

# Tailor-made solutions for energy and environmental engineering.

**Top quality refractory materials.**



**RATH**

# Specialist for top technology in high temperature.

**Quality with an optimum  
price-performance ratio.**



Rath offers the ideal combination of tradition and innovation. The result: optimum refractory solutions for a wide range of applications. All items in our broad product portfolio are manufactured in-house. With carefully selected materials and precision processing techniques, we can guarantee top quality.

The Rath sales teams are focussed on the sector and familiar with its specific requirements; our technical offices provide the necessary engineering and assembly know-how. This means we can offer our customers individual, complete refractory solutions with an optimal price-performance ratio.

*The Rath sales team*

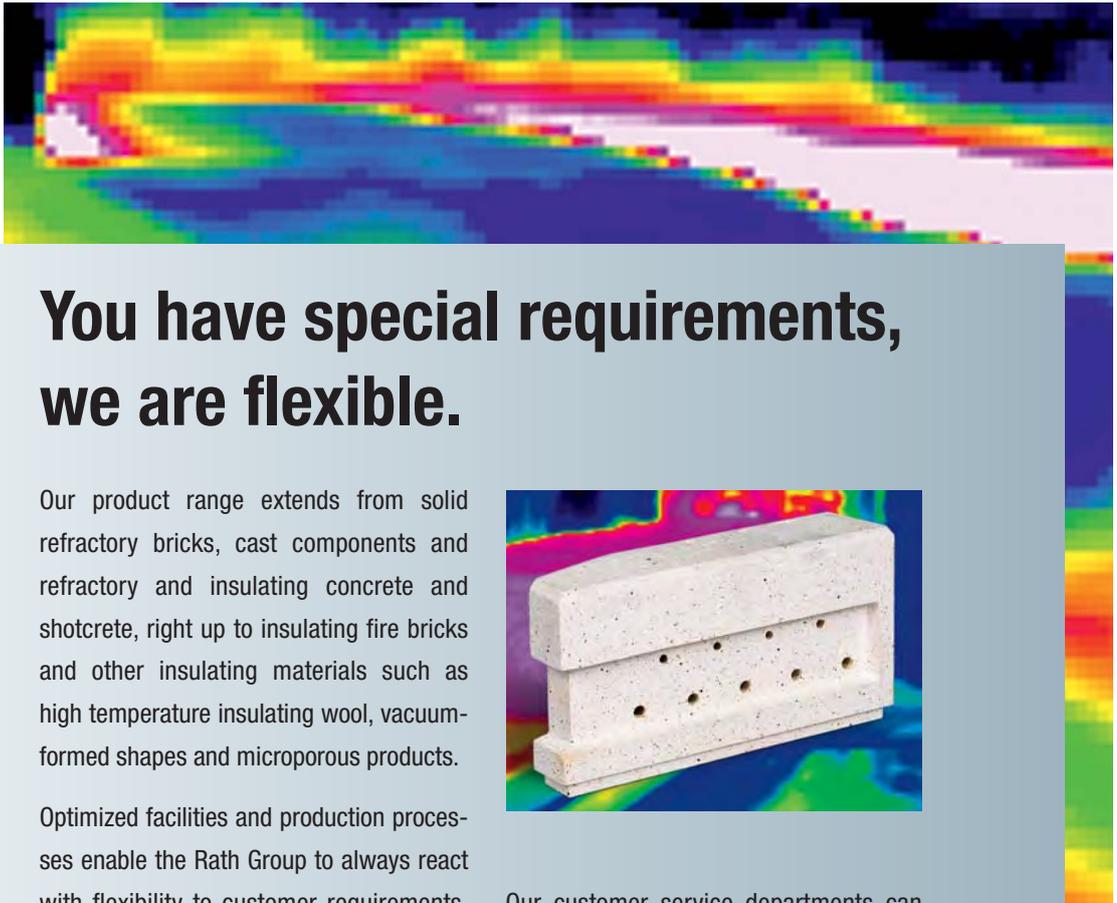
**Sophisticated refractory solutions for efficient incineration.**



The rapidly increasing quantities of waste produced worldwide and the sharply rising demand for energy call for the increased use of sustainable raw materials and the continuous expansion and enhancement of energy production and waste disposal plants.

