

*GREEN ID's first grate cooler
designer and Manufacturer
Company in Iran.*



PGC® reciprocating grate cooler.

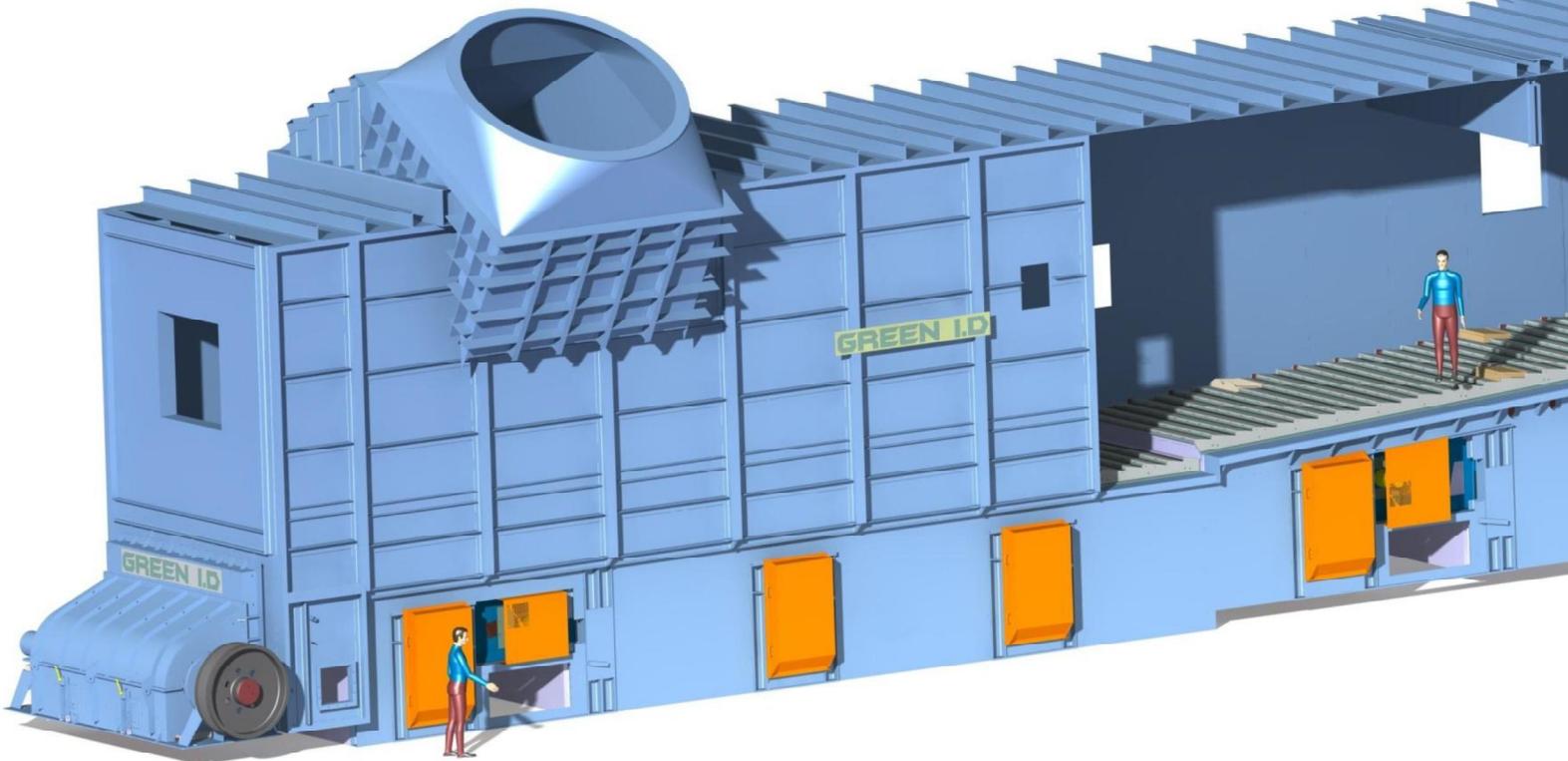
The guarantee for high availability...

