

# HIGH TEMPERATURE INSULATION WOOL

Ultra-lightweight insulating material for thermal insulation up to 1650 °C



# ALTRA® , ALSITRA® , CALSITRA®

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High temperature insulation wool is an ultra-lightweight insulation material that, due to its properties, provides highly efficient thermal insulation for industrial applications.

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## ALTRA®

Excellent up to 1650 °C

ALTRA® is a polycrystalline wool of high purity with excellent thermal and mechanical properties, which is produced in a sol-gel process without use of binders. As a result, the ALTRA® high temperature insulation wool offers virtually infinite thermal shock resistance and is thus excellently suited for periodically operated systems. RATH is the only supplier of polycrystalline wool in three grades with alumina contents of 72%, 80%, and 97%. The products are particularly suitable for use in the high-temperature field up to 1650 °C and offer a wide range of application possibilities.

## ALSITRA®

Universally applicable up to 1300 °C

The optimum application range of Alsitra® is in industrial processes at temperatures up to 1300 °C. Alsitra® is produced using ultrapure raw materials in the melt process.

## CALSITRA®

Strong up to 1000 °C

CALSITRA® is used at temperatures up to 1000 °C. The raw material basis for this grade consists of alkali metal and alkaline earth metal silicates. The suitability must be checked beforehand for the respective application, because the use of Calsitra® high temperature insulation wool is tailored to specific application areas.



# HIGH TEMPERATURE INSULATION WOOL

Due to its excellent properties, the high temperature insulation wool is particularly energy-reducing and ideal for applications with rapidly alternating heating and cooling cycles.

Due to the targeted combination of physical properties, the high temperature insulation wool is particularly energy-reducing, and in combination with standard refractory materials such as bricks and concrete, it is the ideal addition to a complete refractory lining.

## THE ADVANTAGES OF HIGH TEMPERATURE INSULATION WOOL

- Unlimited thermal shock resistance
- **Low thermal conductivity**
- High chemical resistance

ALTRA®	ALSITRA®	CALSITRA®
Polycrystalline wool (PCW)	Aluminum silicate wool (ASW)	Alkaline earth silicate wool (AES)
Alumina wool	Aluminum silicate wool	Calcium silicate wool
Mullite wool	Aluminum-silicate-zircon wool	Magnesium silicate wool
		Calcium-magnesium silicate wool

**HIGH TEMPERATURE INSULATION WOOL**

PROPERTIES		ALTRA B 72	ALTRA B 80	ALTRA B 97 HA	ALSITRA 1300	ALSITRA 1400	ALSITRA 1400Z
<b>Raw material base</b>							
		Alumina, aluminum silicate					
<b>Classification temperature [°C]</b>		1650	1600	1600	1300	1400	1400
<b>Application temperature [°C]</b>		1650	1600	1600	< 1150	< 1250	< 1300
<b>Permanent length change [%]</b>  (24h at given temperature)	1100 °C	-	-	-	-2.0	-	-
	1200 °C	-	-	-	-3.0	-2.0	-1.0
	1300 °C	-	-	-	-4.0	-3.0	-1.6
	1400 °C	-	-1.0	-2.0	-	-4.0	< -4.0
	1500 °C	-1.0	-2.0	-3.0	-	-	-
	1600 °C	-2.0	-3.0	-4.0	-	-	-
<b>Chemical analysis [%]</b>							
DIN EN 955-2; 4	Al <sub>2</sub> O <sub>3</sub>	72	80	97	48	54	37
	SiO <sub>2</sub>	28	20	3	52	46	48
	ZrO <sub>2</sub>	-	-	-	-	-	15
	MgO	-	-	-	-	-	-
<b>Thermal conductivity [W/mK]</b>  (hot-wire method) DIN EN 993-14	400 °C	0.09	0.09	0.10	0.11	0.11	0.08
	600 °C	0.13	0.13	0.16	0.15	0.15	0.12
	800 °C	0.19	0.19	0.25	0.21	0.21	0.18
	1000 °C	0.28	0.28	0.39	0.31	0.31	0.20
	1200 °C	0.41	0.41	0.62	0.44	0.44	0.36
	1400 °C	0.61	0.61	0.97	-	0.64	-
At bulk density [kg/m <sup>3</sup> ]		100	100	100	128	128	128



# MATS

MADE OF ALTRA<sup>®</sup>, ALSITRA<sup>®</sup> AND CALSITRA<sup>®</sup>

Mats are produced directly in the manufacturing process by needling of the wool. No binder system is used in this process. This results in mats made of high temperature insulation wool by RATH that are free of organic constituents.

