

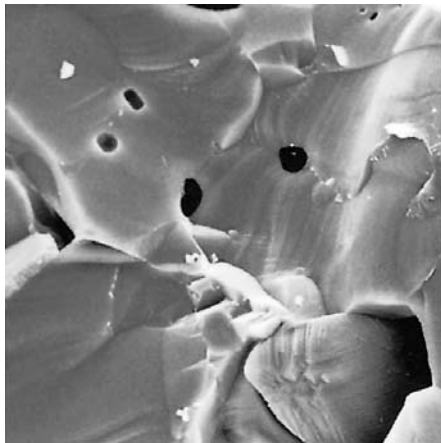


ALMATIS  
PREMIUM ALUMINA

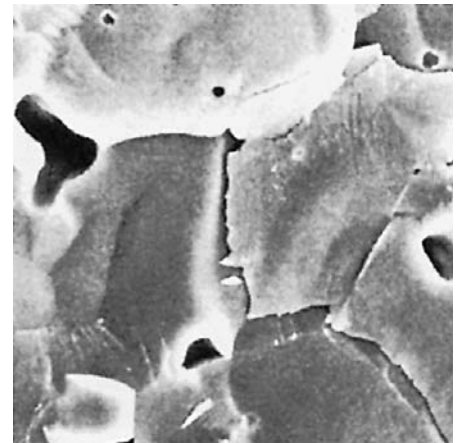


Product Data

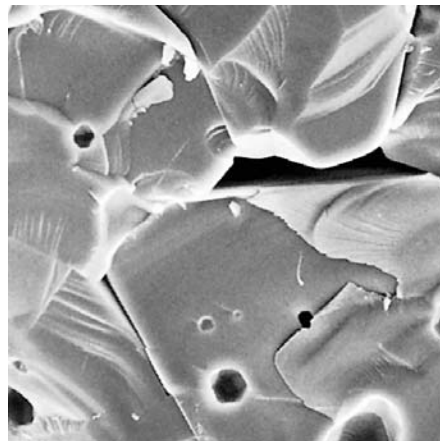
# Magnesium Aluminate Spinel



Spinel MR 66  10  $\mu\text{m}$



Spinel AR 78  10  $\mu\text{m}$



Spinel AR 90  10  $\mu\text{m}$

Think alumina, think Almatis.

GP-RCP/004/R10/0520/SDS 340



# Magnesia-Rich Spinel MR 66

Chemical Composition [%]			
	Typical	Min	Max
Al <sub>2</sub> O <sub>3</sub> by difference		63.0	
MgO	33.0	31.0	35.0
CaO	0.39		0.60
SiO <sub>2</sub>	0.09		0.15
Na <sub>2</sub> O	0.03		0.20
Fe <sub>2</sub> O <sub>3</sub>	0.20		0.30
Fe Magnetic	0.005		0.02

Physical Properties			
	Typical	Min	Max
Bulk Specific Gravity [g/cm <sup>3</sup> ]	3.3	3.2	
Apparent Porosity [%]	1.8		2.9
Water Absorption [%]	0.5		0.9

All data are based upon Almatix standard test methods.

## Particle Size Distribution

DIN <sup>1)</sup> [mm]	Typical [%]	Min/Max [%]
<b>1 - 3 mm</b>		
+ 3.35 mm	2	0 - 10
+ 2.00 mm	52	
+ 1.40 mm	25	
+ 1.00 mm	16	
- 1.00 mm	5	0 - 10
<b>0 - 1 mm</b>		
+ 1.40 mm	0	0 - 2
+ 1.00 mm	3	0 - 10
+ 0.50 mm	45	
+ 0.20 mm	29	
+ 0.106 mm	11	
- 0.106 mm	12	

DIN <sup>1)</sup> [mm]	Typical [%]	Min/Max [%]
<b>- 90 micron*</b>		
+ 0.090 mm	4	0 - 10
+ 0.063 mm	7	
- 0.063 mm	89	
d50 <sup>2)</sup>	22	16 - 32 [µm]

1) Sieve analysis as per DIN/ISO 3310/1

2) Cilas Granulometer 1064

\*Stored under adequate dry conditions, the properties of MR66 -90 micron remain stable for a period of 12 months.

