



High temperature insulation wool



Insulating fire bricks



Vacuum-formed products



Shaped refractory products



Unshaped refractory products

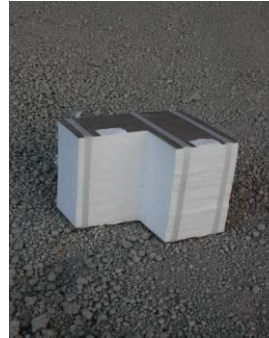
RATH

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High-temperature insulation wool



With high-temperature insulation wool from Rath, we are able to offer ultra-light and efficient refractory solutions for the most varied fields of application, wherever special demands and high temperatures up to 1650°C are encountered.

Our high-temperature insulation wool modules are tailored to the needs of the customer and are especially proven in discontinuously operated industrial kilns, incinerators and special applications.

Thanks to its excellent properties, high-temperature insulation wool boasts extraordinary cost and energy-saving potential. Compared to other refractory materials, it is more economical and more environment-friendly. It stands out through ease of installation and repair, reduced maintenance costs, faster kiln cycles, high resistance to temperature changes, low heat conductivity, high chemical resistance, reduced gas consumption and lower CO₂ emission.

Calsitra Resistant up to 900°C

Calsitra is used up to temperatures of max. 900 °C. The raw materials are alkaline and alkaline-earth silicates.

Consequently, its range of application is limited.

Alsitra Universal up to 1300°C

The range of application of Alsitra covers temperatures up to 1300°C, above all in industrial kiln construction.

Alsitra is manufactured by blow-moulding. Thanks to high-purity raw materials and a high content of aluminium oxide of up to 54 %, it can be used in almost all fields of application up to 1300 °C.

Altra Excellent up to 1650°C

Altra is a high-purity, polycrystalline wool with excellent thermal and mechanical properties.

Altra is manufactured in three product variants using the sol-gel process, with an aluminium oxide content of 72, 80 or 97 %.

The products can be used for a wide range of high-temperature applications up to 1650 °C.

High-temperature insulation wool



High temperature insulation wool

Basic raw material: Aluminium silicate, alumina, magnesium silicate

Properties		Alsitra 1300	Alsitra 1400	Alsitra 1400Z	Altra B 72	Altra B 80	Altra B 97 HA	AES Wolle MS 1260/1
Classification temperature:		1300°C	1400°C	1400°C	1650°C	1600°C	1600°C	1260°C
Continuous application temperature:		<1150°C	<1250°C	<1300°C	1600°C	1600°C	1600°C	<1150°C
Average fibre diameter:		1,5 – 3,5µm	1,5 – 3,5µm	2 – 3µm	2 – 4µm	2 – 4µm	2 – 4µm	6 – 9µm
Fiber density: [g/cm³]/		2,6	2,6	-	3,3	3,3	3,3	2,6
Permanent linear change: (after 24h at:)	1100°C	-2,0%	-	-	-	-	-	-1,5%
	1200°C	-3,0%	-2,0%	-1,0%	-	-	-	-3,0%
	1300°C	-4,0%	-3,0%	-1,6%	-	-	-	-
	1400°C	-	-4,0%	<-4,0%	-	-1,0%	-2,0%	-
	1500°C	-	-	-	-1,0%	-2,0%	-3,0%	-
	1600°C	-	-	-	-2,0%	-3,0%	-4,0%	-
Chemical analysis: DIN EN 955-2; 4	Al ₂ O ₃	48%	54%	37%	72%	80%	97%	< 2,5%
	SiO ₂	52%	46%	48%	28%	20%	3%	> 78,0%
	-	-	-	ZrO ₂ : 15%	-	-	-	MgO: <19,0%
Thermal conductivity: [W/mK]/ (Hot-wire method) DIN EN 993-14	400°C	0,11	0,11	0,08	0,09	0,09	0,10	0,10
	600°C	0,15	0,15	0,12	0,13	0,13	0,16	0,22
	800°C	0,21	0,21	0,18	0,19	0,19	0,25	0,40
	1000°C	0,31	0,31	0,20	0,28	0,28	0,39	0,62
	1200°C	0,44	0,44	0,36	0,41	0,41	0,62	0,99
	1400°C	0,64	0,64	-	0,61	0,61	0,97	-
At density: [kg/m³]		128	128	128	100	100	100	140



High temperature insulation blanket

Basic raw material: Aluminium silicate, alumina, magnesium silicate

Properties		Calsitra Mat-CMS	Calsitra Mat-MS	Alsitra Mat-1300	Alsitra Mat-1400	Alsitra Mat-1400Z	Altra Mat-72	Altra Mat-80	Altra Mat-97
Classification temperature:		1100°C,	1250°C,	1300°C,	1400°C,	1400°C,	1650°C,	1600°C,	1500°C
Continuous application temperature:		<1000°C*	<1100°C*	<1150°C	<1250°C	<1300°C	1600°C	1600°C	1500°C
Average fibre diameter:		2-4µm	2-4µm	1,5-3,5µm	1,5-3,5µm	2-3µm	2-4µm	2-4µm	2-4µm
Bulk density: [kg/m³]/		96-128	96-128	96-160 ³	96-160	96-160	60-120	60-120	60-100
Permanent linear change: (after 24h at:)	1100°C	<-2,5%	<-2,5%	-2,0%	-	-1,0%	-	-	-
	1200°C	<-4%	<-4%	-3,0%	-2,0%	-1,6%	-	-	-
	1300°C	-	-	-4,0%	-3,0%	-3,2%	-	-	-
	1400°C	-	-	-	-4,0%	<-4,0%	-	-1,0%	-2,0%
	1500°C	-	-	-	-	-	-1,0%	-2,0%	-4,0%
	1600°C	-	-	-	-	-	-2,0%	-3,0%	-5,0%
Chemical analysis: DIN EN 955-2; 4	Al ₂ O ₃			48%	54%	37%	72%	80%	97%
	SiO ₂	50-75%	72-77%	52%	46%	48%	28%	20%	3%
	CaO	>25%	-	-	-	-	-	-	-
	MgO	<1%	19-26%	-	-	-	-	-	-
	ZrO ₂	-	-	-	-	15%	-	-	-
Thermal conductivity: [W/mK]/ (Hot-wire method) DIN EN 993-14	400°C	0,10	0,12	0,11	0,11	0,08	0,09	0,09	0,10
	600°C	0,16	0,16	0,15	0,15	0,12	0,13	0,13	0,16
	800°C	-	0,22	0,21	0,21	0,18	0,19	0,19	0,25
	1000°C	-	0,30	0,31	0,31	0,20	0,28	0,28	0,39
	1200°C	-	-	0,44	0,44	0,36	0,41	0,41	0,62
	1400°C	-	-	0,64	0,64	-	0,61	0,61	0,97
At density: [kg/m³]		128	128	128	128	128	100	100	100

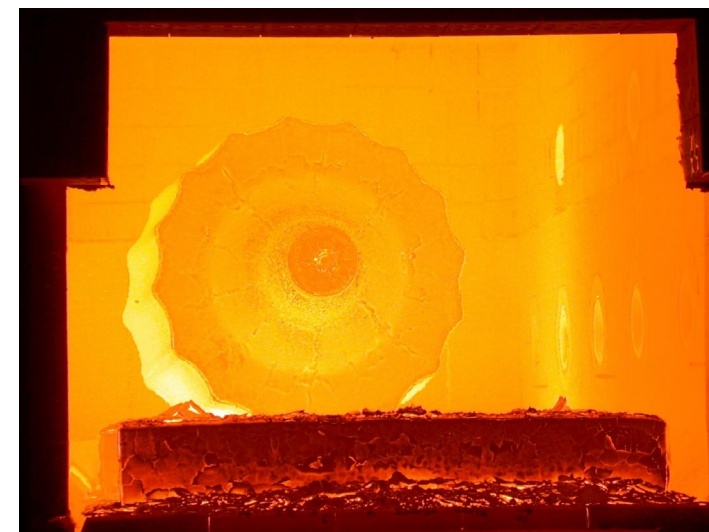
*in not corrosive kiln atmosphere



High temperature paper

Basic raw material: Aluminium silicate, alumina

Properties		Alsitra KP 1250	Alsitra KP 1400	Altra KP 1600
Classification temperature: Continuous application temperature:		1250°C, <1150°C	1400°C, <1250°C	1600°C, <1500°C
Average fibre diameter:		1,5–3,5µm	1,5–3,5µm	2–4µm
Bulk density: [kg/m³]/		>200	>200	>150
Chemical analysis: DIN EN 955-2; 4	Al ₂ O ₃	>46%	>48%	>88%
	SiO ₂	<54%	<52%	<12%
Thermal conductivity: [W/mK]/ (Hot-wire method) DIN EN 993-14	200°C	0,03	0,03	0,12
	400°C	0,05	0,04	-
	600°C	0,08	0,07	0,16
	800°C	0,13	0,11	0,20
	1000°C	0,21	0,18	0,24
	1200°C	-	0,25	0,30
At density: [kg/m³]	1400°C	-	-	0,38
		128		128





Insulating firebricks



Range of Application

With reference to the classification temperature and gross density, our lightweight refractory bricks Alporit and Porrath are designed to cover the full range required for kiln construction. By processing and gluing the bricks we are able to deliver even the most complicated special shapes.

