FIREPROOF SOLUTIONS FOR THE CERAMIC INDUSTRY

Specialized | Customized | Precise







WELCOME TO RATH – YOUR FIREPROOF SPECIALISTS

RATH develops and produces fireproof products and delivers systems with high-quality incombustible liners all over the world. Whenever complicated requirements are involved in a solution, customers choose RATH products and services.

DETAILED PLANNING-PERFECT ASSEMBLY

We find solutions to specific requirements by precisely planning, drawing and calculating the systems in our planning offices. RATH customers receive a standardized construction plan for the system, which can be used for installation either by RATH personnel or by a third party. In many cases, RATH also monitors the assembly work by third party personnel to ensure that the construction is guaranteed to meet the strict RATH quality requirements.

WELL-THOUGHT-OUT PRODUCTS-PERFECTLY COORDINATED

As early as the product development stage, the later ability to assemble the product is considered. A good example is Rathloc[®], a system in which a standardized placement system allows the bricks to be installed simply, ensuring they always fit perfectly.

RESEARCH, DEVELOPMENT, MANUFACTURING-EVERYTHING FROM A SINGLE SUPPLIER

We specialize in fireproof materials for temperatures up to 1,800 °C and for hot-gas filtration up to 1,000 °C. We research and develop in our own laboratories, and manufacture everything in-house, from basic materials to the finished component.

COMPREHENSIVE OFFERINGS

- Dense bricks

2

- Unformed products
- Concrete molded parts
- Lightweight refractory bricks
- High-temperature wool
- Vacuum molded parts



FINDING A SOLUTION FOR COMPLEX SPECIFICATIONS IS OUR SPECIALTY

We adapt the incombustible liners to the furnace design. This is possible through custom planning and manufacturing. Every part is designed in advance in a CAD system and checked for accuracy to ensure everything runs smoothly at the construction site.

RATH COVERS THE ENTIRE SPECTRUM OF CERAMIC FURNACE SYSTEMS

- Tunnel furnaces
- Bogie hearth furnaces
- Bell furnaces
- Roller passage kilns
- Chamber furnaces
- Pusher-plate kilns
- Laboratory and special furnaces

THE FULL-SERVICE PROVIDER FOR THE CERAMIC INDUSTRY

A solid ceramic furnace liner doesn't just begin when you order the material, nor does it end with the delivery of the materials to the ceramic furnace constructor or user. A complete solution includes the professional selection of materials, a solid design, a high-quality liner and efficient project management.

With specialized knowledge and many years of practical experience, our project managers ensure the smooth development and coordination of industrial furnace projects all over the world. RATH customers have a reliable partner for fireproof systems with a comprehensive portfolio of services.

5 I

ENGINEERING

Thermal transfer is the basis for every liner design. It is used to determine the optimum wall structure. This requires comprehensive knowledge of the thermal and corrosive strains. We use modern thermal transfer calculation programs and software systems to calculate thermodynamic balance and phase diagrams for this purpose. As a manufacturer, we can access all the databases necessary to make the calculations.

Upon request, we are also in a position to perform cost-effectiveness calculations of incombustible liners, while taking the material and energy costs into account, in order to assist the customer in making a decision.

MATERIAL DELIVERY

RATH material is made according to the customer's request and is delivered directly to the construction site as agreed with experienced forwarding agents. Regardless of where in the world your construction site is located, our logistics experts will ensure reliable and timely delivery.

ASSEMBLY MONITORING / SUPERVISION

In many cases, RATH also monitors the assembly work by third-party personnel to ensure that the construction is guaranteed to meet the strict RATH quality requirements.

ASSEMBLY

Incombustible liners for ceramic furnaces require specialized assembly during pre-assembly and on-site. Our best-trained assembly workers ensure reliable assembly and place particular value on a high standard of safety. This involves constant monitoring of the construction site by experienced lead assemblers.

We place great value on high-quality assembly equipment and assembly aids to ensure you receive an effective and high-quality liner.

MAINTENANCE AND REPAIR

We monitor the performance of your incombustible liner and carry out the necessary maintenance to ensure that the systems are operating safely. To do so, we offer ongoing and forward-looking maintenance and repair.

