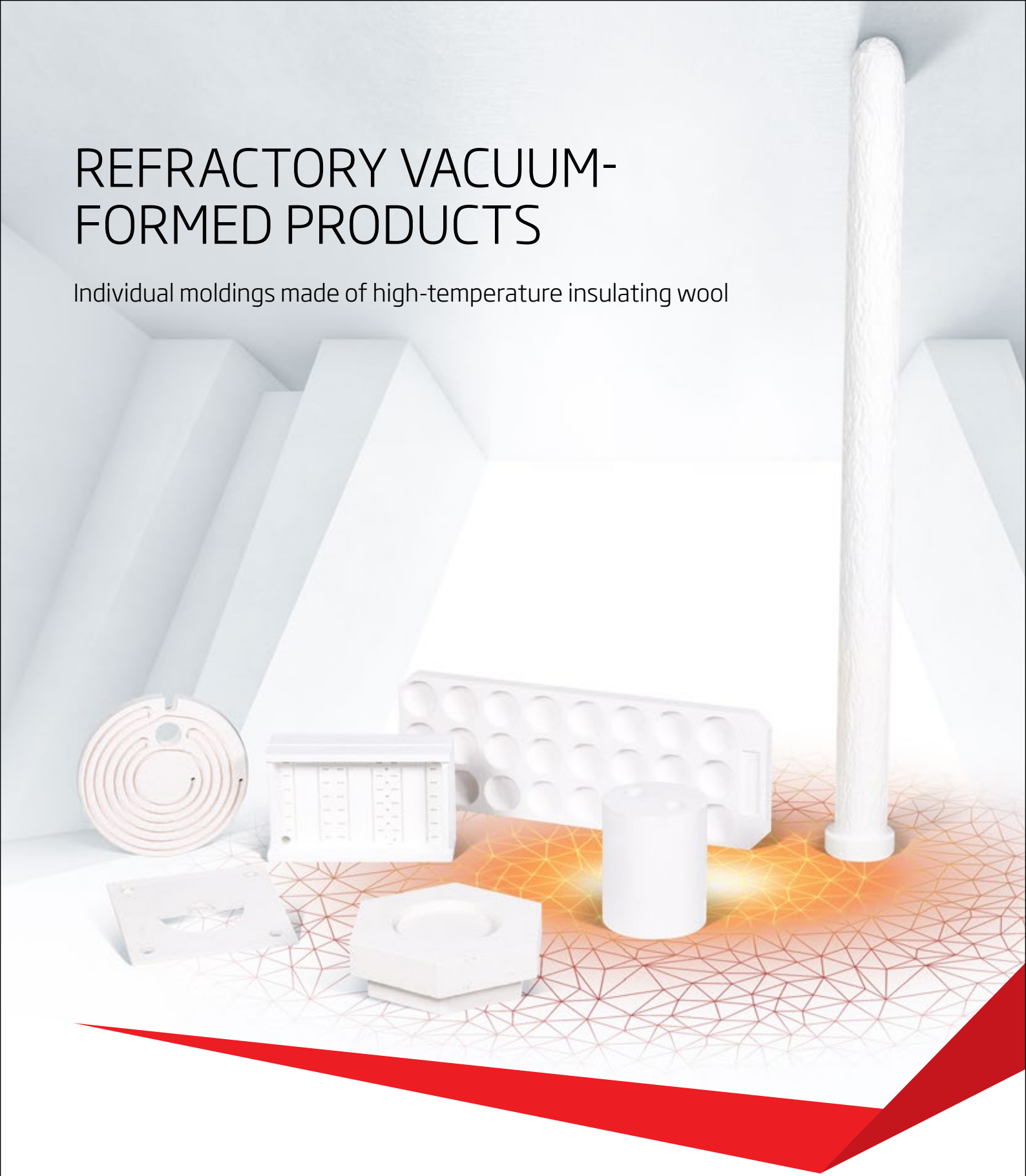
REFRACTORY VACUUM-FORMED PRODUCTS

Individual moldings made of high-temperature insulating wool



www.rath-group.com

OUTSTANDING INSIDE
Refractory Solutions®

RATH

Vacuum-formed products made of high-temperature insulating wool comprise organic and inorganic binders as well as fillers.