Dimensional tolerances

Dry-pressed bricks	<200mm:	±1.5mm	≥200mm:	±0.75%
Ground bricks	<200mm:	±1.0mm	≥200mm:	±0.75%

Maximum dimensions

Ground insulating firebricks	
Maximum length	610mm
Maximum width	300mm
Maximum height	150mm

Lightweight refractory brick



Insulating fire brick

Basic raw material: Perlite, aluminium silicate

Properties		Porrath 900	Porrath FL 24-06	Porrath FL 24-06-li	Porrath FL 24-10	Porrath FL 25-08	Porrath FL 25-10	Porrath FL 25-13 SF	Porrath FL 26-08
Classification temperature:		900°C	1350°C	1350°C	1350°C	1380°C	1400°C	1400°C	1430°C
ASTM group:		-	-	-	-	-	-	-	26
Bulk density:		0,45g/cm ³	0,60g/cm ³	0,64g/cm ³	1,00g/cm ³	0,80g/cm ³	1,00g/cm ³	1,30g/cm ³	0,80g/cm ³
Cold crushing strength: (DIN EN 1094-5)		1,0MPa	1,2MPa	1,3MPa	8,0MPa	4,0MPa	8,0MPa	12,0MPa	3,5MPa
Permanent linear change:		875°C/24h -0,3%	1320°C/12h -0,7%	1320°C/12h -1,2%	1320°C/12h -0,7%	1350°C/12h -0,9%	1370°C/12h -0,9%	1400°C/12h -0,4%	1400°C/12h -0,5%
Chemical analysis: DIN EN 955-2; 4	Al ₂ O ₃ SiO ₂ Fe ₂ O ₃	15% 60% 4,0%	37% 56% 1,9%	38% 59% 1,0 %	38% 56% 1,8 %	36% 57% 2,2%	38% 56% 2,3%	60% MgO: 7,5% 0,8%	52% 44,0% 1,1%
Thermal conductivity: [W/mK] (hot wire method) DIN EN 993-14	200°C 400°C 600°C 800°C 1000°C 1200°C	0,12 0,14 0,17 0,20 - -	- - 0,28 0,32 0,38 0,43	- - 0,26 0,30 0,35 0,41	- - 0,39 0,44 0,49 0,54	- - 0,36 0,41 0,47 0,50	- - 0,42 0,46 0,50 0,54	- - 0,57 0,61 0,65 0,71	- - 0,36 0,39 0,43 0,48



Insulating fire brick

Basic raw material: Cordierite, aluminium silicate, high alumina fireclay

Properties		Porrath FL 26-09	Porrath FL 27-12	Porrath FL 28-09	Porrath FL 28-10	Porrath FL 30-11	Porrath FL 32-12
Classification temperature:		1430°C	1500°C	1540°C	1540°C	1650°C	1760°C
ASTM group:		26	-	28	28	30	32
Bulk density:		0,90g/cm ³	1,20g/cm ³	0,90g/cm ³	1,00g/cm ³	1,10g/cm ³	1,25g/cm ³
Cold crushing strength: (DIN EN 1094-5)		5,5MPa	15MPa	4MPa	5MPa	5MPa	6MPa
Permanent linear change:		1400°C/12h -0,5%	1500°C/12h -1,4%	1510°C/12h -0,7%	1510°C/12h -0,5%	1620°C/12h -1,1%	1730°C/12h 0,7%
Chemical analysis: DIN EN 955-2; 4	Al ₂ O ₃	49%	64%	63%	66%	74%	87%
	SiO ₂	46%	31%	33%	31%	25%	12%
	Fe ₂ O ₃	1,0%	1,3%	0,8%	0,8%	0,3%	0,2%
Thermal conductivity: [W/mK] (hot wire method) DIN EN 993-14	600°C	0,37	0,52	0,36	0,40	0,44	0,66
	800°C	0,40	0,57	0,38	0,42	0,46	0,67
	1000°C	0,44	0,63	0,41	0,45	0,51	0,71
	1200°C	0,48	0,69	0,45	0,48	0,58	0,77



Insulating fire brick

Basic raw material: Lightweight aggregates, bubble alumina

Properties		Porrath FL 33-13/1	Porrath FL 33-13/2	Porrath FL 34-15/1	Porrath FL 34-15/2
Classification temperature:		1800°C	1800°C	1840°C	1840°C
ASTM group:		33	33	34	34
Bulk density:		1,30g/cm ³	1,30g/cm ³	1,50g/cm ³	1,50g/cm ³
Cold crushing strength: (DIN EN 1094-5)		12MPa	12MPa	12MPa	10MPa
Permanent linear change:		1800°C/24h 0,4%	1800°C/12h 0,4%	1800°C/12h -0,3%	1800°C/12h -0,05%
Chemical analysis: DIN EN 955-2; 4	Al ₂ O ₃	91%	91%	99%	99%
	SiO ₂	8%	8%	0,1%	0,1%
	Fe ₂ O ₃	0,2%	0,2%	0,04%	0,04 %
Thermal conductivity: [W/mK] (hot wire method) DIN EN 993-14	600°C	0,97	1,13	1,40	1,05
	800°C	0,96	1,16	1,32	1,04
	1000°C	0,98	1,19	1,32	1,08
	1200°C	1,04	1,13	1,59	1,20





Refractory mortars and adhesives for insulating fire bricks

Properties		Porrathin 26	Porrathin 30	Porrathin 34	Porrathin 34r	Porrathin HT	Blakite mortar
Raw material base:		aluminium silicate	mullite	corundum	corundum	aluminium silicate	aluminium silicate
Service temperature:		1430°C	1650°C	1850°C	1850°C	-	1650°C
Required material: kg/m ²		4,2	4,5	7,5	7,0	3,5	8,0
Chemical analysis:	Al ₂ O ₃	60%	68%	94%	99%	43%	43%
	SiO ₂	35%	30%	0,5%	0,1%	49%	54%
	Fe ₂ O ₃	0,8%	0,3%	0,6%	0,1%	<1%	1,2%
	NaKO	0,4%	0,4%	-	-	6%	2,8%
	P ₂ O ₅	-	-	4%	-	-	-
Required water (approx.): l/100kg		rfp	rfp	15	13	rfp	rfp

rfp – ready for processing

There are special processing guidelines for all mortars and adhesives! They are available upon request!



Vacuum-formed shapes



Range of Application

Vacuum-formed products made of Altraform, Kerform, Kerasetter and Kerathin are used for thermal insulation in industrial kilns, laboratory furnaces, electric appliances and heating boilers.

Product		Description	Examples of applications
Altraform	KVF	Flexible material	Thermal sealing / thermal insulation
	KVR	Very low SiO ₂ content	Insulation material for high-temperature applications (reduction-resistant)
	KVS	Rigid material	Thermal insulation
Kerform	KVF	Flexible material	Thermal sealing, back-up insulation
	KVS	Rigid material	Thermal insulation
Kerasetter	KVR	High gross density and strength, very low SiO ₂ content	Construction elements or as setter material (reduction-resistant)
	KVS	High gross density and strength	Construction elements or as setter material
Kerathin	P	Plastic	Filling of cracks and gaps in high-temperature insulation wool linings
	K	Glue	Glue for lightweight refractory bricks and high-temperature insulation wool products
	H	Hardener	Hardener for vacuum-formed shapes, erosion protection for high-temperature insulation wool elements

Vacuum-formed shapes



ALTRAFORM - KVF, KVR

Basic raw material: Alumina wool

Properties		KVF 161	KVF 161 HA	KVR 164/242	KVR 164/502	KVR 164/702	KVR 174/502
Classification temperature:		1600°C	1600°C	1600°C	1600°C	1600°C	1700°C
Continous application temperature:		1500°C	1500°C	1550°C	1550°C	1550°C	1650°C
Bulk density:		>100kg/m ³	>100kg/m ³	240kg/m ³	500kg/m ³	700kg/m ³	500kg/m ³
Cold crushing strength: (DIN EN 1094-5) at 10% compression		-	-	0,1MPa	0,4MPa	0,9MPa	0,6MPa
Cold bending strength: (DIN EN 993-6)		-	-	0,5MPa	1,4MPa	2,0MPa	1,6MPa
Permanent linear change: DIN EN 1094-6	1400°C/24h	-1,0%	-1,5%	-	-	-	-
	1500°C/24h	-2,0%	-2,8%	-0,2%	-0,2%	-0,1%	0,0%
	1600°C/24h	-	-	-0,4%	-0,5%	-0,4%	-0,2%
	1700°C/24h	-	-	-	-	-	-0,5%
Chemical analysis: DIN EN 955-2; 4	Al ₂ O ₃	73%	94%	98%	98%	98%	98%
	SiO ₂	27%	6%	2%	2%	2%	2%
	org. components	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	0,28	0,24	0,26	0,32
	1200°C	0,35	0,56	0,36	0,29	0,29	0,36
	1400°C	0,48	0,84	0,46	0,32	0,33	0,41