TUNNEL FURNACES

Continuous furnaces, or tunnel furnaces, are mainly used in the ceramic industry for firing sanitary ceramics, porcelain, dishes, roof tiles, clinker brick, fireproof material and technical ceramics, as used in exhaust catalytic converters and diesel particulate filters. RATH has supplied incombustible liners for tunnel furnaces for many decades.



Final firing tunnel kilns for hotel porcelain

The incombustible liner in a tunnel furnace needs to meet the specific requirements for the respective application. Whether you have a completely walled-in furnace or a furnace with metal housing, new liners, repairs or renovation–RATH has a wealth of experience in the field of tunnel furnaces, specifically for the ceramic industry, and creates the optimum liner design based on the customer's requirements.

Our fireproof products used in the heat insulating liners enable a firing process in tunnel furnaces which is designed for optimal material circulation and low cost. Particular importance is placed on specific energy consumption in this process. It is kept low through the use of modern heat insulation materials. Depending on the application, dense bricks, refractory concrete, lightweight refractory bricks or even modules made of high-temperature wool are used for this purpose. Flexibility in the liner design is also one of RATH'S strengths.



Tunnel furnace for sanitary applications and clinker brick firing



Tunnel furnace from RATH for firing lightweight refractory bricks

TUNNEL FURNACES



BOGIE HEARTH FURNACE

The bogie hearth furnace is a particularly flexible firing unit, offering excellent quality results for a broad range of applications thanks to its excellent temperature distribution and low specific energy consumption.



For years, notable furnace manufacturers have trusted in RATH fireproof liners for firing exhaust gas catalytic converters and diesel particulate filters. But RATH products are also used in bogie hearth furnaces for firing porcelain, dishes, fireproof material and construction ceramic.

Minimizing the specific energy consumption by lining with high temperature wool modules that allow an operating temperature of up to 1,600 °C plays an important role in these systems. But liners with hollow sphere corundum brick for operating temperatures of up to 1,750 °C are also successfully used, and are a robust liner in the high-temperature range, even for corrosive and reduced atmospheres.

Bogie hearth furnace for firing ceramic pipes Height: 8 m; width: 4 m, temperature: 1,650 °C



Electrically heated bogie hearth furnace with a liner of Altra modules for an operating temperature of 1,600 $^{\circ}{\rm C}$



Bogie hearth furnaces for porcelain glost firing

9

BOGIE HEARTH FURNACE



BELL FURNACE

Bell furnaces are used for firing fireproof material, exhaust gas catalytic converters, diesel particulate filters, and ballistic ceramics, bioceramics and construction ceramics. They are characterized by their bell-like shape, which is loaded from below.



Bell of a Bickley furnace lined with hollow sphere corundum bricks

Thanks to its excellent temperature distribution and its low specific energy consumption, the bell furnace is a particularly flexible firing unit with a broad range of applications.

It is mainly used to fire fireproof material, ceramic base bodies for particulate filters and catalytic converters, and technical ceramics. RATH products have successfully been used by renowned furnace manufacturers for years. Altra liners play an important role for bell furnaces up to 1,600 °C. For higher temperatures of up to 1,750 °C, it is usually preferable to use hollow sphere corundum bricks.



Bell furnace system from CTB, lined with Altra modules, among others

Bogie hearth of a Bickley bell furnace

wool modules

BELL FURNACE











ROLLER PASSAGE KILN

The roller passage kiln is a modern firing unit for glost firing and once-firing of porcelain, stoneware and earthenware. For technical ceramics, the roller passage kiln works up to 1,600 °C.



Roller passage kiln for ceramic tableware

Newly-developed roller passage kiln designs guarantee the highest level of product quality with minimum maintenance and personnel requirements. High temperature consistency over the setting cross-section in the various furnace sections, and a huge reduction of the specific energy consumption and the throughput time, are additional benefits of this furnace system.

Fireproof material with excellent heat insulation properties and low stored heat are often requirements for these furnaces. High thermal resistance of the products is additionally of great importance. RATH supplies lightweight refractory bricks, hightemperature modules, dense bricks and refractory concrete finished parts with demanding requirements on flexible and innovative heat cycles for roller passage kilns.