SPECIAL CHARACTERISTICS

- Very good thermal insulation properties
- High temperature resistance
- High thermal shock resistance
- Low bulk density
- Low heat storage capacity
- Good corrosion resistance
- Precise moldings with low tolerances

TYPICAL APPLICATIONS

- Thermal insulation in dental, laboratory and industrial furnaces
- Backing insulation in boilers
- Vacuum furnaces
- Hardening furnaces
- Microwave furnaces
- Seals
- Compensating joints
- Casting channels, tubes and crucibles
- Kiln furniture
- Thermal insulation with integrated heating elements
- Hot-gas filtration

Refractory vacuum-formed products made of high-temperature insulating wool

The moldings are produced from high-quality mineral or high-temperature insulating wool using the vacuum molding process. Upon request, the products can be fired, surface-hardened or through-hardened.

THE ADVANTAGES OF VACUUM-FORMED PRODUCTS MADE OF HIGH-TEMPERATURE INSULATING WOOL

- Product characteristics and product shapes are adapted to the customer's requirements.
- Low heat storage capacity and excellent thermal shock resistance permit steep heating and cooling curves and short firing cycles.
- Long service life thanks to high chemical and thermal stability.
- Production of moldings and plates made of non-classified high-temperature insulating wool up to 1800 °C.

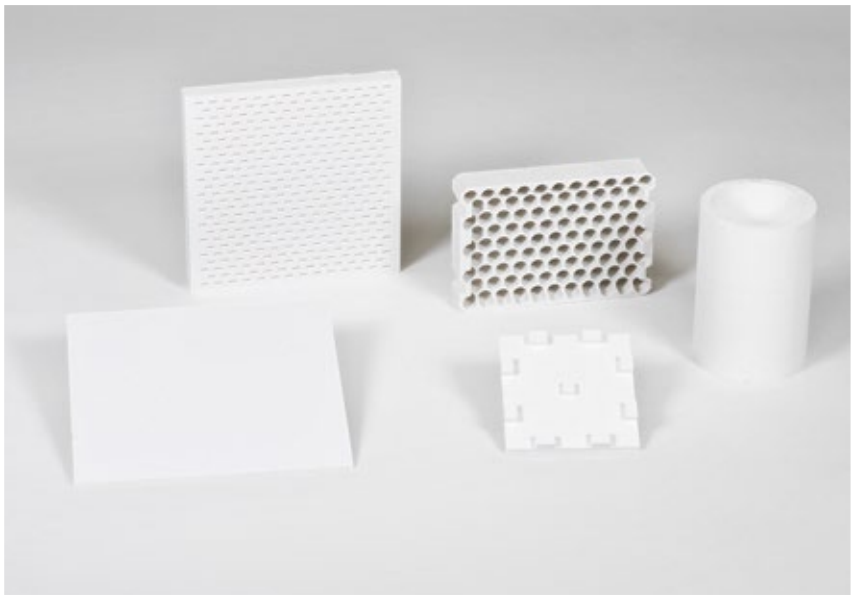
PRODUCT DESIGNATION

The information to be found in the product designation is explained using the example of ALTRAFORM® KVS 161:

KVS	F = flexible variant S = produced with organic components R = suitable for reducing furnace atmospheres
16	1600 °C classification temperature (1/100 °C)
161	dried
164	fired
165	fired and surface-hardened

ALTRAFORM®

ALTRAFORM moldings are made of polycrystalline wool of high purity with an alumina content greater than 72 %, and inorganic binders.



ALTRAFORM moldings

ALTRAFORM offers best corrosion and thermal shock resistance. This permits extremely short firing cycles, among others things.

Only the use of vacuum-formed products as refractory lining allows the design and construction of furnace types that would otherwise not be feasible. This applies to design, size, and intended use. Shortest oven cycles with cold-cold times of 20 minutes are possible.