ALTRAFORM – KVS

Basic raw material: Alumina wool

Properties		KVS 161/301	KVS 161/302	KVS 164/301	KVS 164/302	KVS 174/400	KVS 174/400-HF
Classification temperature:		1600°C	1600°C	1600°C	1600°C	1600°C	1700°C
Continous application temperature:		1500°C	1600°C	1500°C	1600°C	1700°C	1700°C
Bulk density:		300kg/m ³	300kg/m ³	300kg/m ³	300kg/m ³	400kg/m ³	400kg/m ³
Cold crushing strength: (DIN EN 1094-5) at 10% compression		0,4MPa	0,4MPa	0,2MPa	0,2MPa	0,4MPa	0,4MPa
Cold bending strength: (DIN EN 993-6)		1,3MPa	1,3MPa	0,6MPa	0,6MPa	1,1MPa	0,8MPa
Permanent linear change: DIN EN 1094-6	1400°C/24h	-2,0%	-0,3%	-1,0%	0,0%	-	-
	1500°C/24h	-2,0%	0,0%	-1,0%	0,5%	-	-
	1600°C/24h	-3,8%	1,0%	-2,8%	1,0%	0,2%	0,2%
	1700°C/24h	-	-	-	-	-0,3%	0,2%
Chemical analysis: DIN EN 955-2; 4	Al ₂ O ₃	28%	74%	28%	74%	79%	79%
	SiO ₂	20%	26%	20%	26%	21%	21%
	ZrO ₂	51%	-	51%	-	-	-
	org. components	4%	4%	0%	0%	0%	0%
Thermal conductivity: [W/mK] (hot wire method) DIN EN 993-14	400°C	0,12	0,11	0,12	0,11	0,15	0,15
	600°C	0,13	0,14	0,13	0,14	0,18	0,18
	800°C	0,15	0,18	0,15	0,18	0,21	0,21
	1000°C	0,18	0,23	0,18	0,23	0,24	0,24
	1200°C	0,23	0,28	0,23	0,28	0,28	0,28
	1400°C	0,28	0,34	0,28	0,34	0,35	0,35



ALTRAFORM – KVS

Basic raw material: Alumina wool

Properties		KVS 174/700	KVS 174/700-HF	KVS 184/400	KVS 184/400-HF	KVS 184/700	KVS 184/700-HF
Classification temperature:		1700°C	1700°C	1800°C	1800°C	1800°C	1800°C
Continous application temperature:		1700°C	1700°C	1800°C	1800°C	1800°C	1800°C
Bulk density:		700kg/m ³	700kg/m ³	400kg/m ³	400kg/m ³	700kg/m ³	700kg/m ³
Cold crushing strength: (DIN EN 1094-5) at 10% compression		1,5MPa	0,3MPa	0,4MPa	0,5MPa	1,5MPa	0,3MPa
Cold bending strength: (DIN EN 993-6)		1,0MPa	0,7MPa	0,8MPa	0,9MPa	1,0MPa	0,7MPa
Permanent linear change: DIN EN 1094-6	1600°C/24h	-0,5%	0,2%	-	-	-	-
	1700°C/24h	-0,5%	0,2%	-0,1%	0,2%	-0,2%	0,2%
	1750°C/24h	-	-	-0,4%	0,2%	-0,4%	0,2%
	1800°C/24h	-	-	-0,8 %	0,0%	-0,9%	0,0%
Chemical analysis: DIN EN 955-2; 4	Al ₂ O ₃	84%	84%	78%	78%	82%	82%
	SiO ₂	16%	16%	22%	22%	18%	18%
	org. components	0%	0%	0%	0%	0%	0%
Thermal conductivity: [W/mK] (hot wire method) DIN EN 993-14	400°C	0,16	0,16	0,17	0,17	0,28	0,28
	600°C	0,18	0,18	0,19	0,19	0,29	0,29
	800°C	0,21	0,21	0,22	0,22	0,31	0,31
	1000°C	0,33	0,33	0,25	0,25	0,33	0,33
	1200°C	0,35	0,35	0,29	0,29	0,35	0,35
	1400°C	0,38	0,38	0,33	0,33	0,38	0,38



KERFORM – KVF, KV

Basic raw material: Alumina wool, aluminium silicate wool

Properties		KVF 121 (dried)	KVF 141 (dried)	KVF 151 (dried)	KV 101 (dried)	KV 121 (dried)
Classification temperature:		1250°C	1400°C	1500°C	1000°C	1250°C
Continuous application temperature:		1150°C	1300°C	1400°C	900°C	1150°C
Bulk density:		>160kg/m ³	>160kg/m ³	>140kg/m ³	250kg/m ³	250kg/m ³
Cold crushing strength: (DIN EN 1094-5) at 10% compression		-	-	-	0,1MPa	0,1MPa
Cold bending strength: (DIN EN 993-6)		-	-	-	0,3MPa	0,3MPa
Permanent linear change: DIN EN 1094-6	900°C/24h	-1,0%	-	-	-2,0%	-1,0%
	1000°C/24h	-2,0%	-1,0%	-	-3,0%	-2,0%
	1100°C/24h	-3,0%	-2,0%	-1,0%	-	-3,0%
	1250°C/24h	-	-3,0%	-2,0%	-	-
	1400°C/24h	-	-	-3,0%	-	-
Chemical analysis: DIN EN 955-2; 4	Al ₂ O ₃	46%	48%	54%	34%	39%
	SiO ₂	53%	52%	46%	56%	60%
	org. components	5%	5%	5%	0%	0%
	CaO	-	-	-	6%	-
Thermal conductivity: [W/mK] (hot wire method) DIN EN 993-14	400°C	0,07	0,07	0,07	0,06	0,06
	600°C	0,12	0,12	0,12	0,10	0,10
	800°C	0,18	0,18	0,18	0,15	0,15
	1000°C	0,25	0,25	0,25	0,22	0,22
	1200°C	0,35	0,35	0,35	-	0,30
	1400°C	-	0,48	0,48	-	-



KERFORM – KVS

Basic raw material: Aluminium silicate wool, mineral wool

Properties		KVS 101 (dried)	KVS 104 (fired)	KVS 121 (dried)	KVS 124 (fired)	KVS 141 (dried)	KVS 141/301 (dried)
Classification temperature:		1000°C	1000°C	1250°C	1250°C	1400°C	1430°C
Continuous application temperature:		900°C	900°C	1150°C	1150°C	1300°C	1300°C
Bulk density:		300kg/m ³	300kg/m ³	300kg/m ³	300kg/m ³	300kg/m ³	300kg/m ³
Cold crushing strength: (DIN EN 1094-5) at 10% compression		0,4MPa	0,3MPa	0,3MPa	0,3MPa	0,3MPa	0,3MPa
Cold bending strength: (DIN EN 993-6)		1,4MPa	0,8MPa	0,5MPa	0,6MPa	0,5MPa	0,5MPa
Permanent linear change: DIN EN 1094-6	800°C/24h	-1,0%	0,0%	-	-	-	-
	900°C/24h	-2,0%	-1,0%	-	-	-	-
	1000°C/24h	-3,0%	-2,0%	-	-	-	-1,6%
	1100°C/24h	-	-	-2,0 %	-2,0 %	-1,6%	-2,5%
	1150°C/24h	-	-	-3,1 %	-2,2 %	-2,5%	-
	1250°C/24h	-	-	-3,7 %	-3,0 %	-3,7%	-
Chemical analysis: DIN EN 955-2; 4	Al ₂ O ₃	42%	42%	50%	50%	55%	47%
	SiO ₂	49%	49%	49%	49%	44%	43%
	CaO/MgO	6%	6%	-	-	-	ZrO ₂ 10%
Thermal conductivity: [W/mK] (hot wire method) DIN EN 993-14	200°C	0,09	0,09	0,09	0,09	-	-
	400°C	0,11	0,11	0,12	0,12	0,12	0,11
	600°C	0,14	0,14	0,15	0,15	0,15	0,15
	800°C	0,19	0,19	0,19	0,19	0,19	0,19
	1000°C	0,27	0,27	0,25	0,25	0,24	0,24
	1200°C	-	-	-	0,34	0,31	0,30
	1400°C	-	-	-	-	0,40	0,39



