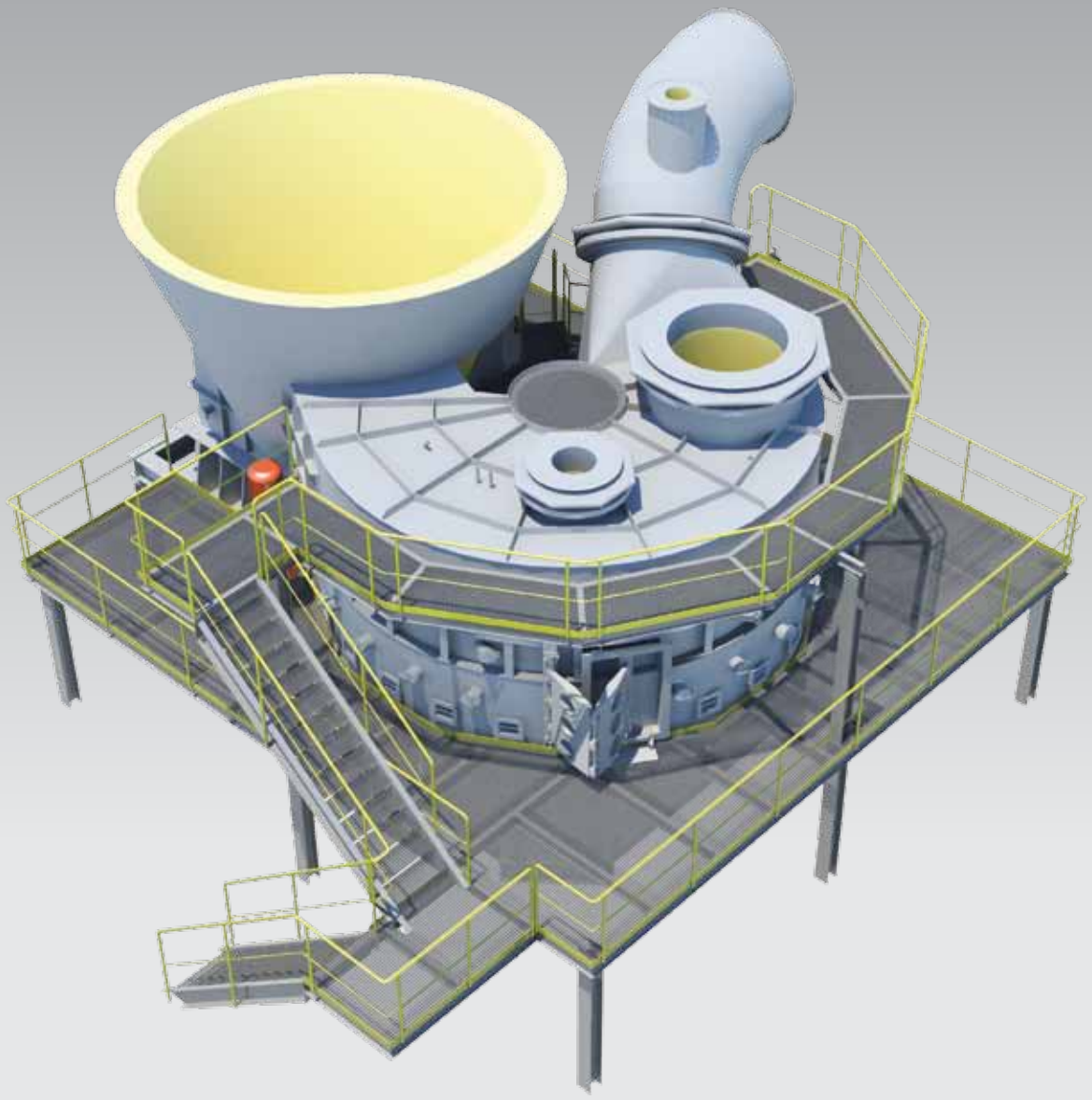
One Source

HOTDISC™ combustion device



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Leverage the benefits of coarse alternative fuels

Key benefits

- **Lower fuel costs by replacing fossil fuels with coarse alternative fuels**
- **Flexibility to use a wide variety of alternative fuel qualities**
- **High substitution rates with difficult alternative fuels (e.g., whole tyres)**
- **Controlled emissions**
- **Guaranteed performance**
- **Robust technology, maintaining high kiln availability with alternative fuels**