The refractory linings of these plants are subject to immense stresses – on the one hand from the chemical composition of the input materials or fuel, on the other hand as a consequence of complex combustion techniques and operator demands for maximum availability.

Rath has tackled these requirements and developed efficient lining systems for many different types of plant.



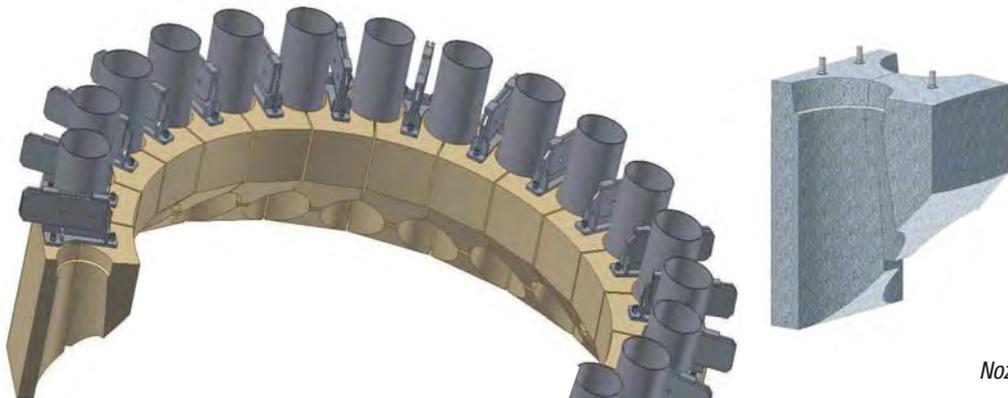
## You have special requirements, we are flexible.

Our product range extends from solid refractory bricks, cast components and refractory and insulating concrete and shotcrete, right up to insulating fire bricks and other insulating materials such as high temperature insulating wool, vacuum-formed shapes and microporous products.

Optimized facilities and production processes enable the Rath Group to always react with flexibility to customer requirements, whether in respect of production deadlines, one-off items or special applications.



Our customer service departments can handle any such request – and always with the focus on quality.