KERFORM – KVS

Basic raw material: Aluminium silicate wool, mineral wool

Properties		KVS 144 (fired)	KVS 144/301 (fired)	KVS 151 (dried)	KVS 154 (fired)	KVS 161 (dried)	KVS 164 (fired)
Classification temperature:		1400°C	1430°C	1500°C	1500°C	1600°C	1600°C
Continuous application temperature:		1300°C	1300°C	1400°C	1400°C	1500°C	1500°C
Bulk density:		300kg/m ³	300kg/m ³	300kg/m ³	300kg/m ³	300kg/m ³	300kg/m ³
Cold crushing strength: (DIN EN 1094-5) at 10% compression		0,3MPa	0,3MPa	0,4MPa	0,2MPa	0,4MPa	0,2MPa
Cold bending strength: (DIN EN 993-6)		0,6MPa	0,6MPa	1,3MPa	0,6MPa	1,3MPa	0,6MPa
Permanent linear change: DIN EN 1094-6	1000°C/24h	-	-0,5%	-	-		
	1100°C/24h	-1,0%	-1,0%	-	-		
	1250°C/24h	-2,0%	-2,0%	-2,0%	-1,0 %		
	1400°C/24h	-	-	-2,0 %	-1,0 %	-2,0%	-1,0%
	1500°C/24h	-	-	-3,0 %	-2,1 %	-2,0%	-1,0%
	1600°C/24h	-	-	-	-	-3,0%	-2,1%
Chemical analysis: DIN EN 955-2; 4	Al ₂ O ₃	55%	47%	60%	60%	65%	65%
	SiO ₂	44%	43%	39%	39%	34%	34%
	ZrO ₂	-	10%	-	others 1,0%	-	-
Thermal conductivity: [W/mK] (hot wire method) DIN EN 993-14	400°C	0,12	0,11	0,10	0,10	0,17	0,11
	600°C	0,15	0,15	0,14	0,14	0,18	0,15
	800°C	0,19	0,19	0,18	0,18	0,20	0,20
	1000°C	0,24	0,24	0,23	0,23	0,26	0,26
	1200°C	0,31	0,30	0,30	0,30	0,34	0,34
	1400°C	0,40	0,39	0,39	0,39	0,44	0,44



EVAC – EVF, EV, EVS, CS

Basic raw material: Alkaline-earth silicate wool

Properties		EVF131/180 (dried)	EVF131/250 (dried)	EV121 (dried)	EVS121 (dried)	EVS131 (dried)	EVS131/301 (dried)	CS 136 (fired)
Classification temperature:		1300°C	1300°C	1250°C	1150°C	1300°C	1300°C	1300°C
Continous application temperature:				1000°C				1100°C
Bulk density:		180kg/m ³	250kg/m ³	300kg/m ³	300kg/m ³	300kg/m ³	300kg/m ³	800kg/m ³
Cold crushing strength: (DIN EN 1094-5) at 10% compression		-	-	-	-	-	-	0,8MPa
Cold bending strength: (DIN EN 993-6)		-	-	-	-	-	-	1,2MPa
Permanent linear change: DIN EN 1094-6	1000°C/24h	-	-1,5%	-	-	-1,8%	-	-0,4%
	1100°C/24h	-2,0%	-1,9%	-1,8%	≤ -4%	-2,2%	-2,5%	-0,8%
	1200°C/24h	1250°C -2,6%	1250°C -2,4%	-2,5%	-	-	1250°C -2,9%	-1,5%
	1300°C/24h	-3,7%	-0,5%	-	-	-3,9%	-3,5%	-
Chemical analysis: DIN EN 955-2; 4	SiO ₂	79%	79%	81%	77%	79%	75%	65%
	Al ₂ O ₃	2,5%	2,5%	-	2%	3%	3%	-
	BaO	-	-	-	-	-	-	16%
	MgO	19%	19%	15%	20%	CaO/MgO 18%	CaO/MgO21%	CaO 12%
	org. comp.	6%	6%	0%	5%	5%	5%	0%
Thermal conductivity: [W/mK] (hot wire method) DIN EN 993-14	200°C	0,10	0,11	0,09	0,08	-	0,24	0,08
	400°C	0,12	0,14	0,10	0,09	-	0,26	0,11
	600°C	0,15	0,19	0,14	0,13	-	0,28	0,15
	800°C	0,23	0,25	0,19	0,19	-	0,29	0,21
	1000°C	0,35	0,35	0,27	0,27	-	0,31	0,29
	1200°C	0,54	0,52	0,38	-	-	0,33	-



KERATHIN Plast

Basic raw material: Aluminium silicate wool, Alumina wool

Properties		P 1000	P 1300	P 1400	P 1500	P 1600	P 1700	P 1800	P AI	P HA
Maximum application temperature:		1050°C	1150°C	1300°C	1450°C	1550°C	1600°C	1750°C	1100°C	1600°C
Dry bulk density:	[kg/m ³]	~900	~900	~900	~900	~900	~1000	~1000	~850	~1000
Material requirement: [kg/m ³]		~1500	~1500	~1500	~1500	~1500	~1800	~1800	~1700	~1800
Organic components:		6%	6%	6%	6%	6%	6%	6%	6%	6%
Permanent linear change: DIN ENV 1094-7		1000°C/24h -2,0%	1100°C/24h -3,0%	1250°C/24h -3,0%	1400°C/24h -3,0%	1500°C/24h -2,5%	1600°C/24h -3,0%	1750°C/24h -3,0%	1000°C/24h -1,5%	1500°C/24h -2,4%
Chemical analysis: EN 955-2; 4	Al ₂ O ₃ SiO ₂ BaO	60% 38%	63% 36%	65% 34%	66% 33%	68% 31%	73% 27%	80% 20%	24% 43% 21%	98% 2%



KERATHIN adhesive

Rohstoffbasis: aluminium silicate, alumina, barium sulphate

Properties		C 1250	C 1500	C 1600	C 1700	C 1800	C HA	C AI
Max. application temperature:		1250°C	1500°C	1600°C	1700°C	1800°C	1600°C	1250°C
Wet density:		1600kg/m ³	1600kg/m ³	1600kg/m ³	1600kg/m ³	1600g/m ³	1600g/m ³	1900kg/m ³
Material requirement:		0,2-1,2kg/m ²	0,2-1,2kg/m ²	0,5-1,2kg/m ²	0,5-1,2g/m ²	0,5-1,2kg/m ²	0,5-1,2kg/m ²	0,5-1,2kg/m ²
Organic components:		0,5%	0,5%	0,5%	0,5%	0,5%	0,5%	0,5%
Condition at time of supply:		ready to use/mastic	ready to use/mastic	ready to use/mastic	ready to use/mastic	ready to use/mastic	ready to use/mastic	ready to use/mastic
Chemical analysis: EN 955-2; 4	Al ₂ O ₃ SiO ₂ BaO	64% 33% -	72% 26% -	76% 22% -	80% 22% -	85% 15% -	99% 0% -	60% 25% 5



KERATHIN adhesive

Basic raw material: Magnesium silicate, aluminium silicate, alumina

Properties		K 1100	K 1250 F	K 1500 F	K 1500 W	K 1600	K 1600 Super	K 1700
Maximum application temperature:		1100°C	1250°C	1500°C	1500°C	1600°C	1600°C	1700°C
Wet density:		2000kg/m ³	2000kg/m ³	2000kg/m ³	2000kg/m ³	1900kg/m ³	1900kg/m ³	1900kg/m ³
Material requirement:		~4kg/m ²	~6kg/m ²	~6kg/m ²	~6kg/m ²	~5kg/m ²	~3kg/m ²	~5kg/m ²
Organic components:		0,5%	0,5%	0,5%	0,5%	0,5%	0,5%	0,5%
Permanent linear change: DIN ENV 1094-7		1100°C/24h -0,5%	1250°C/24h -0,5%	1500°C/24h -1,3%	1500°C/24h -1,0%	1600°C/24h -1,5%	1600°C/24h -1,5%	1700°C/24h -1,5%
Chemical analysis: EN 955-2; 4	Al ₂ O ₃	0%	42%	53%	72%	71%	68%	79%
	SiO ₂	46%	51%	43%	22%	24%	30%	20%
	MgO	42%	-	-	-	-	-	-



KERATHIN adhesive

Basic raw material: Mullite, corundum, alumina wool, aluminium silicate, alumina

Properties		K 1800	K 1800 Super	K HA
Maximum application temperature:		1800°C	1800°C	1600°C
Wet density:		1900kg/m ³	1900kg/m ³	1900kg/m ³
Material requirement:		~5kg/m ²	~3kg/m ²	~5kg/m ²
Organic components:		0,5%	0,5%	0,5%
Permanent Linear change: DIN ENV 1094-7		1800°C/24h 0,3%	1800°C/24h 0,3%	1600°C/24h -1,6%
Chemical analysis: EN 955-2; 4	Al ₂ O ₃	80%	84%	98%
	SiO ₂	19%	16%	2%