Maximum heat recuperation with optimum secondary air quantity, low ultimate clinker temperature with minimum cooling air volume, long service life and availability in spite of increasing grate loading and optimum cooler operation even with frequently changing clinker types are the convincing characteristics of the PGC® grate cooler.

They are also the guarantee for minimal fuel and energy consumption, low capital cost and maintenance expense and flexible adaptation to different production requirements.

The PGC® grate cooler can be combined with any kiln system on the market. The cooler's reliable operation can easily be adapted to the kiln line's requirements. This not only applies to new cooler installations, but also to conversions and capacity increases of existing kiln cooler systems. Our clinker coolers do the job they are designed for!

Traditionally, the main function of the clinker cooler was to cool down the clinker from ~1400°C to ~100°C. For some time now the focus has been on reducing the kiln heat consumption or, recuperating as much heat as possible to reduce fuel costs

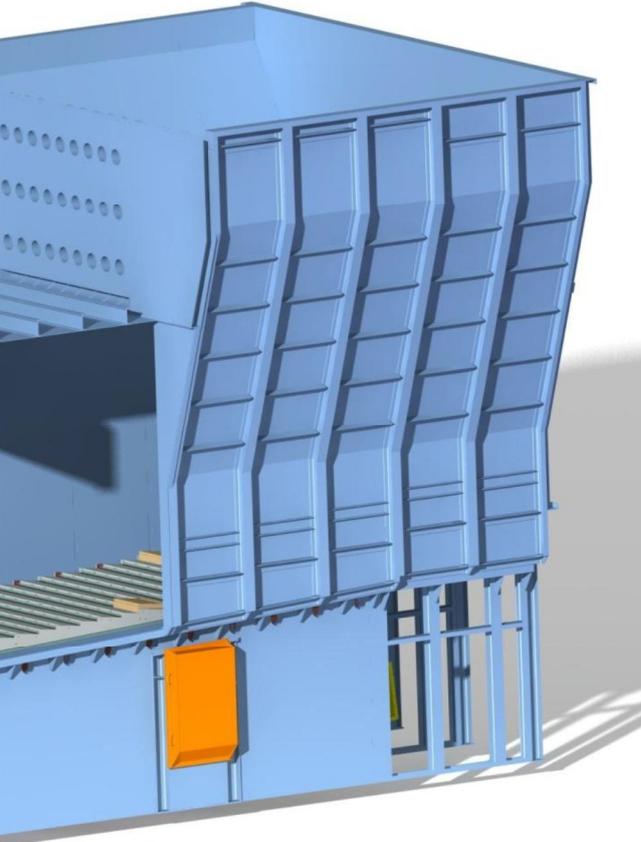


- ✓ Fuel savings of 30-40 kcal/kg clinker
- ✓ Less cooling air consumption and reduction of air to be dedusted
- ✓ Low overall power consumption
- ✓ Effective and consistent cooling of clinker
- ✓ More stable high capacity kiln and cooler performance due to less dust circulation and no blowing through of cooling air
- ✓ Low maintenance costs due to minimum wear on grate plate and movable parts
- ✓ Less red river tendency due to the Controlled Flow Grate system
- ✓ Less snowman tendency
- ✓ Less falling through of clinker
- ✓ Short payback period

Capacity ...

1000 up to 12000

Tones clinker per day



... Static grate

The **static grate** is installed in the inlet zone, which is subjected to severe thermal and mechanical stresses. It ensures both optimum distribution of the clinker over the entire width of the cooler and effective aeration of the clinker bed. The hot clinker discharged from the kiln rolls down a layer of colder clinker which is moving only slowly down the grate. The inclination of the grate, in combination with the individually adjustable aeration, ensures efficient onward conveying of the clinker while effectively preventing formation of red rivers.