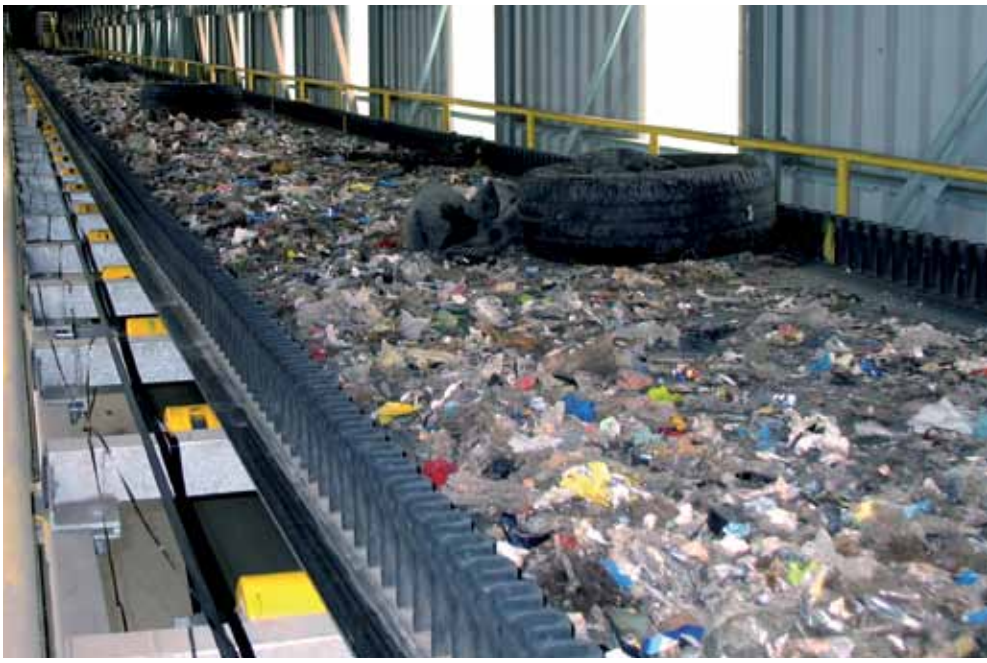
Unsurpassed fuel flexibility
The HOTDISC™ alternative fuels solution is the best way to substitute calciner fuel with coarse alternative fuels – enabling efficient operation and lower operating costs without compromising performance. A safe, simple and effective combustion device, this large, moving hearth furnace is integrated with the preheater and calciner systems for maximum kiln availability.

The HOTDISC gives the flexibility to burn a wide variety of solid waste in sizes up to 1.2 m – from sludge or grains to whole truck tyres. This eliminates the need for expensive shredding of lumpy waste material and boosts your plant's environmental profile.

Because you are not locked into any one fuel supplier, you also gain a much better position on the fuel market with the HOTDISC. Choose the best deal from among a wide variety of alternative fuel options.

High energy efficiency
The HOTDISC's use of clinker cooler tertiary air and preheated raw meal, along with alternative fuel, ensures virtually 100% energy efficiency. This results in maximum production capacity and minimum fuel and power consumption from the pyro system. The high energy efficiency is achieved because the HOTDISC does not rely on external media without recuperated process heat – such as air or water. In addition, the minimal fuel pre-processing requirement saves power and costs.

Because the HOTDISC can burn coarse shredded Refuse Derived Fuel, it eliminates the need for expensive fine shredding and enables fuel market flexibility.



A 3rd generation HOTDISC in operation – ensuring maximum kiln performance and minimum operating costs.

Guaranteed performance
The HOTDISC is designed to achieve a calciner fuel substitution rate of 20% up to 80% – typically 50% of calciner fuel. Results can vary significantly depending upon specific plant conditions and fuel specification. Let our specialists accurately estimate and guarantee the exact performance you can expect at your facility.

Full control
A fuel retention time of up to 45 minutes inside the HOTDISC reduces the adverse effects of unburned fuel in the kiln inlet and provides complete control of the process.

The HOTDISC eliminates operational disturbances such as cyclone blockages, the need for extra cleaning in the riser duct and emissions of unburned components. These disturbances typically occur if combustion and sulphur circulations from unburned fuels cannot be controlled.

Proven technology for new and existing systems
Since the HOTDISC's introduction in 2002, we've continuously improved the design of the system. The latest generation of equipment provides maximum flexibility, process control, capacity and durability.