KERATHIN hardener

Basic raw material: Colloidal silica, colloidal alumina

Properties		H 1250	H 1400	H 1600	H HA
Maximum application temperature:		1250°C	1400°C	1600°C	1600°C
Density:		1250kg/m ³	1200kg/m ³	1200kg/m ³	1200kg/m ³
Solid content:		20%	20%	10%	10%
Organic components:		0%	0%	0%	0%
Chemical analysis: EN 955-2; 4	Al ₂ O ₃	0%	0%	99%	99%
	SiO ₂	99%	99%	0%	0%
	Na ₂ O	1,0%	0,9%	0,3%	0,3%



Calcium silicate and mineral wool boards

Basic raw material: Calcium silicate, mineral wool

Properties		CAS 1000	CAS 1100	Microcal 1100	Mineral wool P750/120
Classification temperature:		1000 °C	1100 °C	1100 °C	750 °C
Continuous application temperature:					-650°C
Standard dimensions:	LxW[mm] T [mm]	1000x500 30/40/50/60/65/70/75	1000x500 30/40/50/60/65/70/75	1250x500 25-100	1200x625/1250x500 30-100
Bulk density:		240kg/m ³	285kg/m ³	260kg/m ³	120kg/m ³
Cold crushing strength:		1,3MPa	2MPa	1,2MPa	-
Linear Shrinkage:		950°C/12h <2,0%	1050°C/12h -1,5%	1050°C/12h -1,5	- -
Chemical analysis:	SiO ₂ CaO Fe ₂ O ₃	50% 49% -	47% 43% Alkaline 0,01%	46% 37% 0,2%	- - -
Thermal conductivity: [W/mK] (hot wire method) DIN EN 993-14	200°C 400°C 600°C 800°C	0,07 0,10 0,14 0,17	- 0,10 0,14 0,18	- 0,10 0,12 0,14	0,06 0,10 ~0,20 -



Shaped refractory products



Rath refractory bricks and mortars have been produced since 1891 and have been a subject of permanent further development ever since.

Rath refractory bricks withstand temperatures up to 1800 °C and can be used in practically all areas of industrial kiln construction.

Our standard program includes the following quality groups:

- Suprath
 - Durrath
 - Alurath
 - Silrath
 - Korrath
- Fireclay bricks
 - High-performance fireclay bricks
 - Bauxite bricks
 - Sillimanite bricks, Andalusite bricks
 - Corundum bricks, chrome-corundum bricks

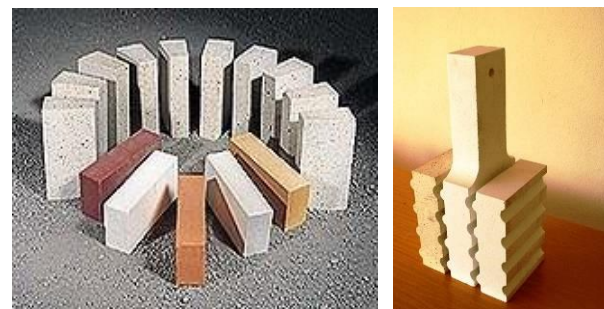
In addition to the above standard qualities, we also manufacture and deliver bricks of zircon mullite and silicon carbide for special applications.

Shaped refractory products



Shaped refractory products

Rath refractory bricks meet the latest state of the art technologies. This refers to raw materials, binding materials and optimum processing.



Korrath and Silrath are high alumina products, which are especially used in thermal highly stressed facilities. Their high density and low porosity stand for an excellent slag resistance. Several binding types as well as different firing temperatures result in a wide product range.

Korrath (with chrome-/zirconium content)

Properties	K 701Cr	K 85Cr	K 853 Cr	K85 Cr C	K 85 Cr Z	K 90 Cr Z	K 972 Zr
Al ₂ O ₃ [%]	69	87	84	87	86	90	97
SiO ₂ [%]	0	7	1,8	6	6,5	1,3	-
Fe ₂ O ₃ [%]	0,19	0,1	0,15	0,2	0,1	0,15	0,15
ZrO ₂ [%]	2,9	-	3,5	P ₂ O ₅ 2	2,0	3,5	2,8
Cr ₂ O ₃ [%]	26	4,9	11	4,7	4,9	5	-
Bulk density [g/cm ³]	3,5	3	3,4	3,0	3,0	3,2	3,3
Open porosity [%]	16,5	17,5	14	15	18	14	16,5
Cold crushing strength [MPa]	100	100	130	100	100	100	60
Thermal shock resistance [n]*	49	52	16	120	40	100	50
Refractoriness t _{0,5} [°C]	≥1600	≥1600	≥1600	≥1600	≥1600	≥1700	≥1600

Korrath

Properties	K 80	K 91	K 901	K 903	K 91 C	K 95	K 99E	K 99
Al ₂ O ₃ [%]	84	90	90	90	90	94	99	99
SiO ₂ [%]	14	8	9	9	7	5	0,1	0,1
Fe ₂ O ₃ [%]	<0,5	0,2	0,06	0,15	0,2	0,15	0,1	0,1
ZrO ₂ [%]	-	-	-	-	P ₂ O ₅ 2	-	-	-
Bulk density [g/cm ³]	2,85	2,95	3,0	3,11	2,9	3,17	3,15	3,4
Open porosity [%]	17	17,5	16	14	15	15,5	16	13
Cold crushing strength [MPa]	70	54	80	100	100	100	90	90
Thermal shock resistance [n]*	100	60	110	40	60	120	17	8
Refractoriness t _{0,5} [°C]	≥1600	≥1560	≥1600	≥1600	≥1560	≥1600	≥1560	≥1600

*water quenching



Shaped refractory products



Silrath

Properties	AK 55	AK 60C	AK 60	AK 60SiC	AK 70	S 65
Al ₂ O ₃ [%]	55	61	61	45	70	68
SiO ₂ [%]	-	35	37	35	28	28
Fe ₂ O ₃ [%]	1,2	1,0	1	1	1,0	1,0
Bulk density [g/cm ³]	2,48	2,6	2,6	15	2,7	2,60
Open porosity [%]	16	14	13	2,6	15	15
Cold crushing strength [MPa]	70	100	100	11	100	90
Thermal shock resistance [n]*	20	120	120	100	100	120
Refractoriness t _{0,5} [°C]	1560	1580	1630	120	≥1650	1650
				1560		

Alurath is manufactured with high value materials and is fired in long term high temperature cycles. Rath optimizes the choice of raw materials, the binding matrix and the firing temperatures depending on the designated field of application.

Alurath

Properties	B80	B 80 C	B 85 AC	M 701	M 702	M 704	SP 78	SP 90	SP 91
Al ₂ O ₃ [%]	80	80	78	74	72	72	79	89	90
SiO ₂	12	12	8	22	26	25	-	-	-
Fe ₂ O ₃ [%]	1,6	1,2	1,2	0,5	0,5	0,5	0,5	0,5	0,5
P ₂ O ₅ [%]	-	4,5	2,8	-	-	-	-	-	-
MgO [%]	-	P ₂ O ₅ 4,5	BaO 5 P ₂ O ₅ 2,8	-	-	-	20	10	9
Bulk density [g/cm ³]	2,7	2,85	2,9	2,6	2,45	2,5	2,9	2,8	2,9
Open porosity [%]	21	12	18	15	19	18	18	20	20
Cold crushing strength [MPa]	90	200	80	130	80	45	90	90	100
Thermal shock resistance [n]*	100	25	50	6	11	100	2	5	9
Refractoriness t _{0,5} [°C]	1510	1520	1230	≥1600	≥1600	≥1600	≥1600	≥1600	≥1600

*water quenching



Shaped refractory products



Suprath

Properties	A 30-h	A 30-t	A 35-h	A 35-t	A 40-h	A 40-t	A 401-t	A 403-t	T 501
Al ₂ O ₃ [%]	30	35	35	35	40	40	38	42	46
Fe ₂ O ₃ [%]	2,5	2,4	2,7	2,5	2,2	2,1	2,5	1,0	1,5
Bulk density [g/cm ³]	2,0	2,17	2,1	2,17	2,2	2,28	2,24	2,3	2,35
Open porosity [%]	20	18	20	18	19	14	16	18	14
Cold crushing strength [MPa]	25	40	30	35	40	50	40	50	70
Refractoriness t _{0,5} [°C]	1280	1310	1300	1320	1380	1420	1320	1450	1460
Refractoriness t _a [°C]	1370	1390	1400	1440	1430	1480	1450	1460	1570
Thermal shock resistance [n]*	25	25	-	-	25	18	30	23	30

Suprath and Durrath are bricks based on several high grade fire clays. They vary in their Al₂O₃-contents and shaping methods.