The typical product properties are based upon the actual averages from product data. The Min/Max data show our standard product specification data for these products. Other sizes are available upon request.



# Alumina-Rich Spinel AR 78

Chemical Composition [%]	Typical	All sizes <sup>3)</sup>		- 20 micron	
		Min	Max	Min	Max
Al <sub>2</sub> O <sub>3</sub> by difference		74.0		74.0	
MgO	22.5	20.5	24.0	20.5	24.0
CaO	0.24		0.30		0.30
SiO <sub>2</sub>	0.10		0.15		0.20
Na <sub>2</sub> O	0.09		0.32		0.32
Fe <sub>2</sub> O <sub>3</sub>	0.15		0.25		0.25
Fe Magnetic	0.005		0.02		0.02

Physical Properties					
Bulk Specific Gravity [g/cm <sup>3</sup> ]	3.3	3.2		3.2	
Apparent Porosity [%]	1.8	2.6		2.6	
Water Absorption [%]	0.5	0.8		0.8	

All data are based upon Almatix standard test methods.

3) All sizes excluding - 20 micron

## Particle Size Distribution

DIN <sup>4)</sup> [mm]	Typical [%]	Min/Max [%]
<b>0.5 - 1 mm</b>		
+ 1.00 mm	3	0 - 5
+ 0.71 mm	47	
+ 0.50 mm	43	
- 0.50 mm	7	0 - 10
<b>0 - 0.5 mm</b>		
+ 0.50 mm	5	0 - 10
+ 0.25 mm	41	
+ 0.125 mm	25	
+ 0.063 mm	13	
+ 0.045 mm	5	
- 0.045 mm	11	

DIN <sup>4)</sup> [mm]	Typical [%]	Min/Max [%]
<b>- 90 micron</b>		
+ 0.090 mm	5	0 - 10
+ 0.063 mm	8	
- 0.063 mm	87	
d50 <sup>5)</sup>	22 [µm]	16 - 32 [µm]
<b>- 45 micron</b>		
+ 0.045 mm	3	0 - 10
d50 <sup>5)</sup>	11 [µm]	5 - 16 [µm]
<b>- 20 micron</b>		
+ 0.020 mm	3	max. 7
d50 <sup>5)</sup>	2.0 [µm]	3.0 [µm]

4) Sieve analysis as per DIN/ISO 3310/1

5) Cilas Granulometer 1064

The typical product properties are based upon the actual averages from product data. The Min/Max data show our standard product specification data for these products. Other sizes are available upon request.



# Alumina-Rich Spinel AR 90

Chemical Composition [%]	Typical	Min	Max
Al <sub>2</sub> O <sub>3</sub> by difference		87.0	
MgO	9.5	8.0	11.0
CaO	0.14		0.25
SiO <sub>2</sub>	0.06		0.18
Na <sub>2</sub> O	0.15		0.38
Fe <sub>2</sub> O <sub>3</sub>	0.06		0.17
Fe Magnetic	0.005		0.02

Physical Properties			
Bulk Specific Gravity [g/cm <sup>3</sup> ]	3.4	3.3	
Apparent Porosity [%]	2.0		3.0
Water Absorption [%]	0.6		0.9

All data are based upon Almatix standard test methods.