The air-blast nozzles fitted between the steps of the grate are a highly successful solution which enables the specific targeting of snowmen right where they occur.

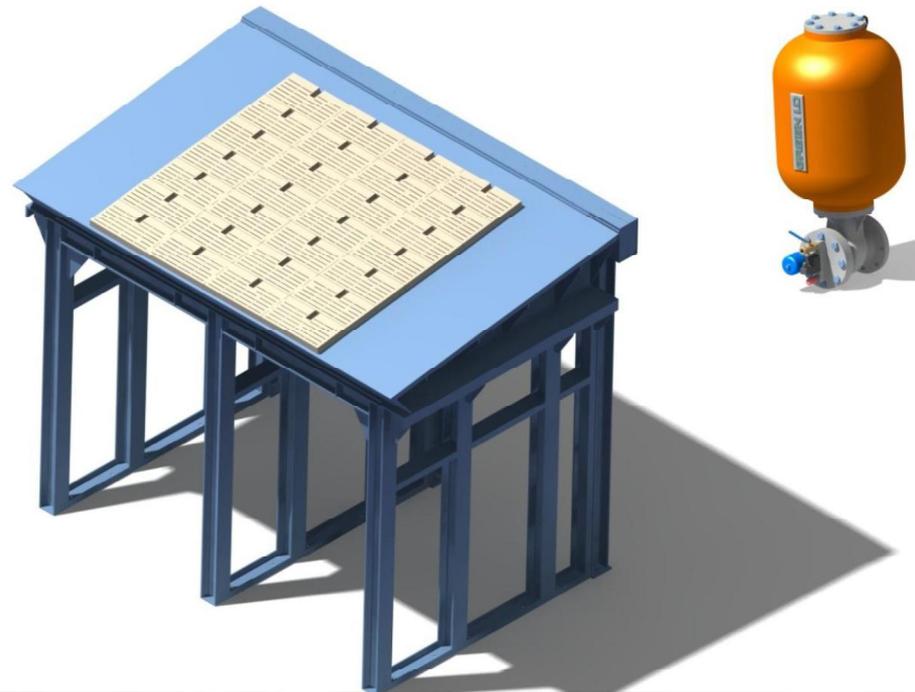
Principle of functioning

The clinker cooler has to perform the tasks of cooling the clinker discharged from the kiln from over 1,400°C to around 100 °C, recuperating the maximum possible amount of thermal energy and of carrying the clinker to the crusher and outward conveying equipment. To perform these functions efficiently, the PGC® reciprocating grate cooler is divided into three zones, which are ideally suited to the different tasks:

The purpose of the **cooler inlet section** is to rapidly and uniformly distribute the clinker discharged from the kiln and aerate it intensively, while avoiding segregation. In the inlet zone, which is subjected to severe thermal and mechanical stresses, a static grate equipped with jet-stream plates is therefore a standard feature of the GREENID reciprocating grate cooler. The 10° inclination and the fixed rows of grate plates are advantageous for good clinker distribution and simultaneously assure optimum clinker aeration.

The **recuperation section** fulfils the function of recovering the heat, which is returned to the kiln. The cooling air can be optimally suited to the clinker bed and thus extract the maximum possible amount of heat for use in the burning process.