**This technology allows producing mats of defined thicknesses, densities, and dimensions. The material is thus interwoven and remains free of organic constituents.**

Mat thicknesses up to 50 mm and lengths up to 21 m are produced by default, depending on density. Densities of up to 160 kg/m<sup>3</sup> can be achieved. RATH offers stampings and cuttings according to the customers' requirements.

## HIGH-TEMPERATURE MAT

PROPERTIES		ALTRA MAT-72	ALTRA MAT-80	ALTRA MAT-97	ALSITRA MAT-1300	ALSITRA MAT-1400	ALSITRA MAT-1400Z	CALSITRA MAT 1250
Raw material base		Aluminum silicate, alumina, alkaline earth silicate						
Classification temperature [°C]		1650	1600	1500	1300	1400	1400	1250
Application temperature [°C]		1650	1600	1500	< 1150	< 1250	< 1300	< 1100*
Bulk density [kg/m <sup>3</sup> ]		60 - 120	60 - 120	60 - 100	96 - 160	96 - 160	96 - 160	96 - 128
Permanent Length change [%]  (24h at given temperature)	1100 °C	-	-	-	-2.0	-	-1.0	-
	1200 °C	-	-	-	-3.0	-2.0	-1.6	-3.0
	1300 °C	-	-	-	-4.0	-3.0	-3.2	-
	1400 °C	-	-1.0	-2.0	-	-4.0	< -4.0	-
	1500 °C	-1.0	-2.0	-4.0	-	-	-	-
	1600 °C	-2.0	-3.0	-5.0	-	-	-	-
Chemical analysis [%] DIN EN 955-2; 4	Al <sub>2</sub> O <sub>3</sub>	72	80	97	48	54	37	-
	SiO <sub>2</sub>	28	20	3	52	46	48	75 - 82
	CaO	-	-	-	-	-	-	-
	MgO	-	-	-	-	-	-	18 - 25
	ZrO <sub>2</sub>	-	-	-	-	-	15%	-
	Thermal conductivity [W/mK]  (hot-wire method) DIN EN 993-14	400 °C	0.09	0.09	0.10	0.11	0.11	0.08
600 °C		0.13	0.13	0.16	0.15	0.15	0.12	0.14
800 °C		0.19	0.19	0.25	0.21	0.21	0.18	0.23
1000 °C		0.28	0.28	0.39	0.31	0.31	0.20	0.34
1200 °C		0.41	0.41	0.62	0.44	0.44	0.36	0.48
1400 °C		0.61	0.61	0.97	0.64	0.64	-	-
At bulk density [kg/m <sup>3</sup> ]		100	100	100	128	128	128	128

\* in non-corrosive furnace atmosphere



### THERE ARE MANY APPLICATIONS FOR MATS:

- Lining of furnace walls
- Starting material for module production
- Compensation strips in furnace construction
- Seals
- Sound damping at high temperatures

# MODULES

## MADE OF ALTRA®, ALSITRA® AND CALSITRA®

Modules are made of parallel Altra®, Alsitra® or Calsitra® mat strips and compressed to the required module thickness. The compression of the modules compensates the possible shrinkage.



Altra® modules with plate binding



Alsitra® modules sewn

### Straightforward mounting systems facilitate the installation of modular linings.

Modules are installed either using comb anchors onto which the modules are individually plugged, or by bonding with Kerathin® adhesive directly onto brick linings or on expanded metals. The selection of the anchor or adhesive is also crucial for the service life of the lining.

Altra® modules are laterally compressed with plates or sheets to ensure the dimensional stability of the module until installation.

Alsitra® and Calsitra® modules are cord modules that are sewn for easier assembly.

The compression elements are removed once the assembly is completed. The modules expand, producing a closed, fire-resistant lining in the system.