Durrath (special fire clay bricks)

Properties	HSC	HS-e	HD45	HD48
Al ₂ O ₃ [%]	37	47	47	49
Fe ₂ O ₃ [%]	1,5	1,4	1,4	1,4
Bulk density [g/cm ³]	2,2	2,35	2,43	2,5
Open porosity [%]	12	14	8	8
Cold crushing strength [MPa]	80	90	120	120
Refractoriness t _{0,5} [°C]	1330	1490	1500	1620
Refractoriness t _a [°C]	1410	1530	1580	1580
Thermal shock resistance [n]*	40	30	3	35

*water quenching



Mortar and adhesives for bricks

Carathin (chemically bonded adhesives and mortars)

	C 30-1	C 35-1	C 40-1	T45-2	T 45-3	B 80-2	B 80Al-2	M 70-3	AZS 30-3	K 65-2	K 90-2	K 90Cr-3	SiC 80-3
Basic raw material	fireclay	fireclay	fireclay	fireclay	fireclay	bauxite, corundum	bauxite	mullite	zirconia mullite	mullite, corundum	corundum	corundum	SiC
Service temperature [°C]	1400	1400	1400	1500	1500	1650	1400	1650	1650	1600	1750	1800	1700 red. 1100 ox.
Material requirement [kg/m ³]	1700	1700	1800	1800	1800	2000	2000	1850	2500	1900	2200	2800	1850
Al ₂ O ₃ [%]	20	30	37	44	40	78	72	69	49	65	92	90	10
SiO ₂ [%]	73	63	56	45	-	18	15	28	16	28	5	0,5	5
Fe ₂ O ₃ [%]	2	2,3	2,3	1,5		1,6	1,5	0,4	ZrO ₂	1,2	0,3	0,05	1
Others [%]	-	-	-	P ₂ O ₅ 9	-	-	BaSO ₄ 10	P ₂ O ₅ 2,5	P ₂ O ₅ 3,9	-	-	Cr ₂ O ₃ 5 P ₂ O ₅ 4	SiC 80 P ₂ O ₅ 1,6
Req. mixing liquid [l/100kg]	30W	30W	27-28W	20Pb	23-25W	20Pb	20Pb	30W	15W	20Pb	20	13W	20W

Carathin (vitrified bonded adhesive and mortars)

	C 30	C 35	C 40	C 403	T 45	AK 50	AK 60	E 75	B 80	K 90
Basic raw material	fireclay	fireclay	fireclay	fireclay	fireclay	fireclay, andalusite	fireclay, andalusite	mullite, corundum	bauxite	corundum
Service temperature [°C]	1400	1450	1450	1450	1550	1600	1600	1700	1650	1750
Material requirement [kg/m ³]	1700	1700	1700	1700	1900	2000	2000	2000	2000	2200
Al ₂ O ₃ [%]	22	32	38	38	43	49	49	74	78	90
SiO ₂ [%]	71	61	55	55	59	46	46	23	18	6
Fe ₂ O ₃ [%]	1,8				1,8	1,7	1,7	0,3	1,5	0,3
Req. mixing liquid [l/100kg]	30W	33W	32W	32W	29W	31W	31W	22W	25W	20W

Kerathin (chemically bonded adhesive)

	Acrathin 1100	Kerathin 1260-S	Kerathin 1500-S
Basic raw material	aluminum silicate	aluminum silicate	aluminum silicate
Service temperature [°C]	1100	1300	1500
Material requirement [kg/m ³]	1950	2000	2000
Al ₂ O ₃ [%]	40	26	53
SiO ₂ [%]	50	67	43
Fe ₂ O ₃ [%]	< 1		
Req. mixing liquid [l/100kg]	18-20W	rfp	rfp

W-water, rfp-ready for processing, Pb-Phosphate binding agent



Unshaped refractory products

Range of Application

Refractory castables and masses from Rath cover a wide range of materials for high-end technical demands:

- Dense refractory castables
 - Thermal insulation castables
 - Special refractory castable
 - Low-cement refractory castable
 - Ultra-low cement refractory castable
 - Cement-free refractory castable
 - Cement-free, chemically bonded special masses (refractory ramming mix)
 - Plastic ramming masses
 - Refractory mortars and glues
- Carath D / Carath GUN
Carath FL / Carath FL-GUN
Carath S
Carath LC
Carath ULC
Carath NC
Carathplast
Carathplast
Carathin



Unshaped refractory products



Dense refractory castables

Designation		Carath 1200-D	Carath 1250-D	Carath 1300-D	Carath 1350-D	Carath 1400-D	Carath 1450-D	Carath 1451-D
Basic raw material:		fireclay	fireclay	fireclay	fireclay	fireclay	high mullite fireclay	high alumina material
Service temperature: [°C]		1200	1250	1300	1350	1400	1450	1450
Material requirement: [kg/m ³]		2100	2150	2200	2200	2250	2190	2800
Cold crushing strength: [MPa] after drying at 110°C		60	50	60	60	40	60	120
Grain size: [mm]		<5, <3	<3, <5, <10	<5, <10	<5, <10	<5, <10	<3, <10	<6
Chemical analysis: [%] EN 955-2; 4	Al ₂ O ₃	40	38	37	43	46	53	90
	SiO ₂	40	42	35	44	40	39	7
	Fe ₂ O ₃	<3,5	<5	6	2,5	<1,5	1	0,5



Dense refractory castables

Designation		Carath 1460-D	Carath 1500-D	Carath 1600-D	Carath 1650-D	Carath 1700-D	Carath 1800-D	Carath 1801-D-SF
Basic raw material:		alumina- silicate	high mullite fireclay	high mullite fireclay, corundum	corundum, mullite	corundum	tabular alumina	tabular alumina
Service temperature: [°C]		1450	1500	1600	1650	1700	1800	1800
Material requirement: [kg/m ³]		2200	2250	2500	2720	2750	3000	2720
Cold crushing strength: [MPa] after drying at 110°C		60	60	30	45	40	90	40
Grain size: [mm]		<10	<5, <10	<5	<3	<3	<3, <5	<1
Chemical analysis: [%] EN 955-2; 4	Al ₂ O ₃	51	54	70	78	94	96	96
	SiO ₂	40	40	26	18	0,2	0,6	0,6
	Fe ₂ O ₃	<0,7	1	0,5	0,4	0,2	0,4	0,4



Dense and low cement gunning castables

Designation		Carath 1300-GUN	Carath 1351-GUN	Carath 1400-AL-GUN	Carath 1400-LC-AL- GUN	Carath 1401-GUN	Carath 1450 GUN	Carath 1451 GUN
Basic raw material:		fireclay	fireclay	corundum	corundum	high mullite fireclay	high mullite fireclay	bauxite
Service temperature: [°C]		1300	1350	1400	1400	1400	1450	1450
Material requirement: [kg/m ³]		1800	2000	2500	2750	2100	2000	2400
Cold crushing strength: [MPa] after drying at 110°C		18	35	50	20	55	30	45
Grain size: [mm]		<5	<3	<3	<3	<3	<5	<3
Chemical analysis: [%] EN 955-2; 4	Al ₂ O ₃	38	>40	80	85	56	52	75
	SiO ₂	46	45	2,5	2,5	32	39	15
	Fe ₂ O ₃	4	<2	<0,5	<0,2	1,3	1	<1,5
	BaSO ₄	-	-	10	10	-	-	4



Dense and low cement gunning castables

Designation		Carath 1452-GUN	Carath 1501-GUN	Carath 1501-SiC- GUN	Carath 1502 GUN	Carath 1550-LC- GUN	Carath 1600-LC- GUN	Carath 1700-SiC- GUN
Basic raw material:		fireclay	andalusite	silicon carbide	aluminous raw material	corundum	bauxite	silicon carbide
Service temperature: [°C]		1450	1500	1500	1500	1550	1600	1700-red. 1100-oxid.
Material requirement: [kg/m ³]		2100	2260	2350	2130	2700	2600	2400
Cold cushioning strength: [MPa] after drying at 110°C		25	35	30	20	13	50	30
Grain size: [mm]		<5	<3	<3	<5	<3	<6	<3
Chemical analysis: [%] EN 955-2; 4	Al ₂ O ₃	56	60	55	61	95	75	22
	SiO ₂	33	36	30	32	2	17	5
	Fe ₂ O ₃	1,5	<1	<0,6	1	<0,2	<1,1	≤1,5
	BaO	-	-	-	-	-	-	-
	CaO	-	2,5	-	-	1,9	1,9	-
	SiC	-	-	5	-	-	-	70