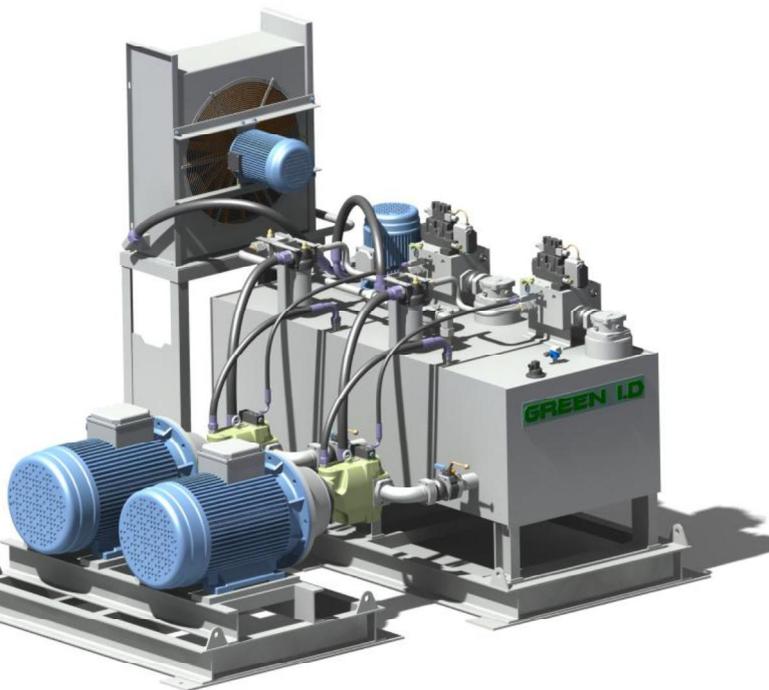
In the **finish cooling section**, also equipped with jet-stream plates, the clinker is cooled to the required ultimate temperature, which is determined by the residence time in the cooler and the total volume of cooling air.



... The drive

The grate is driven by cylinders placed on either side of the cooler. The hydraulic drives consist of axial piston pumps with electro hydraulic servo adjustment of the oil flow to the cylinders which have built in linear transducers. The system is controlled by a PLC .The pump units have built in “swash” plates to regulate the oil flow and its direction.

This ensures very smooth operation of the moveable grate rows and perfect grate control. The system is very reliable and maintenance costs are low. If preferred, a conventional mechanical drive can be supplied instead.



Supporting and drive system

The oscillating frame is supported on dust-protected roller blocks in the side walls of the cooler and driven by the drive cylinder of the fully enclosed hydraulic system, also mounted in a dust-proof casing in the side wall. The centre guidance of the oscillating frame ensures perfectly parallel running.

Individual modernization solutions

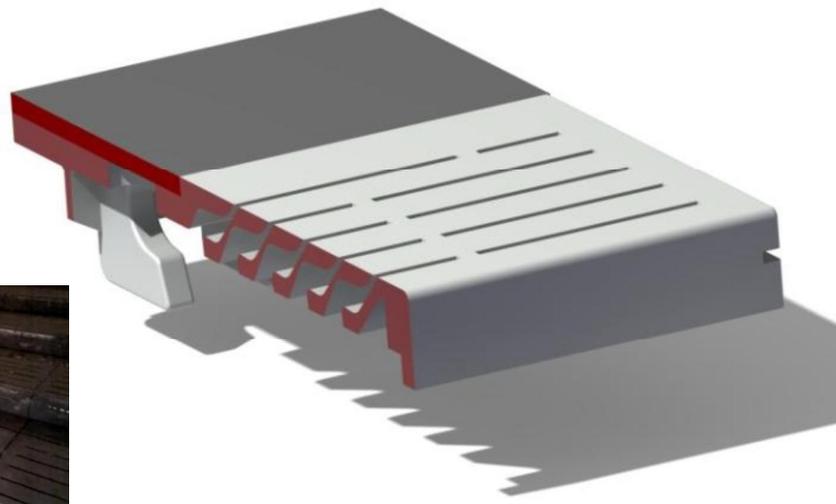
Highly effective components (like the jet stream plate, the static primary grate and the central grate guide) are so designed that they can be retro fitted in nearly all available makes of reciprocating grate coolers. For cooler and kiln system conversions they therefore offer an ideal basis for boosting efficiency and availability with the minimum of investment. Modernized coolers show clearly improved operating results.

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... Flexible connections

The air distribution system consisting of ducts and hollow beams incorporates specially designed and highly reliable flexible connections between the fixed air ducts and the moving grate rows.