### THE ADVANTAGES OF HTW MODULES:

- Easy mounting
- Swift installation
- No special tools required
- Welded or screwed anchors possible
- Control of the anchor fit before it is hidden
- Control of the compression of the modules
- Compensation of irregularities at the furnace casing easily possible
- Easy replacement of damaged modules

## MODULES

PROPERTIES	ALTRA Mod	ALSITRA Mod	CALSITRA Mod
<b>Raw material base</b>	Altra Mat 72 Altra Mat 80 Altra Mat 97	Alsitra Mat 1300 Alsitra Mat 1400 Alsitra Mat 1400Z	Calsitra Mod 1250
<b>Application temperature [°C]</b> <small>depending on density and chemical composition</small>	< 1650	< 1300	< 1000
<b>Bulk density [kg/m³]</b>	100 - 180	140 - 240	140 - 200
<b>Dimensions</b>			
	Length [mm]	50 - 1200	50 - 1200
	Width [mm]	80 - 600	80 - 600
	Height [mm]	50 - 600	50 - 600

Special dimensions upon request

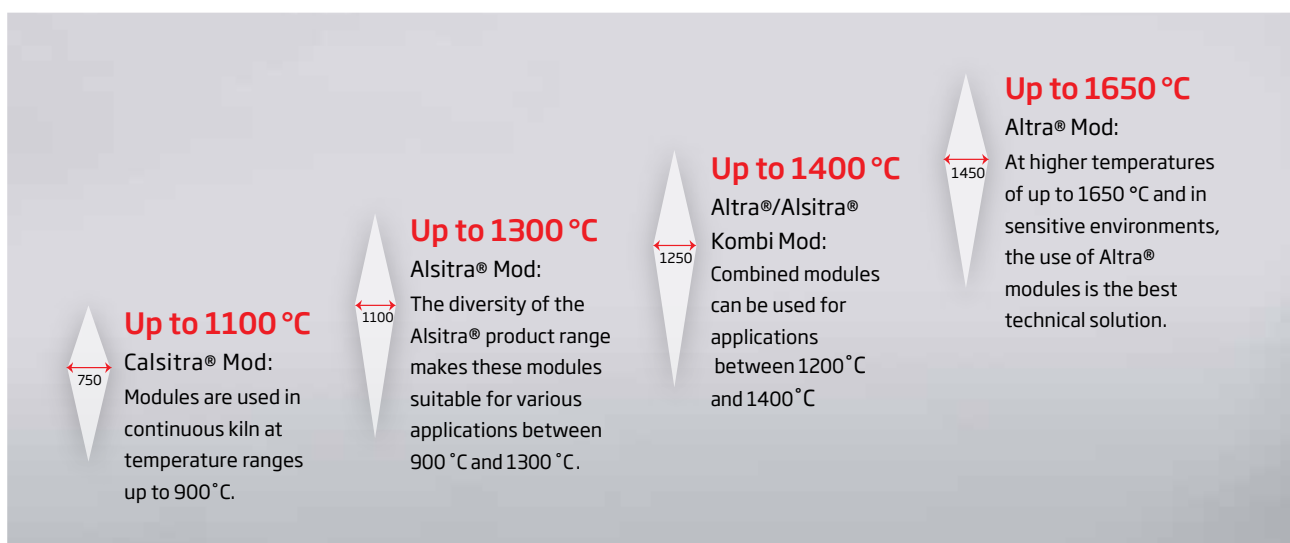
# COMBINATION MODULES

Combination modules without addition of foreign substance were developed by RATH and, thanks to the RATH-specific connection system, represent a unique form of modular lining in the range of 1200 °C - 1400 °C.

**Combination modules consist of two differing mat types, such as Altra®-Alsitra® or Altra®-Calsitra®.**

This allows a very specific temperature range to be covered, in combination with pure Altra, Alsitra, or Calsitra modules providing an optimal and very efficient lining.

Thanks to the RATH-specific connection system, which does not require addition of any foreign substances, combination modules also offer unlimited thermal shock resistance.



## COMBINATION MODULES

PROPERTIES	ALTRA Kombi Mod ALTRA/ALSITRA	ALTRA Kombi Mod ALTRA/CALSITRA
Raw material base	Altra Mat 72/ Alsitra Mat 1400 Altra Mat 97/ Alsitra Mat 1400	Altra Mat 72/ Calsitra Mat 1250 Altra Mat 97/ Calsitra Mat 1250
Continuous application temperature [°C] depending on density and chemical composition	< 1400	< 1300
Bulk density [kg/m <sup>3</sup> ] Alsitra/...	140/180	140/180
Altra content [mm]	50, 75, 100, 125	50, 75, 100, 125
Dimensions	Length [mm]	200 - 600
	Width [mm]	150 - 450
	Height [mm]	250 - 300

Special dimensions upon request

# PAPER

## MADE OF HIGH TEMPERATURE INSULATION WOOL

Paper made of high temperature insulation wool is an aid for refractory lining and is used in a fourdrinier process with addition of small amounts of inorganic and organic binders, such as latex.