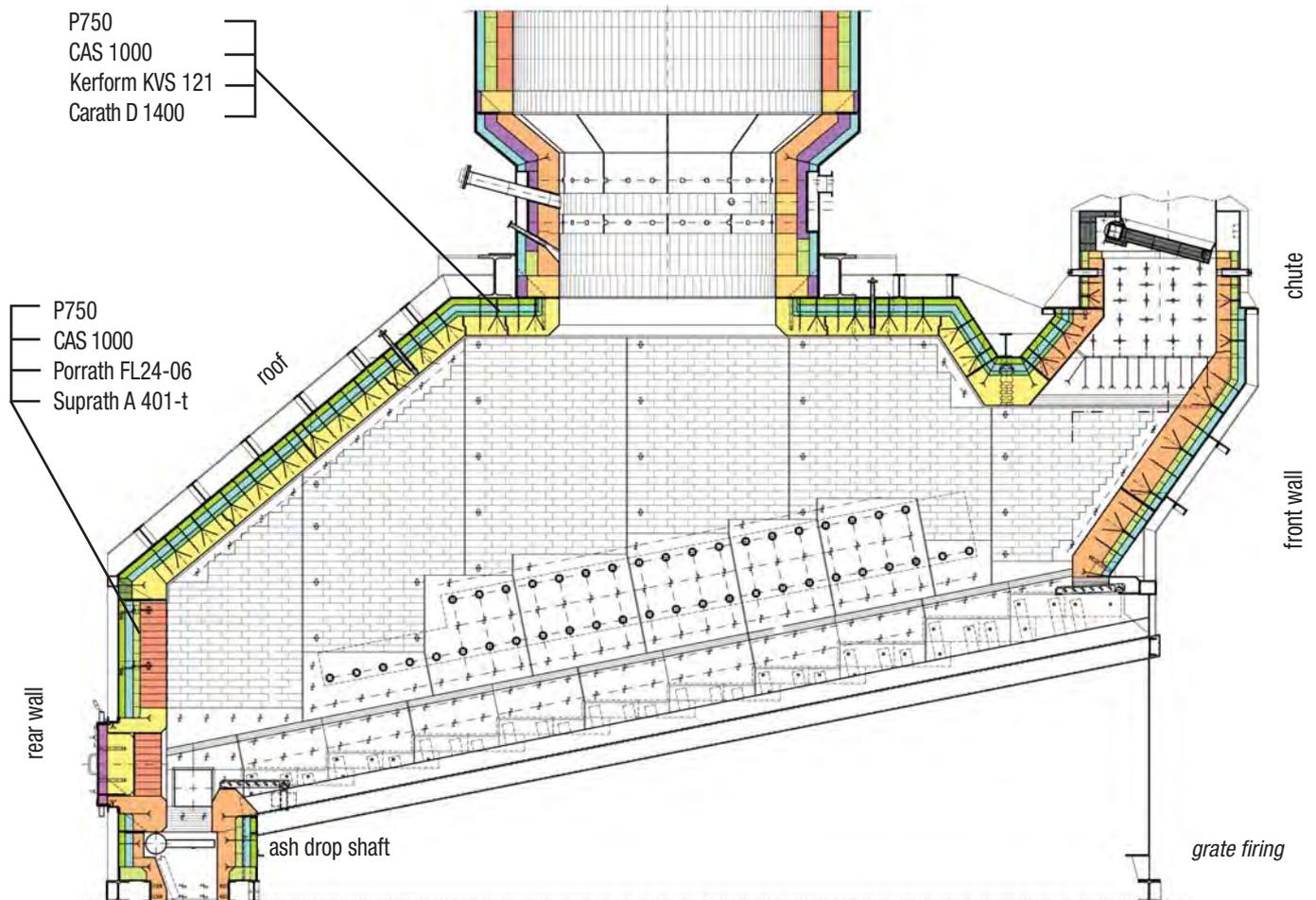


Nozzle ring

## Precision work is at the heart of our business.

Rath has a number of technical departments where design drawings for refractory linings are produced for the various applications. The complexity and size of the plants demand special construction expertise and experience.





## Stoker furnaces.

Stoker furnaces in their various forms are the units typically used for producing energy from biomass, especially woodchips, pellets or other wood waste.

Through our collaboration over many years with renowned plant construction companies we are able to offer proven products and technical solutions for the critical area of refractory linings.

New plant investment is not the only way to take advantage of our expertise. One of our particular strengths is the repair of existing plants.

*Stoker furnace steel housing with and without refractories*

# Even the production of hot air is a skill.



Generation of hot gases



Roof Lining

For the drying of raw materials in the wood industry large quantities of hot gas are required. Plant technique based on the minimization of environmental pollution by emissions, with at the same time the maximum input of wood waste, places great demands on the refractory lining.

Through the appropriate combination of dry-pressed bricks, concrete components, sprayed, cast, rammed-layer lining and heat insulation

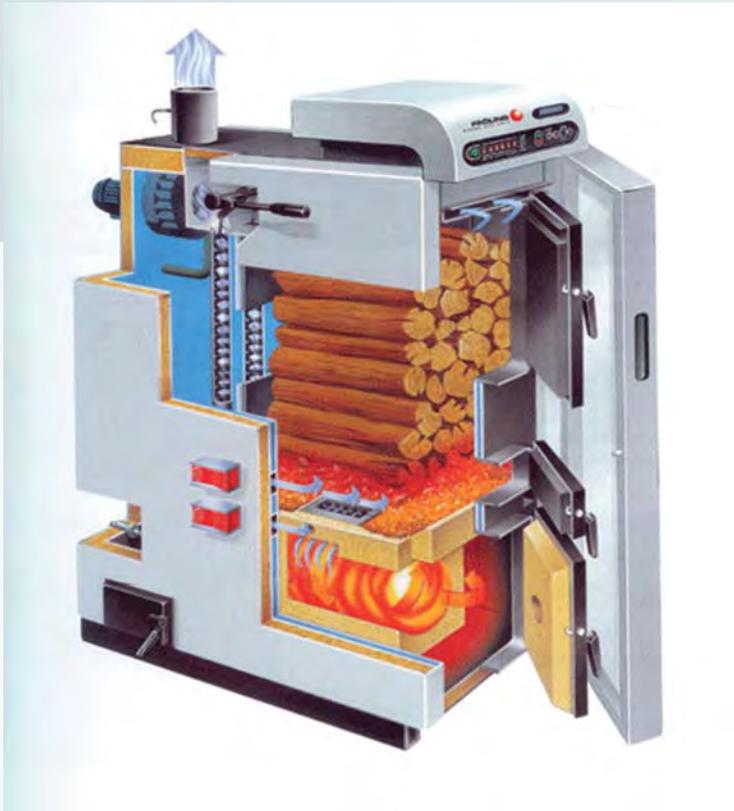
materials, we are able to offer lining systems that have been optimized both technically and economically.