## Particle Size Distribution

DIN <sup>6)</sup> [mm]	Typical [%]	Min/Max [%]
<b>3 - 6 mm</b>		
+ 6.30 mm	1	0 - 10
+ 5.00 mm	27	
+ 4.00 mm	40	
+ 3.35 mm	24	
- 3.35 mm	8	0 - 10
<b>1 - 3 mm</b>		
+ 3.35 mm	2	0 - 10
+ 2.00 mm	48	
+ 1.40 mm	27	
+ 1.00 mm	18	
- 1.00 mm	5	0 - 10

DIN <sup>6)</sup> [mm]	Typical [%]	Min/Max [%]
<b>0.5 - 1 mm</b>		
+ 1.00 mm	2	0 - 10
+ 0.71 mm	46	
+ 0.50 mm	46	
- 0.50 mm	6	0 - 10
<b>0 - 0.5 mm</b>		
+ 0.50 mm	5	0 - 10
+ 0.25 mm	43	
+ 0.125 mm	22	
+ 0.063 mm	13	
+ 0.045 mm	6	
- 0.045 mm	11	

6) Sieve analysis as per DIN/ISO 3310/1

The typical product properties are based upon the actual averages from product data. The Min/Max data show our standard product specification data for these products. Other sizes are available upon request.



# Magnesium Aluminate Spinel

## Product Information

Manufactured from high purity raw materials, Magnesium Aluminate Spinel has excellent refractory properties and is recognized as a superior refractory aggregate.

The development of spinel has followed two distinct paths as prescribed by these two separate industry needs: magnesia-rich spinel products for use with magnesia-based bodies and alumina-rich spinel for use with alumina bodies.

### Almatis Magnesia-Rich Spinel MR 66

Almatis Spinel MR 66 is used extensively as a replacement for chrome ore in basic brick manufacture. MR 66 imparts the improved thermal shock resistance normally associated with chrome additions, but without the potential problem of hazardous waste disposal. This improved thermal shock resistance is achieved through the development of internal micro cracks and voids due to the mismatched thermal expansion rates. The reversible thermal expansion of Spinel MR 66 is approximately half that of magnesia.

The most successful use of magnesia spinel bricks is in cement rotary kilns where they have demonstrated superior performance to the previously used mag-chrome bricks. This extended life has been attributed to the ability of the mag-spinel bricks to retain a coating without excessive penetration and peeling. Spinel MR 66 can be used as a replacement for chrome in other applications where the disposal of used chrome containing refractories is a problem, such as lime kilns and glass tank regenerator checkers. Almatis Spinel MR 66 has a small amount of free magnesia which can be used to advantage in the design of aluminous refractories. This free magnesia will react with available alumina to form secondary spinel. The volume expansion from the reaction of one mole of magnesia with one mole of alumina, to form spinel, measured by technical sintering, is 5 percent. Thus, the addition of MR 66 to aluminous bodies will impart some expansion. The free magnesia in MR 66 can also be used as a setting agent for phosphate bonds to produce a cold setting monolithic refractory or mortar. MR 66 should not be used in H<sub>2</sub>O basis castables because of the high reactivity of the excess MgO.

### Almatis Alumina-Rich Spinel AR 78 and AR 90

Almatis Spinel AR 78 and AR 90 are eminently suitable for castables in steel ladles. It is generally agreed that the spinel content of such castables should be in the order of 15-30%. AR 78 and AR 90 are distinguished by their chemistries (78% and 90% alumina respectively). They are available in a variety of closely controlled sizes, from -20 micron to 3-6 mm. Within spinel containing refractory formulations AR 78 is preferably used for the fines to the medium sized fractions, whereas AR 90 shows most benefit when used in the medium to coarse size grain fractions.

Laboratory investigations and market experiences show that spinel addition to aluminous refractory bodies, prefired shapes, and monolithics considerably improve their resistance to slag attack and their thermal shock resistance.

The hot modulus of rupture and the thermo-mechanical strength can be increased considerably by addition of alumina-rich spinel to the mix.



# Magnesium Aluminate Spinel

## Packaging

- Bags: 25 kg
- Big bags
- Bulk shipments
- Special packaging on request



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