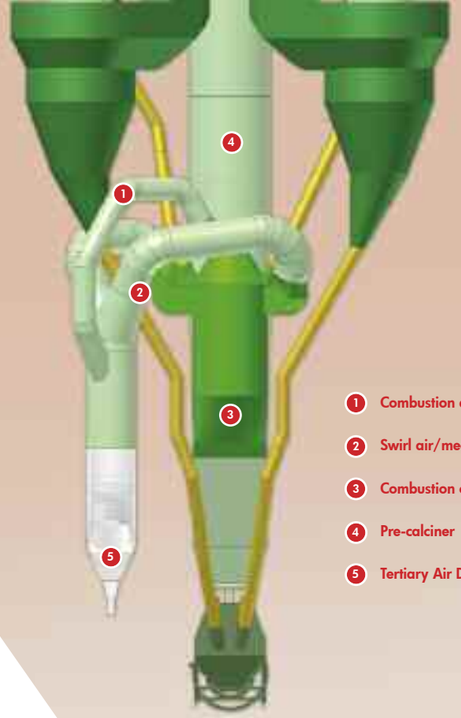
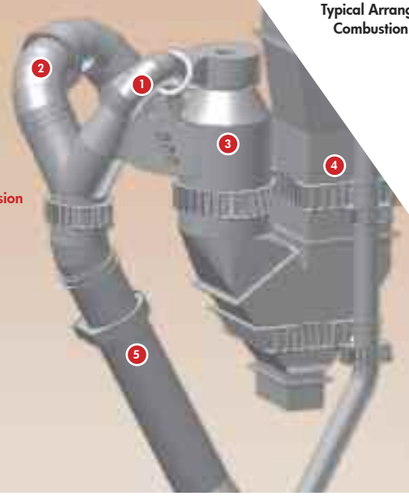


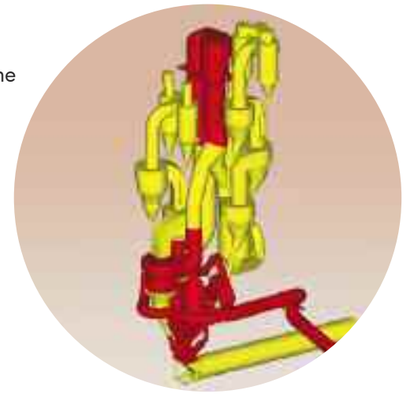


1. Combustion air
2. Swirl air/meal suspension
3. Combustion chamber
4. Pre-calciner
5. Tertiary Air Duct

Typical Arrangement of Combustion Chamber

Burning Technology
KHD Combustion Chamber

The advantage of the Combustion Chamber is that the ignition takes place in pure air at high temperatures (≥ 1,200 °C). The downdraft burner, positioned at the top of the burning chamber, can be designed for various fuels (gaseous, liquid, solid).



- Mixture of coarse refuse derived fuel (RDF) can be fed vertically through the center channel of the burner. Hence, the fuel particles enter the chamber by gravity forces.
- Pulverized fuel is blown into the chamber via an annular gap.
- Liquid fuels are fired with lances at the circumference of the burner
- If required, a start up burner can be integrated.
- The flame shape can be adjusted by setting the swirl air pressure. The outer jacket is protected by a small amount of cooling air.
- The temperature of the combustion chamber can be controlled by the dampers of combustion air and swirl air.

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Burning Technology
PYROCLON® Calciner

KHD HUMBOLDT WEDAG
www.khd.com

Burning Technology
PYROCLON® Calciner

The outstanding characteristic of the **PYROCLON®** Calciner is the intensive mixing of preheated raw meal, fuel and combustion air. Calcination of the raw meal takes place at a temperature of approximately 870 °C. In case of ideal mixing, any energy unit additionally brought into the **PYROCLON®** Calciner will increase the degree of calcination instead of the temperature. During normal operation, the fuel portion burnt in the **PYROCLON®** Calciner ranges between 50 and 60 percent of the total fuel demand.

KHD Humboldt Wedag PYROCLON® Calciners are designed as suspension tube calciners to ensure:

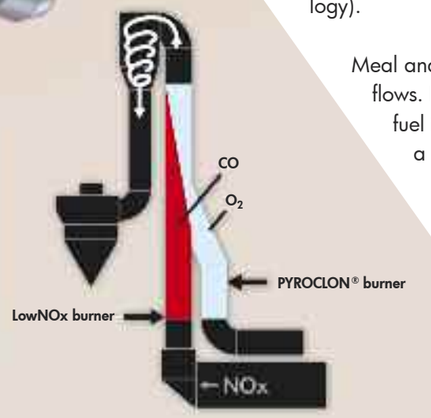
- an even distribution of raw meal, fuel and combustion air across the entire **PYROCLON®** section,
- complete burn-out of the fuel,
- optimum heat transfer between fuel and raw meal,
- high calcination rate up to 95 percent.