Roller passage kiln for firing porcelain



Roller passage kiln for tempering aluminum oxide mats



Loading a pre-installed roller passage kiln

RATH

ROLLER PASSAGE KILN





CHAMBER FURNACE

Chamber furnaces are mainly provided for firing technical ceramics and porcelain, and they stand out thanks to their low space requirements, excellent temperature balance and short firing cycles. This type of furnace operates without a track and a kiln car.



Electrically heated chamber furnace for porcelain firing

Test chamber furnaces are also of particular importance. These firing furnaces for research and development can be used up to a temperature of 1,600 °C. The optimized results from the test firings can be transferred directly to production.

Ideally, the chamber furnaces are equipped with hightemperature module liners. These allow very flexible temperature control, and can be used to realize any heating and cooling process required. But liners with lightweight refractory bricks are also frequently used, for example in electrically heated systems.



Test chamber furnace 1,650 °C



Test chamber furnace 1,600 °C

CHAMBER FURNACE



A

ALSITRA Mod 1600
ALSITRA Mod 1400 Z
ALTRA Mat 1600
ALSITRA Mat 1400 Z
ALSITRA Mat 1400 Z
ALSITRA Mat 1300
KERFORM KVS 124
KERFORM KVS 141
KERFORM KVS 161
PORRATH FL 25
PORRATH FL 27
PORRATH FL 32
KORRATH K 902

PUSHER-PLATE KILNS

In pusher-plate kilns, ceramic parts are sintered at temperatures of up to 1,750 °C. This type of furnace is walled out with dense bricks or lightweight refractory bricks. There are also designs with fiber coverings, but these are limited in use to a maximum temperature of 1,500 °C.



Assembly of a furnace system

Pusher-plate kilns are used for the continuous firing of ceramic products in multi-gas atmospheres. Typical firing products include diesel particulate filters, ferrites, powder, battery components, fuel cells and piezo ceramics.

We offer tailored design solutions and optimal utility of your production system thanks to our well-known products.

Depending on the application, dense bricks, refractory concretes, lightweight refractory bricks and hightemperature wool are used to meet the highly demanding requirements of flexible and innovative production units. Often the materials used in these systems must be carefully selected to withstand the effects of a strong corrosive attack.



Pusher-plate kiln for firing ferrites



Pusher-plate kiln for magnets



Pusher-plate kiln from the interior

SPECIAL FURNACES

Thanks to the variety of requirements, laboratory furnaces and special furnaces up to 1,800 °C require a highly specialized fireproof liner.



Furnace systems with electrical heating spiral supporting bricks

These furnaces demand individual parts and a product spectrum specific to the respective furnace type and fine-tuned to the particular application. RATH offers many years of experience and knowhow in lining furnaces such as laboratory chamber furnaces, elevator furnaces, bottom-loading furnaces and dental furnaces.

RATH can put together a complete, incombustible liner for high-temperature furnaces using the ACS system (Altra® Composite System) which, despite being highly specialized, is easy to install and has a custom design.



Dental furnace liner



Infrared furnace for foaming aluminum plates

ACS ALTRA® COMPOSITE SYSTEM

The ALTRA® Composite System is a specially designed insulation system that eliminates common problems such as excessive shrinkage, stress cracking and roof sagging that often cause failure of high-temperature ceramic fiberboard insulation in furnaces and combustion chambers.



Industrial furnace



HT furnace up to 1,700 °C with ACS components in the roof and wall



ACS cover for HT furnace

Due to their modular structures, ACS insulation systems can be manufactured in many shapes and sizes for use in laboratory and industrial furnaces up to 1,800 °C.

The unique ACS component design and freely-hanging roof construction make quick furnace cycles possible, in contrast to a traditional design.