A HOTDISC can be retrofitted to existing kiln systems and incorporated in new kiln systems.

The fuel feeding and handling system can be integrated with the HOTDISC supply, thereby optimally integrating it with the HOTDISC and preheater layout.

The ingredients of successful performance

Burns just about anything

- **Refuse Derived Fuel (produced from municipal garbage), loose or compacted**
- **Old tyres (whole, shredded or cut into pieces)**
- **Bleaching earth**
- **Paper sludge**
- **Lime-stabilised oil sludge (from tanker cleansing)**
- **Old car fragments (upholstery, dashboards, etc)**
- **Impregnated wood waste**

How it works

As an integrated part of the kiln system, the HOTDISC is added onto the calciner and functions as a moving hearth furnace. When alternative fuel, preheated raw meal and tertiary air are fed into the HOTDISC, it produces combustion gases, partly calcined meal and combustion residues. These are then processed in the calciner along with the other streams that go into the calciner. The result is calcined meal ready for the kiln and well-controlled emissions.

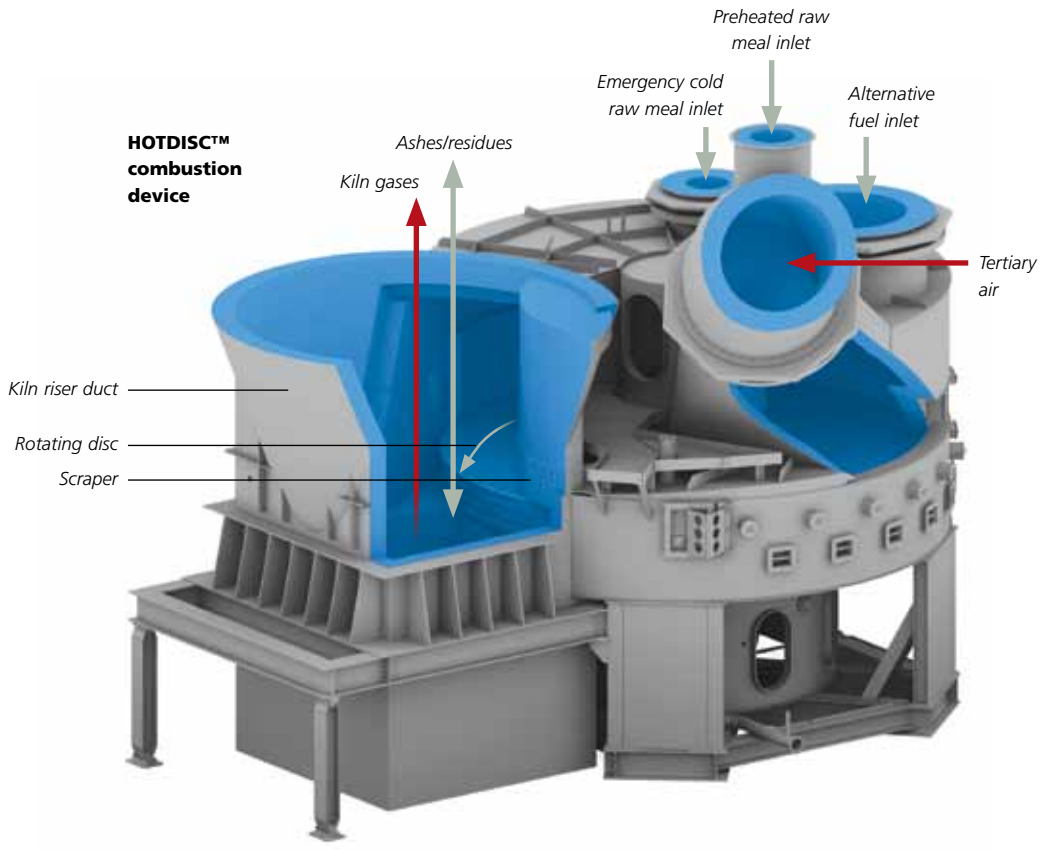
Technical details

The heat content of the alternative fuels is used for calcination. By providing extra residence time for the fuel, volatile circulation and blockages at the kiln inlet are minimised.

Alternative fuels are introduced onto the slowly rotating disc, where they start to burn in fully oxidizing conditions when meeting the hot tertiary air. Fuel residence time can be optimised simply by adjusting the disc's rotational speed. Operation is also controlled by regulating raw meal feed to the HOTDISC.