...Jet-Stream Plate.

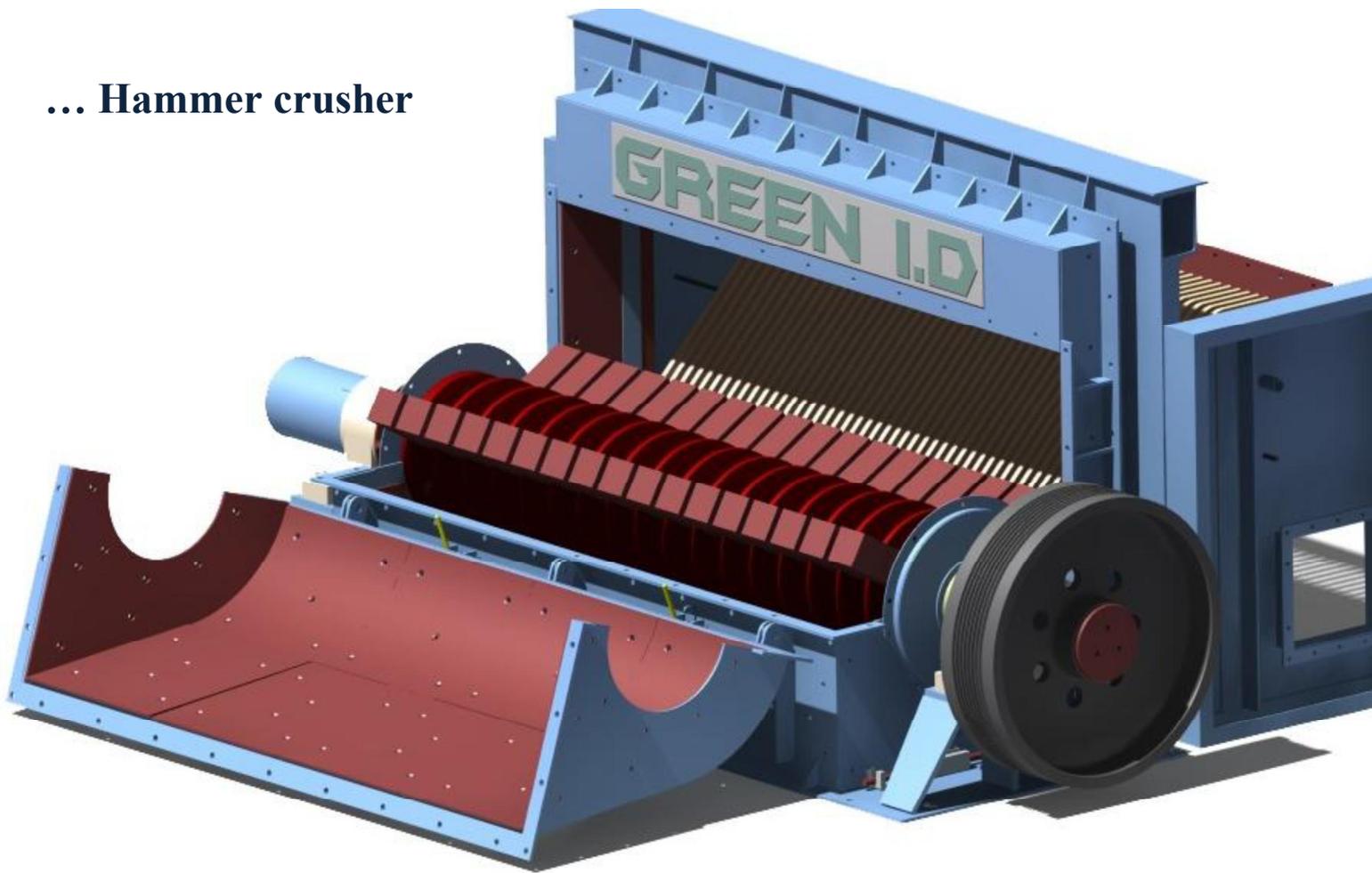
As the centre piece of the aeration system, the jet stream plate totally eclipses all process technological and service life results previously obtained with cooler plates.