ACS properties

- Modular design
- Operating temperature up to 1,800 °C
- Heat-up time of 200 °C/h
- Cool-down time of 100 °C/h
- Excellent heating insulation through low thermal conductivity
- Excellent thermal resistance
- Low heat storage capacity due to low apparent density

Applications

- Laboratory furnaces
- Industrial production furnaces for:
 - Ceramics
 - > Electronics
 - > Medical products

Design, supply and service

- For customized manufacturing of chamber furnaces, bogie hearth furnaces and elevator furnaces
- The construction elements are standardized, and can therefore be procured as individual parts
- We provide complete liner systems which integrate into all fireproof materials
- RATH offers planning and design services for customized furnaces and combustion chambers.

ACS COMPONENTS



Freely-hanging composite roof



Tongue-in-groove support system



Tongue-in-groove stack-bonded elements

Composite roof

Roof modules made from KVS 174/400 or KVS 184/400 laminates with Kerasetter support are manufactured stably and without sagging through multilayer stack bonding. These modules are secured to the furnace housing with a ceramic hanger system.

Tongue-in-groove walls

Made of KVS 174/400 or KVS 184/400 stack-bonded elements that have been equipped with a tongue-in-groove system. These wall elements can be set up to a height of 1,000 mm without the need for an internal support system.

Door

Made of KVS 174/400 or KVS 184/400 stack-bonded elements in which the fiber alignment is set perpendicular to the hot face over its entire material thickness.

Floor

Made of KVS 174/400 or KVS 184/400 with additional layers of KVS 164 and KVS 144. The floor can be customized for the process requirements, for example to contain special supporting elements or high-density plates for heavier loads.

Materials

- KVS materials for oxidizing processes up to 1,800 °C
- KVR materials for reducing processes up to 1,600 °C
- Aluminum oxide or aluminum silicate fiber, adjusted to the respective application as background insulation and seal
- Technical ceramic based on mullite, corundum or SiC for the ACS design elements
- Completion of the system with seals, bricks and molded parts

Advantages

- Custom furnace sizes and styles possible
- Higher throughput times thanks to quick furnace cycles
- Long-term radiation stability
- Design stability, even with material cracks
- Repair of individual segments possible in some cases
- Efficient energy consumption
- Overall higher productivity

PRODUCTS

Innovative special products with a high post-processing effort made of dense bricks, lightweight refractory bricks, vacuum molded parts, as well as pre-cast concrete parts are hugely important in lining the various ceramic furnaces. RATH supplies pre-cast concrete parts as firing blocks, roller bricks, hearth components, roof parts, tunnel furnace wagon parts, and much more.

Liners with fireproof bricks are also increasingly supplemented by concrete molded parts, as concretes can be poured to form individual shapes, and larger components or sections. In one of the most modern production facilities for pre-cast concrete parts, almost all of our refractory concretes can be cast in nearly any geometric shape. These parts can be tempered depending on their intended use and pre-fired up to 1,750 °C, allowing them to be offered in a ceramized form.



MONOLITHIC REFRACTORIES

FIREPROOF CONCRETES

		Dense c	oncretes		Low-cement concretes				
DESIGNATION	CARATH 45D	CARATH D 1250	CARATH D 1400	CARATH D 1500	CARATH 47 A LC	CARATH 52 MC R	CARATH A 58 LC	CARATH 1400 LC	CARATH 1500 LC
Raw material base	High-alu- mina clay	Fireclay	Fireclay	Mullite-rich fireclay	Light- weight fireclay	Mullite-rich fireclay	Andalusite	Mullite-rich fireclay	Mullite-rich fireclay, bauxite
Application temperature [°C]	1,400	1,250	1,400	1,500	1,400	1,500	1,650	1,400	1,550
Material requirements [kg/m³]	2,100	2,150	2,250	2,250	2,300	2,350	2,550	2,300	2,400
Cold compres- sion strength at 110 °C	40	50	40	60	100	100	75	100	100
Grain size [mm]	6				<10	<10	<6		
Chemical anal- ysis [%]									
Al ₂ O ₃	45	38	46	54	50	52	63	50	60
SiO ₂	40	42	40	40	41	42	34	41	33
Fe ₂ O ₃	2	-	-	-	1.3	1	0.8	-	-
CaO	7.8	-	-	_	-	-	-	-	-