Whether it involves ceilings with a diameter in excess of seven meters with integrated high performance burners, or hot gas piping of the most complicated geometry – we have the solution.

## Dense bricks \*

Name	Suprath A 40-t	Suprath T 46	Durrath HS	Silrath AK 60	Silrath AK 60 C	Silrath AK 60 SiC	Silrath AK 60 V	Korrath® K 85 CrC
Raw material	Fireclay	Fireclay mullite	Mullite	Andalusite	Andalusite	Andalusite Silicon carbide	Andalusite	Tabular Alumina Eskolaite
Bulk density [g/cm <sup>3</sup> ]	2,28	2,35	2,3	2,6	2,6	2,6	2,6	3,0
Cold crushing strength [MPa]	50	70	70	100	100	100	60	100
Porosity [Vol.-%]	14	14	14	13	15	11	14	15
Thermal shock-resistance [n]	18	30	25	120	120	120	120	120
Chemical analysis [%] Al <sub>2</sub> O <sub>3</sub>	40	46	40	60	60	45	60	87

\* this and all the following tables contain only an extract of the wide Rath product range.



Domestic boiler

## Biomass furnaces up to 150 kW.

The innovative fuel value technology of modern pellet, firewood and woodchip boilers with output of up to 150 kW leads to constant new developments in furnace linings.

Also in the areas of insulation, sealing and corrosion protection, many noteworthy producers have been placing their trust in Rath for many decades.

Complex geometries, different atmospheres and chemical stresses on the smallest of spaces – these are the demands we overcome.