The burning fuel is transported approximately 270° on the disc until it reaches the scraper, where the remaining ash and partly calcined materials are discharged into the riser duct.

Heavy combustion residues fall down into the kiln inlet, while the lighter fractions and the combustion gases move upwards into the calciner.



HOTDISC components

The HOTDISC consists of:

- An annular, refractory-lined combustion chamber with a stationary casing, a roof, and a central column. The bottom of the combustion chamber is a horizontal, refractory lined rotary disc.
- A wall upon which scraper segments are mounted. The wall itself divides the annular combustion chamber between the fuel feed inlet and the residual ash outlet.
- A slewing ring which rests on a support and carries the rotary disc. The slewing ring is toothed on the inside and driven by two geared motors with frequency drive. By means of the frequency drives, the speed can be varied from 1-22 revolutions/hour.

The support for the central column, slewing ring and casing rests on a common bottom frame. There is easy access for maintenance and inspection below the disc. The central column is air cooled by means of natural draught.

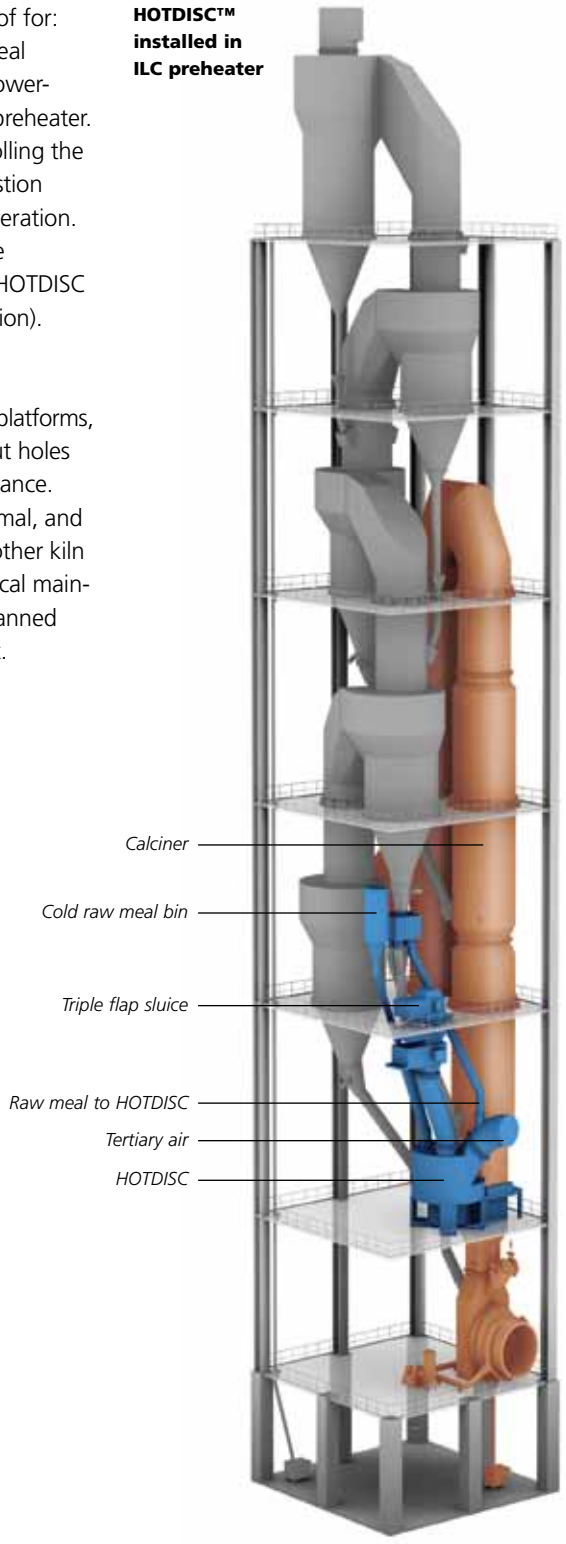
The casing has inlets in the roof for:

- Tertiary air, fuel and raw meal typically from the second lowermost cyclone stage in the preheater. The meal is used for controlling the temperature in the combustion chamber during normal operation.
- Cold raw meal, for possible emergency cooling of the HOTDISC (not used in normal operation).