For the plate surfaces, thrust faces and side plates, which are subjected to high mechanical and thermal stress, a coating material was selected whose really outstanding wear resistance provides enormously long service lives.

Measurements also prove that, thanks to both material and design, the plates hardly heat up, so that deformations are reliably avoided. In achieving the process technological optimum, the new aeration slots are a crucial feature. The staggered arrangement of the slots and the tangential outflow of air ensure very uniform and non turbulent penetration of the clinker bed without blow through, resulting in an excellent heat exchange effect



... Hammer crusher

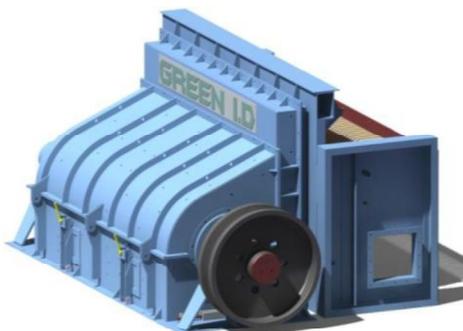


The cement clinker burning process produces agglomerated balls of clinker which may be so large as to make their further passage from the kiln for storage or grinding extremely difficult. To avoid such complication, these balls are removed at the clinker cooler outlet and reduced in size by clinker crushers before being returned to the main clinker flow.

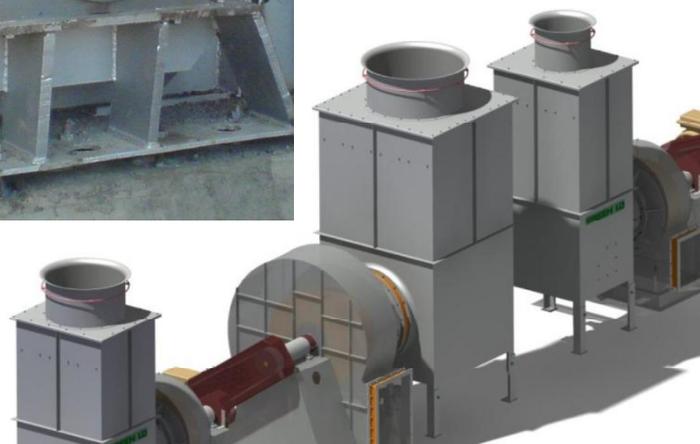
In both cases crushing is performed by hammers pivotally mounted between rows of hammer discs. The hammer extends radially during rotation, and crushing is effected by the impact between clinker balls and hammers the resulting lumps being dashed against the crushing plates. In the PGC cooler the wholly or partially crushed clinker is hurled back to the grate cooler for further cooling.

GREENID Clinker Crushers are easy to service, the top section swiveling open to facilitate access to internal components.

GREENID clinker Crushers are equipped with adjustable jaws which can not only be set at the required degree of crushing, but can also be adjusted to compensate for hammer wear. Wear is concentrated on the hammer face, and the hammers can be reversed when worn to expose the opposite surface. GREENID Clinker Crusher is driven by V-belts powered by electric motors. GREENID Clinker crusher requires little maintenance. It is advisable, hammer unit in reserve to facilitate rapid change over.