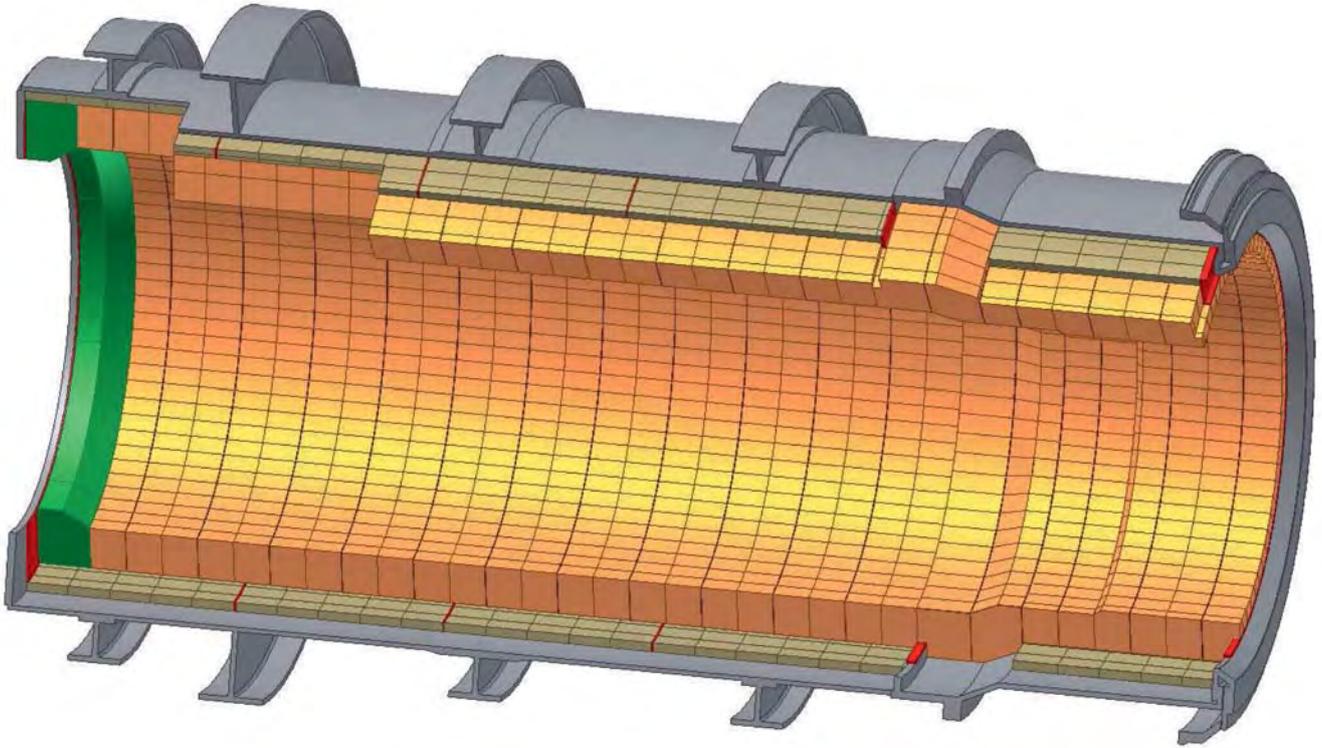


Precast blocks and castables

## Unshaped refractories

	dense castables		low-cement castables			gunning castable
	Carath® D 1400	Carath® D 1460	Carath® LC 1550	Carath® LC 1655	Carath® LC 1400 SiC	Carathgun LC 1501
Name	Fireclay	Aluminium silicate	Fireclay Bauxite	Andalusite	Fireclay Silicon carbide	Andalusite
Raw material	2250	2200	2400	2550	2540	2250
Bulk density [kg/m <sup>3</sup> ]	40	60	100	75	85	35
Cold crushing strength [MPa]	1400	1450	1550	1650	1400	1500
Application temperature [°C]	Chemical analysis [%]					
Al <sub>2</sub> O <sub>3</sub>	46	51	60	63	35	60

# Turn to us for an effective solution.



*Rotary furnace for hazardous waste incineration*

The assembly of furnaces built by Rath is supervised by at least one of our employees. This supervision, and a comprehensive final inspection, enables us to guarantee the durability of our refractory linings.

Perfect planning leads to effective solutions. Three-dimensional representations of refractory structures make it possible to fine-tune projects even before assembly.

It also enables us to optimize your bills of materials and thereby significantly reduce contingency stocks. The net effect is that you, the customer, are able to save both money and space during construction.