Minimum maintenance

The HOTDISC features various platforms, manholes, doors and clean-out holes to facilitate fast, easy maintenance. Required maintenance is minimal, and is similar to maintenance for other kiln system components. Mechanical maintenance is done during the planned shutdown for the whole plant.

HOTDISC™ installed in ILC preheater



Everything you need to operate efficiently

Because the HOTDISC is an integrated part of a kiln system, your plant must meet several prerequisites before its installation, including adaptations to the kiln system.

Kiln system integration

The HOTDISC is suitable for integration in kiln systems with a calciner positioned directly above the kiln inlet (e.g., In-Line calciner kiln systems). The minimum process requirement for the installation of a HOTDISC is that the kiln system has a tertiary air duct and that preheated meal from a preheater can be fed to the HOTDISC. Both need to be adapted to fit the HOTDISC. An air lock must always be installed at the fuel feed point – typically a large triple flap gate. A hot meal dividing gate must typically also be installed.

The civil structure in the preheater is another critical point to consider. The physical dimensions and weight of the HOTDISC must be accommodated by the civil structure that supports the preheater. Because the HOTDISC has a 5-8 m diameter and is 5-9 m tall, it requires a large free space. The civil structure must also be able to support the HOTDISC's additional weight of 130-450 t.

Fuel feeding and handling installation

The installation of a fuel feeding and handling system for HOTDISC fuel typically represents a major part of a HOTDISC project. The system must be designed for continuous feeding of the desired capacities and fuel qualities to the air lock above the HOTDISC. Typically an enclosed belt conveyer is used to convey fuel from one or more dosage points on the ground to the feed point 30-60 m up in the preheater. Separate dosage systems are generally required for bulk fuel, whole tyres and sludge. The fuel dosage systems' capacities typically range from 3-30 tph.

Internal view of the HOTDISC after refractory installation.

Internal view of the HOTDISC during operation with tyres.