Low cement refractory

Designation		Carath 1200-LC-AL	Carath 1400-LC-AL	Carath 1400-LC-SiC	Carath 1450-LC-SiC	Carath 1500-LC-SiC	Carath 1600-LC-SiC	Carath 1650-LC-SiC	Carath 1700-LC-SiC
Basic raw material		bauxite	corundum	fireclay, silicon carbide	high alumina material	silicon carbide	silimanite, silicon carbide	mullite, silicon carbide	silicon carbide
Service temperature: [°C]		1200	1400	1400	1450	1400	1600	1650	1700-red. 1100-oxid.
Material requirement: [kg/m ³]		2860	2960	2540	2800	2540	2750	2750	2650
Cold crushing strength: [MPa] after drying at 110°C		120	75	85	80	55	85	85	100
Grain size: [mm]		<6	<4	<6	<6	<3	<6	<6	<3
Chemical analysis: [%] EN 955-2; 4	Al ₂ O ₃	78	84	35	60	27	43	58	16
	SiO ₂	8	5	30	6	16	25	13	-
	Fe ₂ O ₃	1,4	<0,2	<1,5	<1	<1	<1,5	1	<1
	BaO	6,5	8	-	-	-	-	-	-
	CaO	-	2	-	-	-	-	-	-
	SiC	-	-	>25	30	>55	>25	>25	80



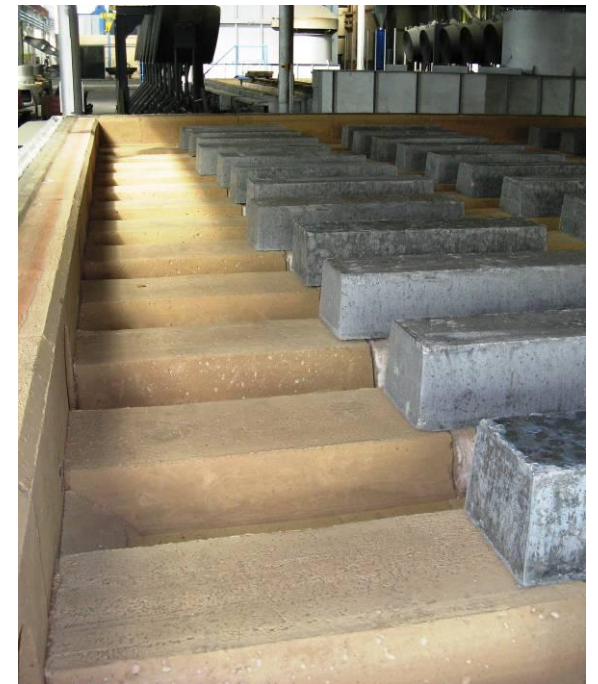
Low cement refractory

Designation		Carath 1301-LC	Carath 1400-LC	Carath 1450-LC	Carath 1451-LC	Carath 1500-LC	Carath 1550-LC	Carath 1600-LC	Carath 1602-LC
Basic raw material:		fireclay	high mullite fireclay	high mullite fireclay	high alumina material	high mullite fireclay	high mullite fireclay, bauxite	high mullite fireclay, alumina	bauxite
Service temperature: [°C]		1300	1400	1450	1450	1500	1550	1600	1600
Material requirement: [kg/m ³]		2280	2300	2300	2800	2350	2400	2550	2600
Cold crushing strength: [MPa]* after drying at 110°C		80	100	100	40	100	100	100	32
Grain size: [mm]		<10	<10	<10	<10	<10	<10	<5	<6
Chemical analysis: [%] EN 955-2; 4	Al ₂ O ₃	43	50	50	91	52	60	74	82
	SiO ₂	47	41	43	6	42	33	18	12
	Fe ₂ O ₃	2,1	1,3	<1	0,2	1	1,5	0,7	2
	BaO	-	-	-	-	-	-	-	-
	CaO	-	-	-	-	-	-	-	2,6
	Alkali	-	-	-	-	-	0,4	-	-



Low cement refractory

Designation	Carath 1650-LC	Carath 1652-LC	Carath 1655-LC	Carath 1700-LC-SF	Carath 1750-LC	
Basic raw material:	alumina	bauxite	andalusite	silicon carbide, tabular alumina	corundum	
Service temperature: [°C]	1650	1650	1650	1700 red. 1100 oxid.	1750	
Material requirement: [kg/m ³]	3000	2850	2550	2750	3000	
Cold crushing strength: [MPa] after drying at 110°C	100	85	75	35	65	
Grain size: [mm]	<6	<5	<6	<3	<5	
Chemical analysis: [%] EN 955-2; 4	Al ₂ O ₃ SiO ₂ Fe ₂ O ₃ BaO CaO SiC	93 4 0,1 - 1,6 -	85 9 1 - - -	63 34 0,8 - - -	70 3 <1 - - 25	97 0,5 - 2,5 - -





Ultra low cement refractory

Designation		Carath 1600 ULC-SF	Carath 1650 ULC	Carath 1650 ULC- AZS	Carath 1651 ULC	Carath 1700 ULC-SF	Carath 1700 ULC- SiC	Carath 1750 ULC	Carath 1751 ULC
Basic raw material:		bauxite	periklas	AZS	spinel	corundum	silicon carbide	corundum	corundum
Service temperature: [°C]		1600	1650	1650	1650	1700	1700 red. 1100 oxid.	1750	1750
Material requirement: [kg/m³]		2800	2800	3000	2850	2980	2660	3200	3150
Cold crushing strength: [MPa] after drying at 110°C		35	35	100	100	60	50	55	85
Grain size: [mm]		<6	<3	<6	<6	<6	<3	<5	<5
Chemical analysis: [%] EN 955-2; 4	Al ₂ O ₃	80	6,5	56	85	95	16	>98	96
	SiO ₂	9	-	16	2,4	3	-	0,5	2,5
	Fe ₂ O ₃	1,7	-	-	-	0,5	<1	-	0,4
	CaO	1,3	1,7	-	-	1,1	-	-	-
	MgO	-	89	-	10	-	-	-	-
	ZrO ₂	-	-	26	-	-	-	SiC 80	-



Ultra low cement refractory

Designation		Carath 1800-ULC-Cr	Carath 1801-ULC-SF	Carath 1803-ULC-SF	Carath 1804-ULC	Carath 1805-ULC	Carath M1650-ULC-SF	Carath M1651-ULC-SF
Basic raw material:		corundum	corundum	spinel	corundum	spinel	mullite	mullite
Service temperature: [°C]		1800	1800	1800	1800	1800	1650	1650
Material requirement: [kg/m ³]		3100	3050	2720	3100	2950	2450	2600
Cold crushing strength: [MPa] after drying at 110°C		60	20	20	70	50	37	45
Grain size: [mm]		<4	<6	<6	<6	<6	<3	<6
Chemical analysis: [%] EN 955-2; 4	Al ₂ O ₃	>90	98	88	98,5	88	72	78
	SiO ₂	4	-	-	0,1	0,2	25	19
	Fe ₂ O ₃	<0,5	-	-	-	-	0,2	0,2
	Cr ₂ O ₃	<5	-	-	-	-	-	-
	CaO	-	1,3	-	-	-	-	-
	MgO	-	-	10,5	-	10	-	-



Insulating castables

Designation		Carath FL-900	Carath FL-950	Carath FL-951	Carath FL-1000	Carath FL-1000 RG	Carath FL-1001	Carath FL-1050
Basic raw material:		perlite	light fireclay vermiculite	vermiculite	light fireclay vermiculite	aluminium silicate	expanded clay	perlite
Service temperature: [°C]		900	950	950	1000	1000	1000	1050
Material requirement: [kg/m ³]		450	740	600	800	~450	790	650
Crushing strength: [MPa] after drying at 110°C		0,75	1,5	1	2	~0,6	5	2
Grain size: [mm]		<4	<8	<4	<4		<8	<4
Chemical analysis: [%] EN 955-2; 4	Al ₂ O ₃	35	33	35	36	38	30	43
	SiO ₂	40	34	15	29	29	35	40
	Fe ₂ O ₃	<2,5	10	13	9	1,4	12	1,5
	CaO	17	-	-	-	6,2	13	8,5
	MgO		8			P ₂ O ₅ 25		
Thermal conductivity: [W/mK] (hot wire method) DIN EN 993-14	200°C	0,14	0,19	0,13	0,30	0,12	0,36	0,19
	400°C	0,15	0,19	0,15	0,29	0,16	0,31	0,19
	600°C	0,16	0,20	0,17	0,27	0,21	0,31	0,20
	800°C	0,18	0,21	0,20	0,24	0,27	0,36	0,24
	950°C	0,19	0,23	0,22	-	0,35	0,43	-
	1000°C	-	-	-	0,23	0,45	-	0,26