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... Fan & Silencers

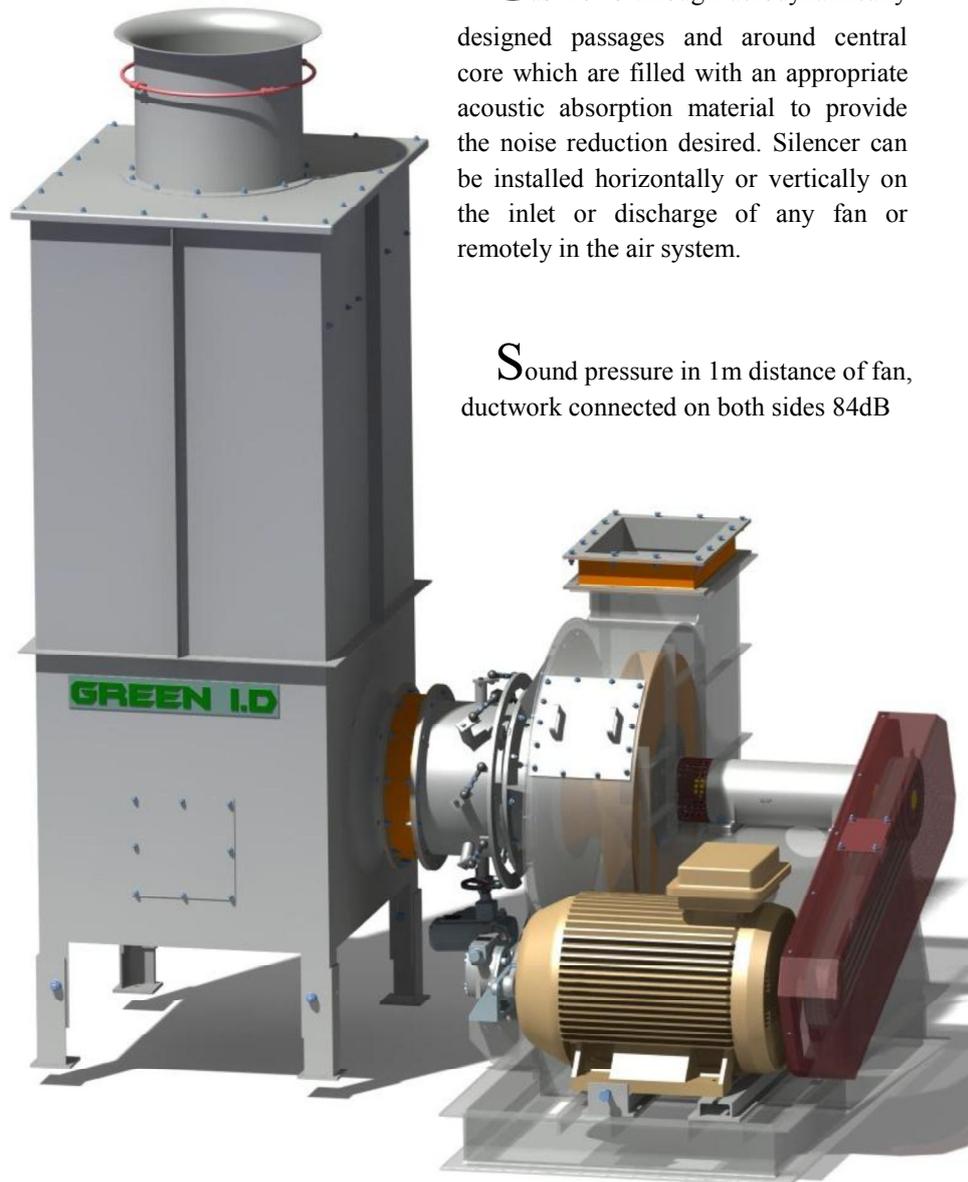
Due to the abrasive nature and the clinker dust in the surroundings, the cooler fan must be suited to the possible wear from these conditions.