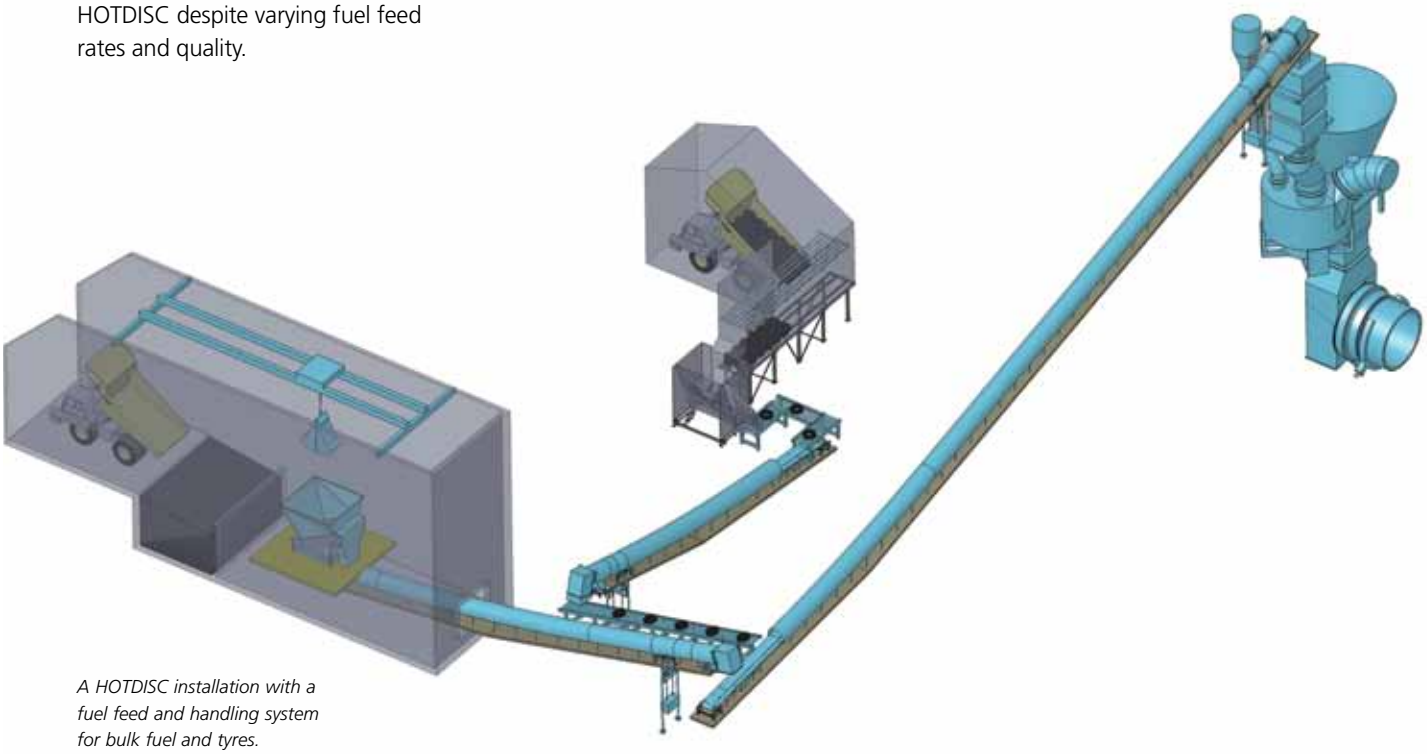
Control and safety

HOTDISC control and safety are simple. Due to the relatively long fuel burnout times in the HOTDISC, which provide a valuable response buffer, the HOTDISC fits well with the time constants for typical control systems on cement kilns. This makes the HOTDISC unaffected by the adverse effects of varying fuel feed rates and qualities, which results in effective emissions and process control.

HOTDISC operation is primarily controlled by the split ratio of the raw meal between the HOTDISC and calciner. It can be controlled automatically or manually to maintain the temperature of the outlet gases from the HOTDISC into the riser duct at approximately 1050° C. This control maintains the appropriate temperature in the HOTDISC despite varying fuel feed rates and quality.

In the event of major changes to fuel properties and/or fuel feed capacities, adjustment of the disc speed optimises the overall performance of the HOTDISC and kiln system. The temperature in the lowermost cyclone stage of the preheater is conventionally controlled by a control loop with the calciner's "control fuel" stream.

In case of power failure or during other situations where the kiln or ID fan suddenly stops, the fuels on the disc will continue to burn. To stop the combustion process, cold raw meal will be introduced to the HOTDISC from a bin placed above. This makes it possible to quickly extinguish the combustion process at any time and avoids any unacceptable emissions during upset conditions.



A HOTDISC installation with a fuel feed and handling system for bulk fuel and tyres.

Addressing common alternative fuel requirements

It's often appropriate to adapt the overall kiln system to common alternative fuel requirements when installing a HOTDISC. These requirements are mainly related to process aspects and legislation.

The process aspects primarily involve accommodating the effects of the differences in elemental composition between typical alternative fuels and fossil fuels; e.g.:

- A higher moisture content in alternative fuel results in higher flow rates and altered temperature profiles at a given clinker production capacity (must be accommodated to maintain production capacity)
- Alternative fuel typically has a substantial chlorine content, which may necessitate the installation of a "kiln gas bypass" (may need to be addressed to maintain operational stability)
- Adaptation to the different content and composition of ash from alternative fuels may necessitate an adjustment of the raw meal composition (may need to be addressed to maintain product quality)

The two main legislative requirements to consider when burning alternative fuels are:

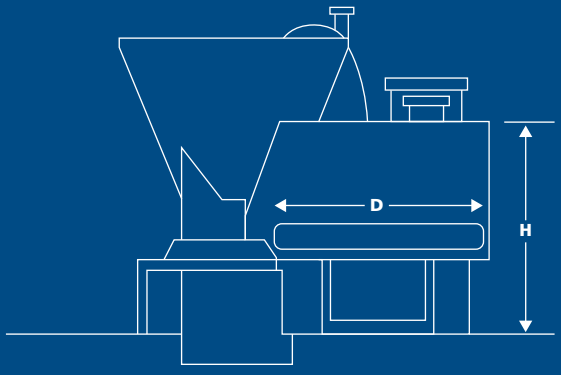
- Stricter emissions limits often apply to specific components, thus requiring additional abatement measures to be taken into consideration
- Requirements for emissions monitoring are typically enhanced, thus requiring the introduction of new monitoring equipments and/or procedures.

Dimensions

HOTDISC Types	D = Disc diameter m	H = Unit height* m	Typical firing capacity** tph
50 series	5	4.6 - 6.5	2 - 7
63 series	6.3	5 - 7.2	3 - 10
80 series	8	5.5 - 9	5 - 16

* *Height from supporting deck to chamber roof (not including height requirement of tertiary air duct)*

** *Capacities depend on process details as well as chemical and physical properties of fuels*



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