*Jam ring*

Carathgun LC 1501  
Carathgun FL 1000  
Kerform KVS 101  
P 750

Flue Gas

Durrath HS  
Porrath FL 24-06  
Porrath 900  
Alsitra Mat 1300

Carathgun LC 1501  
Carathgun FL 1000  
Kerform KVS 101  
P 750

Durrath HS  
Porrath FL 24-06  
Porrath 900  
Alsitra Mat 1300

Silrath AK 60  
Porrath FL 24-06  
Porrath 900  
Alsitra Mat 1300

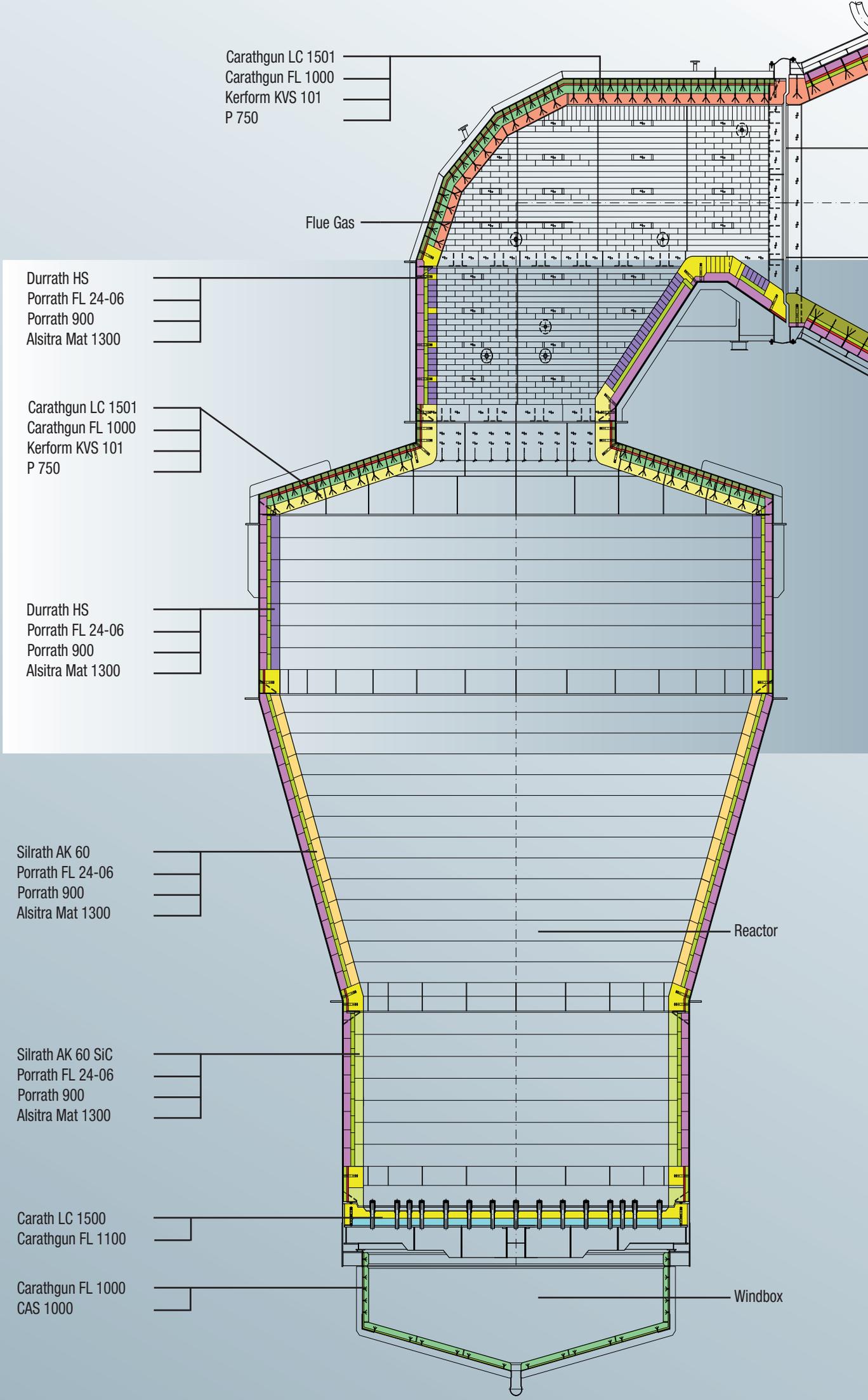
Silrath AK 60 SiC  
Porrath FL 24-06  
Porrath 900  
Alsitra Mat 1300