Normally, size, RPM and power consumption of a fan type is specified in process diagrams. The fan must be sized for the necessary air flow at the nominal kiln production rate. The calculated fan capacity includes a reserve capacity to make possible adjustments of the amount of cooling air at various operating conditions

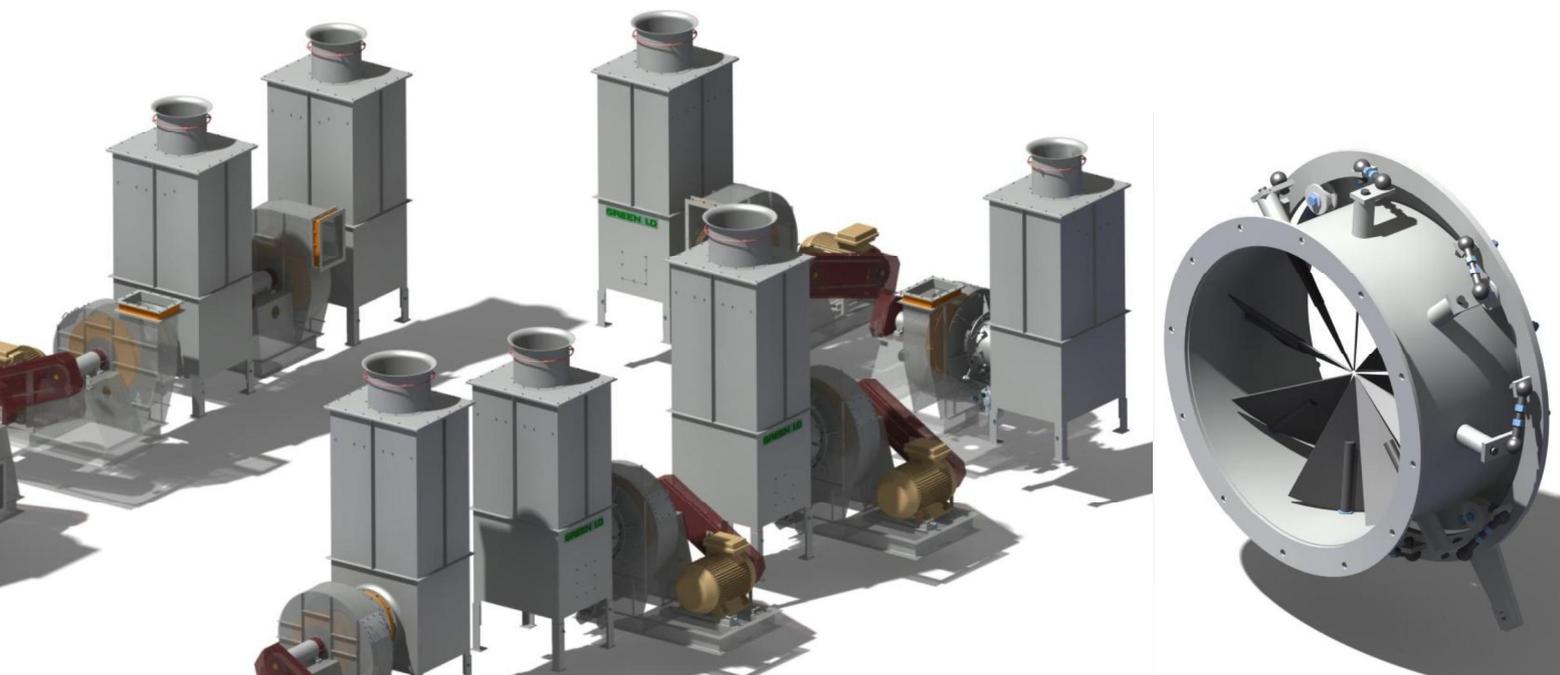
Some plants specify larger spare capacities to protect the grate against thermal load. Furthermore, the fan size ensures that the fans under normal operating conditions work in the high efficiency area of fan P-V diagram.

Gas flows through aerodynamically designed passages and around central core which are filled with an appropriate acoustic absorption material to provide the noise reduction desired. Silencer can be installed horizontally or vertically on the inlet or discharge of any fan or remotely in the air system.

Sound pressure in 1m distance of fan, ductwork connected on both sides 84dB



Dampers used in conjunction with centrifugal fans provide a simple, reliable and cost effective means for controlling air systems.



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