	Cement-free	e concretes	Insulating concretes				
DESIGNATION	CARATH 1800 NC SF	CARATH FLUX NC 1800	CARATH FL-900	CARATH FL-1401	CARATH FL-1405	CARATH FL-1500	CARATH FL K 93
Raw material base	Tabular alumina clay	Corundum	Perlite	Lightweight fireclay	Lightweight fireclay	Low-iron mullite fireclay	Hollow sphere corundum
Application temperature [°C]	1,800	1,800	900	1,400	1,400	1,500	1,700
Material re- quirements [kg/m³]	3,210	2,850	450	1,400	1,500	1,750	1,500
Cold compres- sion resistance at 110 °C	65	45	0.75	25	25	24	6.5
Grain size [mm]	<5		<8	<8	<8	<5	<2
Chemical analy- sis [%]							
Al ₂ O ₃	92.5	92	35	45	55	64	93.5
SiO,	6.8	7	40	35	30	30	0.5
Fe ₂ O ₃	0.15	-	-	З	0.8	0.6	0.1
CaO	-	-	-	11	-	-	

DENSE BRICKS



DENSE BRICKS

		Star firecla	idard y bricks	Andalusi	te bricks	High-alu firepro	mina brick of bricks	High-alumina bricks
DESIGNATIO	N	SUPRATH A 40-t	SUPRATH T 45	SILRATH AK 60	SILRATH AK 65	KORRATH K 974 ZR	KORRATH K 99	ALURATH M 704
Raw materia	al base	Fireclay	Mullite-rich fireclay	Andalusite	Andalusite	Corundum	Tabular alumina clay	Sinter mullite
Apparent de [g/cm³]	ensity	2.25	2.3	2.58	2.65	3.40	3.15	2.50
Open porosi [%]	ity	16	15	14	13	14	17	18
Cold compre resistance [ession MPa]	50	60	100	110	130	80	45
Thermal resistance [number of deterrents]		30	30	100	120	36	10	100
Deformation MPa]	n t05 [20	1,420 °C	1,400 °C	1,600 °C	1,600 °C	> 1,600 °C	>1,600 °C	> 1,600 °C
	Al ₂ O ₃	40	43	60	62	97	99	72
Chemical	SiO ₂	50	-	37	33	0.10	0.20	25
analysis	Fe ₂ O ₃	1.9	2	1	1	0.10	0.10	0.5
[%]	Cr ₂ O ₃	-	-	-	-	-	-	
	ZrO ₂	-	-	-	-	2.80	-	
Hot bending	1,200 °C	-	-			12.0	18.0	15.0
strength	1,400 °C	1.8	1.9	2.5	2.0	8.0	12.0	8.0
[мрај	1,500 °C		-	-	-	6.0	8.5	6.0
	600 °C		1.50	2.02	1.75	2.40	2.90	1.69
Thermal	1,000 °C	_	1.50	2.12	1.98	2.50	2.90	1.82
ty [W/mK]	1,200 °C	-	1.80	2.32	2.24	2.60	3.00	1.97
	1,400 °C		2.00	2.64	2.53	2.70		2.07

LIGHTWEIGHT REFRACTORY BRICKS





LIGHTWEIGHT REFRACTORY BRICKS

DESIGNATI	ON	PORRATH 900	PORRATH FL 24-06	PORRATH FL 24-10	PORRATH FL 25-08	PORRATH FL 25-10	PORRATH FL 25-12
Raw mater	ial base	Calcium/ aluminum silicate	Aluminum silicate	Aluminum silicate	Aluminum silicate	Aluminum silicate	Aluminum silicate
Classificati temperatu	on re [°C]	900	1,350	1,350	1,380	1,400	1,400
ASTM grou	р	-	-	-	-	-	-
Apparent d cm³]	lensity [g/	0.45	0.64	1	0.8	1	1.15
Cold compr strength [N	ession 1Pa]	1	1.2	8	4	8	8
Permanent in length [9	t change %]	1,420 °C/ 24 h -0.3	1,320 °C/ 12 h -0.7	1,320 °C/ 12 h -0.1	1,320 °C/ 12 h -0.9	1,320 °C/ 12 h -0.9	1,320 °C/ 12 h -0.5
Chemical	Al ₂ O ₂	15	37	39	38	40	48
analysis	SiO ₂	60	56	55	55	54	47
[%]	Fe ₂ 0 ₃	4	1.9	1.9	2.2	2.3	1.8
DESIGNAT	ION	PORRATH FL 26-08	PORRATH FL 27-12	PORRATH FL 28-09	PORRATH FL 30-11	PORRATH FL 33-13	PORRATH FL 34-15