Carath LC 1500  
Carathgun FL 1100

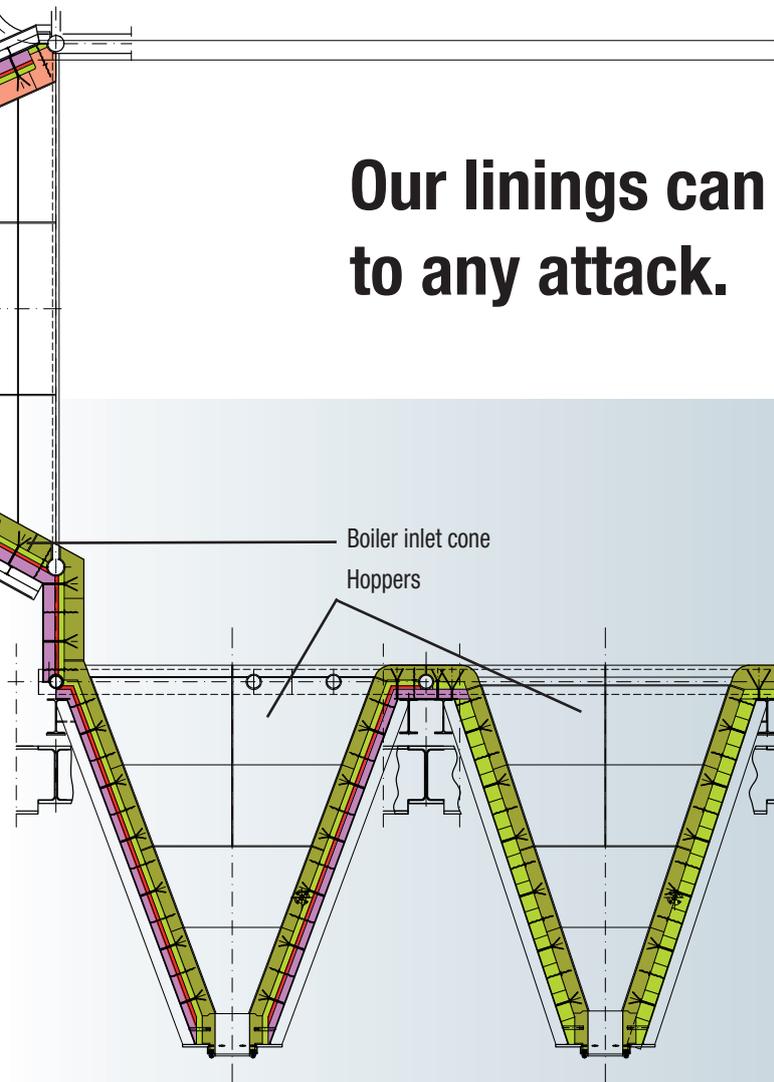
Carathgun FL 1000  
CAS 1000

Reactor

Windbox



# Our linings can stand up to any attack.



*Fluidized bed reactor*



## Fluidized bed reactors.

For a whole variety of applications in the environmental and energy technology sectors, as well as in metallurgy, fluidized bed reactors have proven themselves to be effective.

Typical applications include:

- Acid regeneration
- Sludge/hazardous waste incineration
- Power generation

The performance of the fluidized bed can be demonstrated using the example of power generation.

Fluid, viscous, grainy and dust-like energy carriers and biomass can all be used. Attack by acid, reducing atmospheres and alkalis, and above all mechanical stress through abrasion require the very highest of performance levels from refractory materials.

Steelworks and refineries, power stations and waste disposal plants all rely on the excellent durability of linings built and delivered by Rath.

# Flexible modules with a wide range of applications



Penetration via modules

## Lightweight.

A whole range of plants for thermal post-combustion of gases containing pollutants can be economically lined with modules made from high temperature insulating wool.

Rath's special production technique makes it possible to manufacture and build plant-specific modules. Even the most complex of geometries can be supplied with a minimum of joints and low assembly costs.

Early dust removal at high temperature from waste gases containing high quantities of particles is one increasingly common requirement for both financial and ecological reasons. Accordingly, Rath supplies filter candles for hot gas filtration up to exhaust temperatures of 1000°C.



Ceramic filter candles

## Insulating materials

Name	High temperature wool		Vacuum formed shapes		Insulating fire bricks		Calcium silicate board
	Alsitra Mat 1300	Alsitra Mat 1400	Kerform KVS 121	Kerform KVS 145	Porrath 900	Porrath FL 24-06	CAS 1000
Raw material	Aluminium silicate	Aluminium silicate	Aluminium silicate wool	Aluminium silicate wool	Calcium / Aluminium silicate	Aluminium silicate	Calcium silicate
Classification temperature [°C]	1300	1400	1250	1400	900	1350	1000
Bulk density [g/cm <sup>3</sup> ]	0,13	0,13	0,30	0,35	0,45	0,64	0,24
Cold crushing strength [MPa]	-	-	0,3	0,3	1,0	1,2	1,3
Thermal conductivity at 1000°C [W/mK]	0,31	0,31	0,25	0,25	-	0,38	-
Chemical analysis [%]							
Al <sub>2</sub> O <sub>3</sub>	48	54	50	47	15	37	-
SiO <sub>2</sub>	52	46	49	52	67	56	50
CaO	-	-	-	-	5	-	49

# Production in our own factories.

There is one very special feature of Rath: we can always fully guarantee the quality of our highly refractory products, as we manufacture them all ourselves.

State-of-the-art production processes are used in our plants in Europe and the USA. We constantly adapt these processes in line with technical and technological developments as we strive to provide you with top quality.

Our approach benefits our customers: high quality products ensure operational safety and reliability over a long period of time. This means less repairs, less breaks in production and lower costs.



*Krummnußbaum*



*Budapest*



*Mönchengladbach*

# Rath meets all ISO criteria.

Quality in production can be measured – with ISO 9001/9002. All companies in the Rath Group are certified according to the strict criteria for this standard. We are doing everything to build constantly on this quality standard.

Our products undergo rigorous testing in our own company laboratories. We also regularly have externally government-authorized recognised test centres check material characteristics.

Our customers can rest assured that all our products are up to date – and provide, in practice, everything that we have promised.

# The Rath Group.

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