TYPICAL APPLICATIONS

- Thermal insulation in industrial furnaces
- Thermal insulation in thermal analyzers
- Foundry equipment
- Accessories for glass furnaces
- Sealing material
- Kiln furniture

ALTRAFORM - KVS

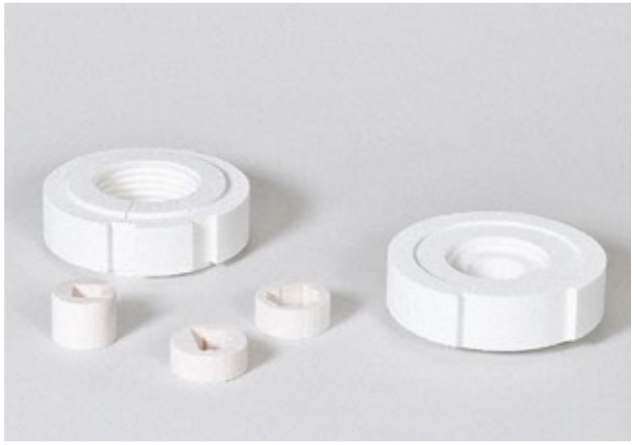
PROPERTIES		KVS 164/302	KVS 174/400	KVS 174/400-HF	KVS 174/700	KVS 184/400	KVS 184/700
Raw material base				Alumina wool			
Classification temperature [°C]		1600	1700	1700	1700	1800	1800
Application temperature [°C]		1600	1700	1700	1700	1800	1800
Bulk density [kg/m³]		300	400	400	700	400	700
Permanent length change [%] DIN EN 1094-6	1400 °C/24 h	0.0	-	-	-0.5	-	-
	1500 °C/24 h	0.5	-	-	-0.5	-0.1	-0.2
	1600 °C/24 h	1.0	0.2	-0.2	-	-0.4	-0.4
	1700 °C/24 h	-	-0.3	0.2	-	-0.8	-0.9
Chemical analysis [%] DIN EN 955-2; 4	Al_2O_3	74	79	79	84	78	82
	SiO_2	26	21	21	16	22	18
	ZrO_2	-	-	-	-	-	-
Thermal conductivity [W/mK] (hot-wire method) DIN EN 993-14	400 °C	0.11	0.15	0.15	0.16	0.17	0.28
	600 °C	0.14	0.18	0.18	0.18	0.19	0.29
	800 °C	0.18	0.21	0.21	0.21	0.22	0.31
	1000 °C	0.23	0.24	0.24	0.33	0.25	0.33
	1200 °C	0.28	0.28	0.28	0.35	0.29	0.35
	1400 °C	0.34	0.35	0.35	0.38	0.33	0.38

ALTRAFORM - KVF, KVR

PROPERTIES		KVF 161	KVF 161 HA	KVR 164/300	KVR 164/502	KVR 164/702	KVR 174/502
Raw material base				Alumina wool			
Classification temperature [°C]		1600	1600	1600	1600	1600	1700
Application temperature [°C]		1500	1500	1550	1550	1550	1650
Bulk density [kg/m³]		>100	>100	360	500	700	500
Permanent length change [%] DIN EN 1094-6	1400 °C/24 h	-1.0	-1.5	-1.1	-	-	-
	1500 °C/24 h	-2.0	-2.8	-2.7	-0.2	-0.1	0.0
	1600 °C/24 h	-	-	-4.5	-0.5	-0.4	-0.2
	1700 °C/24 h	-	-	-	-	-	-0.5
Chemical analysis [%] DIN EN 955-2; 4	Al_2O_3	73	94	95	98	98	98
	SiO_2	27	6	5	2	2	2
	organic ingredients	5	5	0	0	0	0
Thermal conductivity [W/mK] (hot-wire method) DIN EN 993-14	400 °C	0.07	0.08	0.13	0.18	0.20	0.21
	600 °C	0.12	0.15	0.16	0.19	0.22	0.24
	800 °C	0.18	0.24	0.21	0.21	0.24	0.28
	1000 °C	0.25	0.34	0.24	0.24	0.26	0.32
	1200 °C	0.35	0.56	0.38	0.29	0.29	0.36
	1400 °C	0.48	0.84	0.46	0.32	0.33	0.41

KERFORM®

KERFORM vacuum-formed products are made of high-quality aluminum silicate wool.



KERFORM moldings

KERFORM has high chemical resistance, with the exception of hydrofluoric acid, phosphoric acid, and strong alkalis. By different finishing classes, the moldings can be adapted to the application conditions.