Insulating castables

Designation		Carath FL-1051	Carath FL-1053	Carath FL-1055	Carath FL-1100	Carath FL-1101	Carath FL-1200 AL	Carath FL-1300	Carath FL-1300 AL
Basic raw material:		light weight fireclay	vermiculite	perlite	light weight fireclay	light weight fireclay, vermiculite	aluminium silicate fibre	light weight fireclay	light weight fireclay BaO
Service temperature: [°C]		900	1050	1050	1050	1100	1100	1200	1300
Material requirement: [kg/m ³]		970	650	670	1250	1170	1100	1600	1500
Cold crushing strength: [MPa] after drying at 110°C		2,5	1,2	2,5	5	4	3	25	19
Grain size: [mm]		<8	<3	<4	<8	<4	-	-	<12
Chemical analysis: [%] EN 955-2; 4	Al ₂ O ₃	34	56	45	37	50	30	41	42
	SiO ₂	38	11	40	40	30	40	39	45
	Fe ₂ O ₃	8	2,1	1,5	7	3	<7,5	4,5	2,8
	CaO	-	-	8,5	-	-	20	-	3,4
	BaO	-	-	-	-	-	-	-	6,4
Thermal conductivity: [W/mK] (hot wire method) DIN EN 993-14	200°C	0,30	0,21	0,19	0,38	-	0,34	0,67	-
	400°C	0,35	0,23	0,19	0,40	0,35	0,33	0,68	0,66
	600°C	0,41	0,25	0,20	0,44	0,38	0,30	0,70	0,55
	800°C	0,47	0,27	0,24	0,50	0,42	0,26	0,72	0,61
	1000°C	0,53	0,29	0,26	0,51	0,46	0,30	0,76	0,62
	1150°C	-	-	-	0,53	0,48	0,38	1200 - 0,86	0,69



Insulating castables

Designation		Carath FL-1301	Carath FL-1401	Carath FL-1402	Carath FL-1404	Carath FL-1405	Carath FL-1450 PR	Carath FL-1500	Carath FL-1800
Basic raw material:		aluminium silicate bubbles	light weight fireclay	aluminium silicate fibre	light weight fireclay	light weight fireclay	Al ₂ O ₃ -high light weight aggregate	light fireclay, ceramic bubbles	bubble alumina
Service temperature: [°C]		1300	1400	1400	1400	1400	1450	1500	1800
Material requirement: [kg/m ³]		850	1400	900	1200	1500	1600	1750	1400
Cold crushing strength: [MPa] after drying at 110°C		9	25	2	7	25	3	10	8
Grain size: [mm]		<1	<8	-	<8	<8	3; 6	<5	<2
Chemical analysis: [%] EN 955-2; 4	Al ₂ O ₃	56	45	68	48	55	>90	60	94
	SiO ₂	27	35	22	35	30	<1,5	34	0,3
	Fe ₂ O ₃	<1	3	1,5	2	0,8	<0,2	<1	0,3
	CaO	11	11	8	11	-	5,5	-	4,1
Thermal conductivity: [W/mK] (hot wire method) DIN EN 993-14	200°C	0,17	0,48	-	0,33	0,53	0,68	0,62	-
	400°C	0,20	0,47	-	0,37	0,53	0,58	0,68	-
	600°C	0,23	0,52	0,29	0,36	0,55	0,54	0,74	0,71
	800°C	0,26	0,55	0,33	0,39	0,60	0,53	0,81	0,68
	1000°C	0,30	0,58	0,42	0,45	0,67	0,54	0,88	0,68
	1200°C	0,39	0,63	0,53	0,54	0,77	0,58	0,96	0,73
	1400°C	-	0,68	-	0,66	0,89	0,60	1,05	0,86



Insulating gunning castables

Designation		Carath FL-1000 GUN	Carath FL-1100 GUN	Carath FL-1301 GUN	Carath FL-1400 GUN	Carath FL-1500 GUN	Carath FL-1650 GUN
Basic raw material:		vermiculite, light weight fireclay	vermiculite, light weight fireclay	perlite, light weight fireclay	light weight fireclay	fireclay, bubble alumina	corundum, bubble alumina
Service temperature: [°C]		1000	1100	1300	1400	1500	1650
Material requirement: [kg/m ³]		900	1200	1300	1450	1700	1700
Cold crushing strength: [MPa] after drying at 110°C		2	6	12	24	20	25
Grain size: [mm]		<4	<4	<4	<4	<3	<3
Chemical analysis: [%] EN 955-2; 4	Al ₂ O ₃	34	36	47	55	79	90
	SiO ₂	26	40	38	30	12	2
	Fe ₂ O ₃	11	7,5	<2	<2	0,7	0,3
	CaO	20	11	11,5	9,5	-	-
Thermal conductivity: [W/mK] (hot wire method) DIN EN 993-14	200°C	0,20	0,29	0,38	0,64	-	-
	400°C	0,22	0,34	0,39	0,60	-	-
	600°C	0,25	0,39	0,40	0,58	-	-
	800°C	0,29	0,44	0,42	0,58	-	-
	1000°C	0,34	0,50	0,46	0,66	-	-
	1100°C	-	0,54	-	0,71	-	-



No cement castables

Designation		Carath 1300-NC	Carath M1650-NC	Carath 1650 NC-SF	Carath 1800-NC SF
Basic raw material:		fireclay	mullite	andalusite	corundum
Service temperature: [°C]		1350	1650	1650	1800
Material requirement: [kg/m ³]		2100	2460	2500	2850
Cold crushing strength: [MPa] after drying at 110°C		35	45	30	45
Grain size: [mm]		<6	<6	<5	<5
Chemical analysis: [%] EN 955-2; 4	Al ₂ O ₃	41	66	59	92
	SiO ₂	54	28	40	7
	Fe ₂ O ₃	2	1	<0,5	0,2
	ZrO ₂	-	-	-	-
Thermal conductivity: [W/mK] (hot wire method) DIN EN 993-14	200°C	0,9	1,2	1,2	1,3
	400°C	1,0	1,3	1,3	1,7
	600°C	1,1	1,3	1,4	2,1
	800°C	1,2	1,4	1,5	2,4
	1000°C	1,3	1,5	1,7	2,7
	1200°C	1,4	1,5	1,9	2,9
	1400°C	1,6	1,6	2,1	3,1



Plastic mixes and ramming masses

Designation		Acrath-Patch	Carathplast 1700-SiC	Carathplast 1700-SiC	Carathplast 1351	Carathplast 1400-AL	Carathplast 1650-AZS	Carathplast 1651	Carathplast 1652
Basic raw material:		aluminium-silicate	SiC	SiC	fireclay	corundum	AZS	bauxite	andalusite
Service temperature: [°C]		1100	1100 oxid. 1700 red.	1100 oxid. 1700 red.	1350	1400	1650	1650	1650
Material requirement: [kg/m³]		2000	2400	2400	2070	2700	2900	2200	2200*/2650**
Cold crushing strength: [MPa] after drying at: 110°C 400°C		30	12	10 20	20	10	30	10	10*/ 40** 30*/ 60**
Grain size: [mm]		3	<2	<2	<3	<1,5	<3, <6	<3	<3
Chemical analysis: [%] EN 955-2; 4	Al ₂ O ₃	37	2,5	2,5	>35	85	48	80	58
	SiO ₂	50	SiC 87	SiC 90	<55	BaO 8	16	15	38
	Fe ₂ O ₃	-	-	-	-	-	-	2,5	<1
	ZrO ₂	-	-	-	-	-	29	-	<2,5
	P ₂ O ₅	3	5	2,5	<2	2,5	4	-	-
Required mixing liquid: [l/100kg]		10-12W	20Pb	~12*W ~5**W	10W	4,5-5W	~5W	9W	~11*W ~5**W

* for use as plastic mixes masses

** for use as ramming masses

Pb phosphate binding agent

W water



Plastic mixes and ramming masses

Designation	Carath-plast 1652-GUN	Carath-plast 1-180	Carath-plast 1800	Carath-plast 1800-Cr	Carath-plast FL-1801	Carath-plast 850-AL	Carath-plast 1600	Carath-plast 1650	
Basic raw material:	andalusite	corundum	corundum	corundum	bubble alumina	fireclay, barium sulphate	bauxite	bauxite, corundum	
Service temperature: [°C]	1650	1800	1800	1800	1800	850	1600	1650	
Material requirement: [kg/m ³]	2650	3000	3000	2600	1800	2100	2700	2700	
Cold crushing strength: [MPa]	after drying at:								
	110°C	40	10	10	10	-	-	-	
	400°C	60	-	-	-	8	-	-	
	850°C	-	-	-	-	-	8	-	
	1100°C	-	-	-	-	-	-	-	
	1400°C	-	-	-	-	-	45	40	
Grain size: [mm]	<3	<5	<3,5	<3,5	<1	<1	6	6	
Chemical analysis: [%] EN 955-2; 4	Al ₂ O ₃	58	90	95	89	97	<25	74	80
	SiO ₂	38	-	-	-	-	>55	18	13
	Fe ₂ O ₃	<1	-	-	Cr ₂ O ₃ <5	-	<1	1,6	1,4
	P ₂ O ₅	<2,5	-	4	2,5	2	BaO 5		
Required mixing liquid: [l/100kg]	5W	10Pb	11W	11-12W	-	3-4W	rfp	rfp	

Pb phosphate binding agent

W water

rfp ready for processing