The standard calciner for oil and gas is the **PYROCLON®-R** with **PYROTOP®** compact swirl chamber. The **PYROCLON®-R LowNOx** with **PYROTOP®** is the standard calciner for using solid fuels. Both calciners have proved their capabilities of reaching emission limits of worldwide legislation without the use of additives. The reduction of NOx emissions in the **LowNOx** calciner is based on the principle of "continuous staged combustion" and reaches the "BAT" emission level (best available technology).

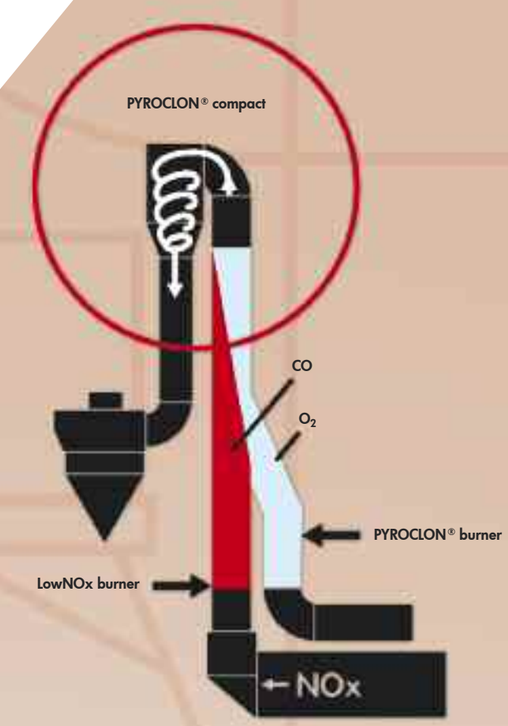
PYROCLON® Calciner
- High calcination rate
- Modular set-up
- Suitable for secondary fuels
- Complete burn out
- Flexibility

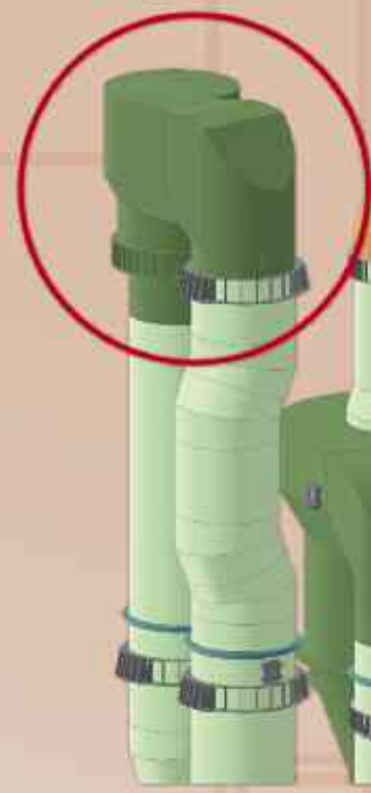
Meal and fuel are fed into both parallel gas flows. In the **LowNOx** zone, a portion of the fuel is burned with the kiln gases generating a reducing atmosphere zone which lowers the NOx content of the kiln waste gases.

PYROCLON®-R LowNOx
- staged combustion
- low cost NOx-reduction without additives (SNCR process)
- high efficiency and flexibility
- > 40 references
- BAT "Best Available Technique"
- emission level: < 500 mg NO_2/Nm^3 with gas, oil, lignite and most kind of coals



PYROTOP® compact
- Intensive mixing of gas strands to ensure complete fuel burn out





The reducing gas strand from the **LowNOx** zone is united with the oxidizing gas strand and later intensely mixed in the **PYROTOP®** compact swirl chamber. Due to this turbulent mixing, the remaining CO oxidizes to CO_2 with the oxygen present in the gas stream.

To achieve a highly efficient thermal utilization for less ignitable fuels, e. g. petcoke or anthracite, the calciner can be easily extended to increase the retention time to more than five seconds.

The use of lumpy secondary fuel or fuels characterized by poor ignitability becomes possi by additional installation of a combustion chamber equipped with a "hot spot" burner. Depending on the physical and chemical properties of the secondary fuels, up to 100 percent of the fuel required in the calciner can be substituted.

PYROCLON®
Overview Combustion Chamber

1. Connection raw meal pipe second lowest stage
2. Swirl air
3. Combustion air
4. Burner
5. Pre-calciner
6. Kiln inlet