The maximum classification temperature is, depending on the type, between 1000 °C and 1600 °C.

TYPICAL APPLICATIONS

- Thermal insulation in industrial furnaces
- Thermal insulation in thermal analyzers and laboratory furnaces
- Thermal insulation in dental furnaces
- Foundry equipment
- Accessories for feeder covers
- Sealing material
- Kiln furniture

KERFORM - KVS

PROPERTIES		KVS 121 (dried)	KVS 124 (fired)	KVS 141 (dried)	KVS 144 (fired)	KVS 161 (dried)	KVS 164 (fired)
Raw material base				Aluminium silicate wool			
Classification temperature [°C]		1250	1250	1400	1400	1600	1600
Application temperature [°C]		1150	1150	1300	1300	150	1500
Bulk density [kg/m³]		300	300	300	300	300	300
Permanent length change [%] DIN EN 1094-6	1000 °C/24 h	-	-	-	-	-	-
	1100 °C/24 h	-2.9	-2.0	-1.6	-1.0	-	-
	1250 °C/24 h	-3.7	-3.0	-2.5	-2.0	-	-
	1300 °C/24 h			-3.7	-3.0	-	-
	1400 °C/24 h	-	-	-	-	-2.0	-1.0
	1500 °C/24 h	-	-	-	-	-2.0	-1.0
	1600 °C/24 h	-	-	-	-	-3.0	-2.5
Chemical analysis [%] DIN EN 955-2; 4 after burnout	Al_2O_3	50	50	55	55	65	65
	SiO_2	49	49	44	44	34	34
Thermal conductivity [W/mK] (hot-wire method) DIN EN 993-14	200 °C	0.09	0.09	-	-	-	-
	400 °C	0.12	0.12	0.12	0.12	0.17	0.11
	600 °C	0.15	0.15	0.15	0.15	0.18	0.15
	800 °C	0.19	0.19	0.19	0.19	0.20	0.20
	1000 °C	0.25	0.25	0.24	0.24	0.26	0.26
	1200 °C	0.35	0.35	0.31	0.31	0.34	0.34
	1400 °C	-	-	0.40	0.40	0.44	0.44

KERFORM - KVF, KV

PROPERTIES		KV 121 (dried)	KVF 121 (dried)	KVF 141 (dried)	KVF 151 (dried)
Raw material base			Aluminum silicate wool, Altra		
Classification temperature [°C]		1250	1250	1400	1500
Application temperature [°C]		1150	1150	1300	1400
Bulk density [kg/m³]		250	> 160	> 160	> 140
Permanent length change [%] DIN EN 1094-6	900 °C/24 h	-1.0	-1.0	-	-
	1000 °C/24 h	-2.0	-2.0	-1.0	-
	1100 °C/24 h	-3.0	-3.0	-2.0	-1.0
	1250 °C/24 h	-	-	-3.0	-2.0
	1400 °C/24 h	-	-	-	-3.0
Chemical analysis [%] DIN EN 955-2; 4	Al_2O_3	39	46	48	54
	SiO_2	60	53	52	46
Thermal conductivity [W/mK] (hot-wire method) DIN EN 993-14	400 °C	0.06	0.07	0.07	0.07
	600 °C	0.10	0.12	0.12	0.12
	800 °C	0.15	0.18	0.18	0.18
	1000 °C	0.22	0.25	0.25	0.25
	1200 °C	0.39	0.35	0.35	0.35
	1400 °C	-	-	0.48	0.48

EVAC®

EVAC vacuum-formed products are produced from non-classified alkaline earth silicate wool* of high quality, fillers, and organic as well as inorganic binders.

The high-temperature insulating wool used in this product is not classified. Various finishing classes determine the applicability of the moldings, which can be used only in dry and non-corrosive atmospheres.

The max. classification temperature reaches, depending on the grade, up to 1600 °C. Due to the characteristics of the wool, usability is to be checked carefully for any application at more than 1000 °C. EVAC is available in plate form as well as in customer-specific geometries.