High-temperature paper

**This results in elastic papers, which are available in thicknesses from 0.5 mm to 6 mm as rolled goods. The further processing takes place by cutting (to strips of different width and length) or stamping.**

According to the raw material base contained in the paper, the papers are designated as follows:

- Altra® KP are papers based on polycrystalline wool
- Alsitra® KP are papers based on aluminum silicate wool
- Calsitra® KP are papers based on alkaline earth silicate wool

The Altra® KP paper excels by its high temperature resistance and its very smooth surface. For this reason, it is used in processes in which damage to the surface of the product must be avoided (glass fusing).

### HIGH-TEMPERATURE PAPER

PROPERTIES		ALTRA KP 1600	ALSITRA KP 1250	ALSITRA KP 1400	CALSITRA CP 1250
Raw material base		Aluminum silicate, alumina, alkaline earth silicate			
Classification temperature [°C]		1600	1250	1400	1250
Application temperature [°C]		< 1500	< 1150	< 1250	1100
Bulk density [kg/m³]		> 150	> 200	> 200	> 200
Chemical analysis [%] DIN EN 955-2; 4 after burnout	Al <sub>2</sub> O <sub>3</sub>	> 88	> 46	> 48	-
	SiO <sub>2</sub>	< 12	< 54	< 52	70 - 80
	CaO / MgO	-	-	-	18 - 25



# EXTREMELY EASY INSTALLATION

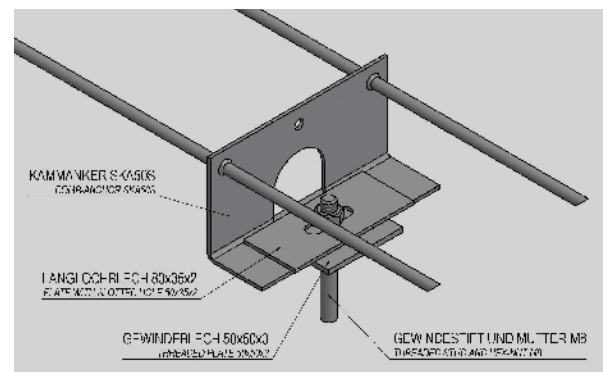
In addition to standard dimensions, modules with complex contours are also available.

**Alsitra® and Calsitra® modules are provided as cord modules. In the case of combination and Altra® modules, lateral plates or sheets ensure the dimensional stability of the module until installation.**

Thanks to the comb anchors, the modules can be easily assembled in a short time and without any special tools. After assembly, the compression systems are detached and removed.



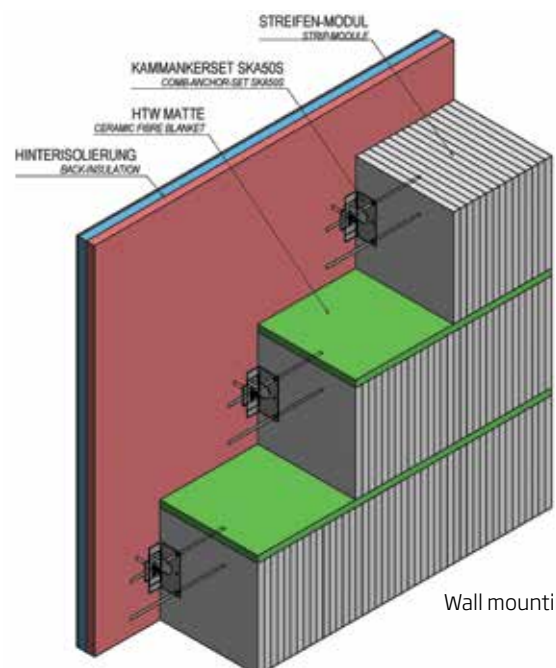
Backing insulating



Fastening anchor



Ceiling mounting of Altra® modules



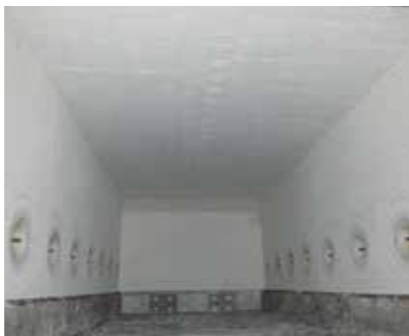
Wall mounting

# A WIDE APPLICATION RANGE

High temperature insulation wool and modules are usually used in combination with other refractory materials such as refractory bricks and concrete. This results in an optimal solution for the respective requirements with regard to mechanical and chemical resistance as well as thermal shock resistance.



