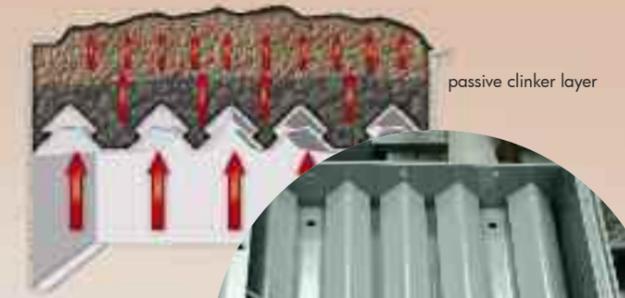
Best clinker transportation and specific aeration for maximum heat recovery

Clinker transportation by walking floor

The walking floor principle was developed more than 60 years ago and has proven its reliability in numerous bulk conveying applications. The principle consists of several lanes, arranged beside each other in the direction of clinker transport. These lanes are pushed forward simultaneously and retracted in such a pattern that no adjacent lanes are moved at the same time. The clinker bed behaves like a solid body held in place by the majority of the non moving lanes while the lane retracts beneath it.



PYROFLOOR® Concept component	Target characteristic
walking floor bottom	no conveying elements in clinker layer active clinker distribution, red river fighting
aeration cassette	autogenous wear protection homogenous aeration
contact seals	no stray air no under-grate spillage
flow regulator	aeration according to local requirement (3-D) constant aeration irrespective of any incidents within the layer



Walking floor bottom and aeration cassette:

For the application of the walking floor principle in a clinker cooler, the design had to be engineered as an aeration floor. To meet the requirements of low wear rates on modest materials, the floor has been designed as a cassette set-up.

The basic concept incorporates the formation of a layer of stationary passive clinker, remaining on the cassette at all times, serving two objectives:

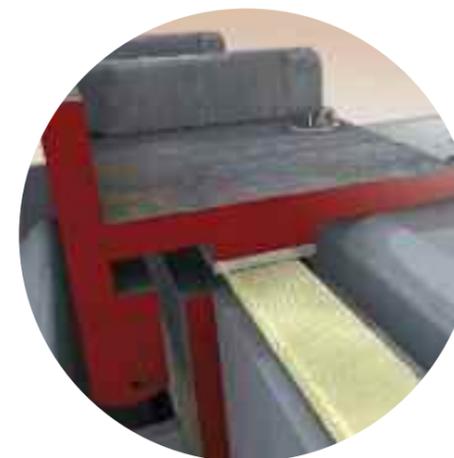
- provide autogenous wear protection
- use the passive clinker layer as a distributor sieve for homogeneous air distribution.

At the functional joint between clinker transport and layer aeration, the cassette design prevents any relative movement between clinker particles and metallic surfaces. There are no pushing surfaces perpendicular to the clinker movement, which would be subject to wear. In fact, a wedgeformed layer of passive clinker always remains on top of the cassette during the forward stroke and backward retractions of the lanes. The gross transport of clinker is created in those layers of the clinker bed adjacent to and above the passive cushion.

The design principle: A robust modular system

Contact seals:

The PYROFLOOR® cooler utilizes newly designed unique contact

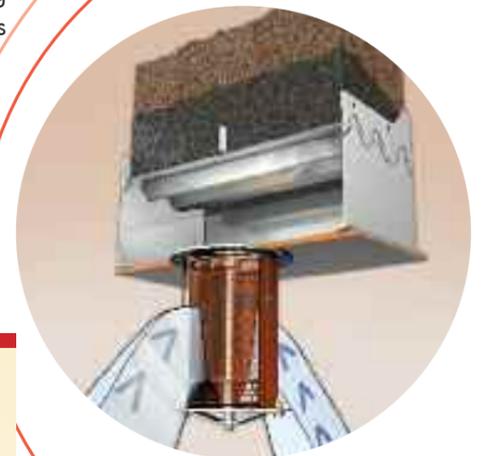


seals at all those places where air could otherwise stray through labyrinth gaps. Through this technology, neither air can find its way through gaps where it should not pass, nor can clinker penetrate between the cassettes and fall into the lower grate compartment. The functioning of all sealings is secured regardless of any thermal and operational aspects.

design keeps the air flow constant irrespective of any influence by mass inertia. The principal set-up consists of a central shaft, which allows a spring loaded plate to travel up and down within a cylindrical tube. The tube has openings of a

Flow regulators:

A new type of flow regulator has been developed for the application in movable systems. Unlike other types of flow regulators, this



New sealing concept

- Contact sealing
- No leakage
- No riddlings
- Self-aligning
- Self-adjusting
- All sealings identical
- Perfect aeration
- Perfect process control
- High heat transfer
- Low maintenance