DESIGNATIO	N	FL 26-08	FL 27-12	FL 28-09	FL 30-11	FL 33-13	FL 34-15
Raw materia	l base	Aluminum silicate	High-alumina clay	Aluminum silicate	Aluminum silicate	Hollow sphere corundum	Hollow sphere corundum
Classification temperature	n e [°C]	1,430	1,500	1,540	1,650	1,800	1,840
ASTM group		26	-	28	30	33	34
Apparent de cm ³]	nsity [g/	0.8	1.2	0.9	1.1	1.35	1.55
Cold compressure strength [MI	ssion Pa]	3.5	15	4	5	12	10
Permanent of in length [%	:hange]	1,400 °C/12 h -0.5	1,500 °C/12 h -1.4	1,510 °C/12 h -0.7	1,620 °C/12 h -1.1	1,620 °C/12 h 0.4	1620 °C/12 h -0.3
Chemical	Al ₂ O ₃	52	64	66	72	91	99
analysis	SiO ₂	44	31	31	27	8	0.4
[%]	Fe ₃ O ₃	1.1	1.3	0.8	0.3	0.2	0.1

HIGH TEMPERATURE WOOL





HIGH-TEMPERATURE WOOL

DESIGNATION	N	ALSITRA Mat 1250	ALSITRA Mat 1300	ALSITRA Mat 1400	ALSITRA Mat 1400 Z	ALTRA Mat 72
Raw materia	l base	Calcium/ magnesium silicate	Aluminum silicate	Aluminum silicate	Aluminum- zirconium silicate	Aluminum silicate
Classification temperature	າ [°C]	1,250	1,300	1,400	1,400	1,650
Continuous u temperature	ise [°C]	1,100	<1,150	<1,250	<1,300	1,600
	1,100 °C	-	-2	-	-1	-
Permanent	1,200 °C	-	-3	-2	-1.6	-
change	1,300 °C	1,250 °C/-3,0	-4	-3	-3.2	-
in length	1,400 °C	-	-	-4	-4	-
[%]	1,500 °C	-	-	-	-	-1
	1,600 °C	-	-	-	-	-2.0/1,650 °C/-4.0
Chamical	Al ₂ O ₃	-	48	54	37	72
analysis	SiO ₂	70-80	52	46	48	28
[%]	CaO/MgO	18-25	-	-	-	-
	ZrO ₂	-	_	-	15	-
Thermal	400 °C	-	0.11	0.11	0.08	0.09
conductivity	600 °C	0.14	0.15	0.15	0.12	0.13
[W/MK]	800 °C	0.23	0.21	0.21	0.18	0.19
(hot wire	1,000 °C	0.34	0.31	0.31	0.20	0.28
DIN EN 993-	1,200 °C	0.48	0.44	0.44	0.36	0.41
14	1,400 °C	-	0.64	0.64	-	0.61

VACUUM MOLDED PARTS





ALTRAFORM - KVS

PROPERTIES		KVS 174/400	KVS 184/400
Raw material base		Aluminum	oxide wool
Classification temperatur	e [°C]	1,600	1,800
Continuous use temperat	ure [°C]	1,700	1,800
Apparent density [kg/m³]		400	400
Permanent	1,400 °C/24 h	-	-
change in length [%]	1,500 °C/24 h	-	-0.1
DIN EN 1094-6	1,600 °C/24 h	0.2	-0.4
	1,700 °C/24 h	-0.3	-0.8
Chemical analysis [%]	Al ₂ O ₃	79	78
DIN EN 955-2; 4	SiO ₂	21	22
	ZrO ₂	-	-
Thermal conductivity	400 °C	0.15	0.17
[W/mK]	600 °C	0.18	0.19
(hot wire method)	800 °C	0.21	0.22
DIN EN 993-14	1,000 °C	0.24	0.25
	1,200 °C	0.28	0.29
	1,400 °C	0.35	0.33