Rotary kiln



Combined lining: Refractory bricks, concrete moldings, HTW modules (ceiling)



HTW lining for bogie-type furnaces

**Modules made of high temperature insulation wool are successfully used in the steel, ceramics and chemical industries.**

Modules made of high temperature insulation wool are particularly suitable for discontinuously operated industrial furnaces, post-combustion plants, and special applications.



Combination concrete molding and HTW modules



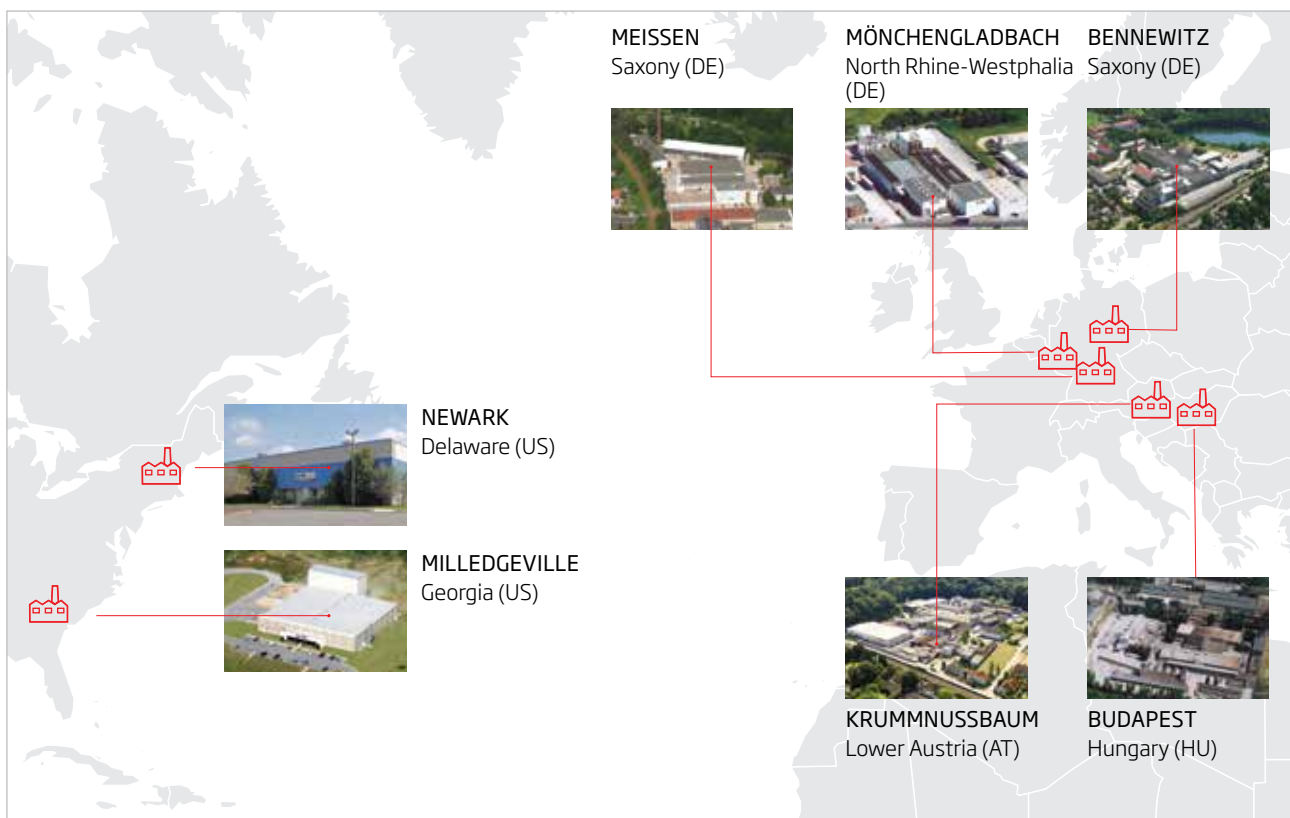
Exhaust gas chamber with L-modules

On account of its performance, the material high temperature insulation wool nowadays offers increasingly innovative solutions for a wide range of problems in the area of high-temperature technology.

# COMPETENCE CENTER MÖNCHENGLADBACH

The production of high temperature insulation wool at the Mönchengladbach factory is unique in Europe. In addition to the competence in the area of development and process technology residing here, all final products of the Altra®, Alsitra® and Calsitra® families are finished downstream in two highly specialized production lines for the production of the wool.

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.



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