EVAC moldings

TYPICAL APPLICATIONS

- Thermal insulation in boiler systems and household appliances
- Thermal insulation for thermal analyzers and laboratory furnaces
- Thermal insulation in industrial furnaces
- Sealing material

EVAC - EVF, EV, EVS, CS

PROPERTIES		EVS 121 (dried)	EVS 131 (dried)
Raw material base		Alkaline earth silicate wool	
Classification temperature [°C]		1150	1300
Maximum application temperature [°C]		-	1280
Bulk density [kg/m³]		300	320
Permanent length change [%] DIN EN 1094-6	1000 °C/24 h	-	-1.8
	1100 °C/24 h	≤ 4	-2.2
	1200 °C/24 h	-	-
	1300 °C/24 h	-	-3.9
	1400 °C/24 h	-	-
	1500 °C/24 h	-	-
	1600 °C/24 h	-	-
Chemical analysis [%] DIN EN 955-2; 4	SiO_2	76	79
	Al_2O_3	2	2
	CaO+MgO	22	19
Thermal conductivity [W/mK] (hot-wire method) DIN EN 993-14	200 °C	0.08	-
	400 °C	0.09	-
	600 °C	0.13	-
	800 °C	0.19	-
	1000 °C	0.27	-
	1200 °C	-	-

NEWVAC®

NEWVAC moldings are prepared from high-quality mineral wool, fillers, and organic and inorganic binders.

NEWVAC moldings

The wool used for this product is not classified according to K0*. Various finishing classes determine the applicability of the moldings, which can be used only in dry and non-corrosive atmospheres.

The maximum application temperature is, depending on the grade, between 600 °C and 1000 °C. Newvac is available in plate form as well as in customized geometries as moldings.

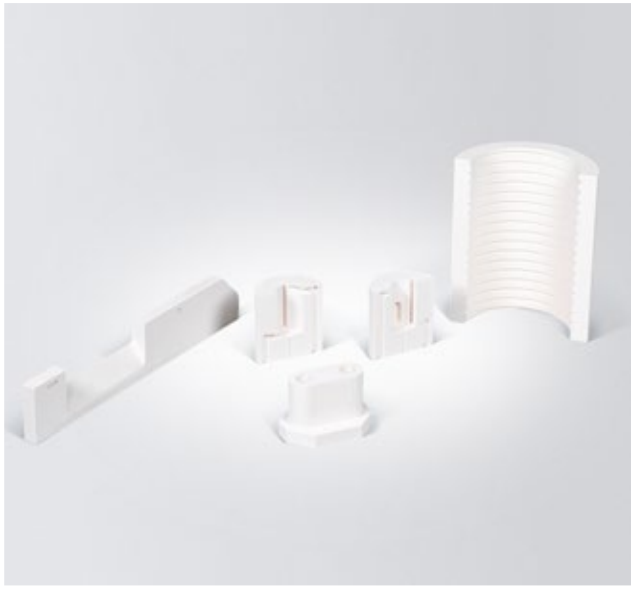
TYPICAL APPLICATIONS

- Thermal insulation in boiler systems and household appliances
- Thermal insulation for thermal analyzers and laboratory furnaces
- Sealing material

*) Contains no fibers classified as hazardous substances according to directives REACH 1272/2008 and EU 97/548/EEG

ULTIFORM®

ULTIFORM is a new high-performance insulating material consisting of non-classified polycrystalline wool, fillers, and organic as well as inorganic binders.



ULTIFORM moldings

ULTIFORM has excellent corrosion resistance, very low thermal conductivity and good thermal shock resistance.

The vacuum-formed products can be easily processed and have a very smooth surface. Various finishing classes determine the applicability of the vacuum-formed products. The maximum classification temperature is 1400 °C.

TYPICAL APPLICATIONS

- Thermal insulation in laboratory furnaces
- Thermal insulation in thermal analyzers
- Thermal insulation in dental furnaces
- Thermal insulation in industrial furnaces
- Foundry equipment
- Kiln furniture