KERFORM - KVS

PROPERTIES (dry)		KVS 121	КVS 141	KVS 161
Raw material base		Alumi	num silicat	te wool
Classification temperatu	ıre [°C]	1,250	1,400	1,600
Continuous use tempera	ature [°C]	1,150	1,300	150
Apparent density [kg/m	³]	300	300	300
Permanent	1,000 °C/24 h	_	_	
change in length [%]	1,100 °C/24 h	-2.9	-1.6	-
DIN FN 1094-6	1,250 °C/24 h	-3.7	-2.5	-
DIVENTOST 0	1,300 °C/24 h		-3.7	-
	1,400 °C/24 h	-	-	-2.0
	1,500 °C/24 h	-	-	-2.0
	1,600 °C/24 h	-	-	-3.0
Chemical analysis [%]	Al ₂ O ₃	50	5	65
DIN EN 955-2; 4 after burnoff	SiO ₂	49	44	34
Thermal conductivity	200 °C	0.09	-	_
[W/mK]	400 °C	0.12	0.12	0.17
(hot wire method)	600 °C	0.15	0.15	0.18
DIN EN 993-14	800 °C	0.19	0.19	0.20
	1,000 °C	0.25	0.24	0.26
	1,200 °C	0.35	0.31	0.34
	1,400 °C	-	0.40	0.44

EVAC - EVF, EV, EVS, CS

PROPERTIES (dry)		121	131	151
Raw material base		Alkalin	e earth silic	ate wool
Classification temperat	ure [°C]	1,150	1,300	1,600
Maximum application te	mperature [°C]	-	1,280	1,500
Apparent density [kg/n	n³]	300	320	700
Permanent	1,000 °C/24 h	_	-1.8	-0.4
change in length [%]	1,100 °C/24 h	<= 4	-2.2	-0.8
DIN EN 1094-6	1,200 °C/24 h			-1.5
	1,300 °C/24 h		-3.9	-
	1,400 °C/24 h	-	-	-
	1,500 °C/24 h	-	-	-2.9
	1,600 °C/24 h	-	-	-
Chemical analysis [%]	SiO ₂	76	79	3
DIN EN 955-2; 4	Al ₂ O ₃	2	2	63
	CaO+MgO	22	19	24
Thermal conductivity	200 °C	0.08	-	-
[W/mK]	400 °C	0.09	-	-
(bot wire method)	600 °C	0.13	-	0.17
DIN EN 993-14	800 °C	0.19	-	0.22
	1,000 °C	0.27		0.27
	1,200 °C	_	-	0.34

KERFORM - KVF, KV

PROPERTIES (dry)	KV 121	KVF 121	KVF 141
Raw material base		Aluminu	m silicate w	ool, Altra
Classification temp	erature [°C]	1,250	1,250	1,400
Continuous use ten	nperature [°C]	1,150	1,150	1,300
Apparent density [kg/m³]	250	>160	>160
Permanent	900 °C/24 h	-1.0	-1.0	-
change in length	1,000 °C/24 h	-2.0	-2.0	-1.0
[%]	1,100 °C/24 h	-3.0	-3.0	-2.0
DIN EN 1094-6	1,250 °C/24 h	-	-	-3.0
	1,400 °C/24 h	-	-	-
Chemical analysis	Al ₂ O ₃	39	46	48
[%] DIN EN 955-2; 4	SiO ₂	60	53	52
Thermal	400 °C	0.06	0.07	0.07
conductivity	600 °C	0.10	0.12	0.12
[W/mK]	800 °C	0.15	0.18	0.18
(hot wire method)	1,000 °C	0.22	0.25	0.25
DIN EN 993-14	1,200 °C	0.39	0.35	0.35
	1,400 °C	_	-	0.48

INDUSTRIES AND APPLICATIONS



Forging furnace



Glass production



Aluminum smelting furnaces

Thanks to their many successfully completed projects, RATH employees can draw on a huge wealth of experience and expertise when developing and planning fireproof liners.

RATH HAS EXPERIENCE AND KNOW-HOW IN SPECIFIC INDUSTRIAL APPLICATIONS

Metal industry	Petrochemical industry, chemistry	Energy & environmental technology	Tiled stoves and domestic fireplaces
 Metallurgic heating furnaces Thermal treatment furnaces Aluminum smelting furnaces Direct reduction systems Hot-gas filtration 	 Carbon reactors Reformers and cracking furnaces Chlorine reactors Sulfur recovery systems Hot-gas filtration 	 Biomass furnaces Wood gasifiers, grate furnaces Hot gas production Fluidized bed reactors Rotary kilns Waste incinerators Heat exchangers Hot-gas filtration 	 Complete furnace systems Biological combustion chamber plus Exhaust systems Combustion chamber liners Doors with view pane Refractory mortar and adhesives
Ceramic industry	Special furnace construction	Glass industry	
 Technical ceramics, sanitary ceramics, ceramic tableware, fireproof ceramics Tunnel furnaces Rotary furnaces Bell furnaces 	 Laboratory furnaces Dental furnaces Analysis devices 	 Regenerator chambers Melting tanks Work tanks Forehearth Basin for glass work 	

IN-HOUSE PRODUCTION AT THE HIGHEST LEVEL OF QUALITY



Seven production locations in Europe and America are in constant communication in order to sustainably optimize production processes and create the best-possible products.

At RATH, quality isn't just a buzzword; it's our corporate culture. Every employee at RATH strives to achieve the best solution–and is only satisfied when they've done so.



RATH GROUP

OUR SALES OFFICES

AUSTRIA RATH AG Walfischgasse 14 A-1015 Vienna T: +43 (1) 513 44 27-0

F: +43 (1) 513 44 27-2187 AUG. RATH JUN. GMBH Hafnerstrasse 3

A-3375 Krummnussbaum T: +43 (2757) 2401-0 F: +43 (2757) 2401-2286

RATH FILTRATION GMBH Walfischgasse 14 A-1015 Wien T +49 (3521) 46 45-10

 HUNGARY

 RATH HUNGARIA KFT.

 Porcelán utca 1

 H-1106 Budapest

 T:
 +36 (1) 433 00 40

 F:
 +36 (1) 261 90 52

POLAND RATH POLSKA SP. Z O.O. ul. Budowlanych 11

PL-41 303 Dąbrowa Górnicza

- T: +48 (32) 268 47-01
- F: +48 (32) 268 47-02

GERMANY RATH GMBH Ossietzkystrasse 37/38 D-01662 Meissen T: +49 (3521) 46 45-0

F: +49 (3521) 46 45-88

Krefelder Strasse 680-682 D-41066 Mönchengladbach T: +49 (2161) 96 92-0 F: +49 (2161) 96 92-61

Leulitzer Strasse 6A D-04828 Bennewitz

T: +49 (3425) 89 48-0 F: +49 (3425) 89 48-4313

CZECH REPUBLIC

RATH ŽÁROTECHNIKA SPOL. S.R.O. Vorlesská 290 CZ-544 01 Dvůr Králové n. L. T: +420 (499) 32 15 77 F: +420 (499) 32 10 03

UKRAINE RATH UKRAINA wul. Kosmitschna 49 B

49040 Dnepropetrowsk T +380 (56) 785-30-35 F +380 (56) 785-30-36

+380 (56) 785-30-36

USA

RATH USA INC. **290 Industrial Park Drive Milledgeville, GA 31061, USA** T: +1 (478) 452 00-15 F: +1 (478) 452 00-70 **BOO Ruthar Drive Suite 1 Newark, DE 19711, USA** T: +1 (302) 294 44-46 F: +1 (302) 294 44-51

MEXICO

RATH GROUP S. DE R. L. DE C.V. **Av. Adolfo Ruiz Cortines #2700-14 Col. La Esperanza CP 67192, Guadalupe N.L. Mexico** T: +52 81 14 31 15 90

All displayed information here is just for your orientation and is not legally or technically binding. All presented figures of properties are not valid for calculation of industrial facilities. Any decisions based on the displayed information lies within the responsibility of the decision maker. The rights to changes and misprints are reserved.