ULTIFORM

PROPERTIES		UVS 141 (dried)	UVS 144 (fired)	UVS 145 (fired)
Raw material base			Polycrystalline wool	
Classification temperature [°C]		1400	1400	1400
Application temperature [°C]		1350	1350	1350
Bulk density [kg/m³] EN 1094-4		>300	>300	>350
Permanent length change [%] EN 1094-6	1000°C/24h	-	-	-
	1100°C/24h	-0.5	-0.3	-0.3
	1250°C/24h	-0.8	-0.5	-0.5
	1400°C/24h	-1.4	-1.0	-1.0
Chemical analysis [%] EN ISO 21587-2	Al_2O_3	67	67	55-65
	SiO_2	32	32	35-45
Thermal conductivity [W/mK] (hot-wire method) EN ISO 8894-1	200°C	-	-	-
	400°C	0.11	0.11	0.15
	600°C	0.14	0.15	0.20
	800°C	0.19	0.19	0.25
	1000°C	0.24	0.25	0.30
	1200°C	0.31	0.30	0.35
	1400°C	-	-	0.45

FILTRATH®

FILTRATH filter elements have been specially developed for use in hot-gas filtration up to 1000 °C.

FILTRATH filter element

They are made of high-temperature insulating wool, are therefore very lightweight, and have a very favorable differential pressure behavior due to their high porosity.

Their excellent separation performance meets the most stringent emission requirements.

ADVANTAGES

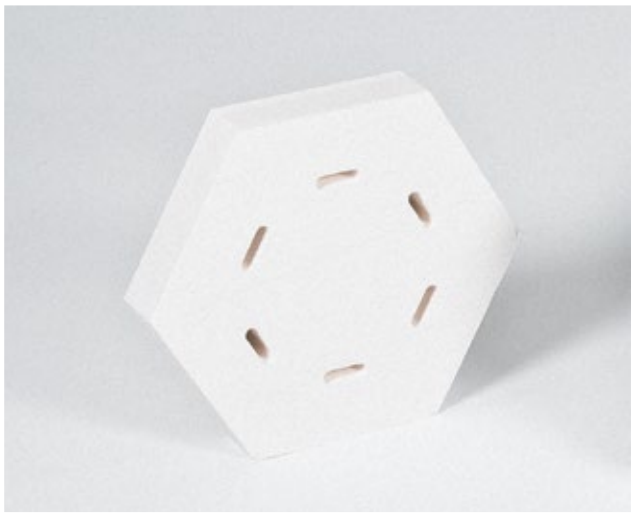
- Resistant to high temperature
- 100% spark-resistant
- Lightweight
- Robust
- Highly efficient
- Emission values < 1 mg/m³

APPLICATIONS

- Waste incineration plants
- Power plant processes and combustion plants
- Pyrolysis and gasification processes
- Production and recovery of powdered materials (e.g. glass and metal melting)
- Brick cooling in the cement industry
- Production of plastics

ACS
ALTRA® COMPOSITE SYSTEM

The lining system ACS consists of laminated composite moldings, from which insulations in high-temperature furnaces can be easily built with low installation effort.



ACS ALTRA COMPOSITE SYSTEM Moldings

The refractory materials can be combined in such a way that a lining with optimized thermal, physical, and chemical properties is produced.

Thus, the particular requirements e.g. for the furnace roof, the furnace walls or the furnace floor can be met flexibly and effectively.

ADVANTAGES

- Individual furnace sizes and formats are possible
- Higher throughput due to rapid oven cycles
- Long-term penetration safety
- Stability of the construction, even in case of material cracks
- Repair of individual segments may be possible
- Efficient energy use
- Overall higher productivity

APPLICATIONS

- Laboratory furnaces
- Industrial production furnaces for:
  - Ceramics,
  - electronics and
  - medical devices

KERASETTER®

KERASETTER plates are made of high-quality aluminum silicate and alumina wools, fillers, organic and inorganic binders.

KERASETTER plates

KERASETTER products are used as kiln furniture in the dental, electronics and ceramics industries and as construction materials for furnaces and laboratory equipment.

ADVANTAGES

- High density
- High mechanical durability
- Can be used as construction material

KERATHIN® K

KERATHIN K is used for bonding high-temperature insulating wool and vacuum-formed products.

KERATHINE K product range

It can be used for all other insulation materials as well. The properties are adapted to the particularly lightweight materials.

In-house production of highest quality

Eight production sites on three continents are in constant exchange for the sustainable optimization of production processes to manufacture the best products possible.

At Rath, quality is not a buzzword but living corporate culture. Every employee at Rath is personally motivated to strive for the optimal solution – incessantly until it is found.

VFT/202507/1000/EN

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