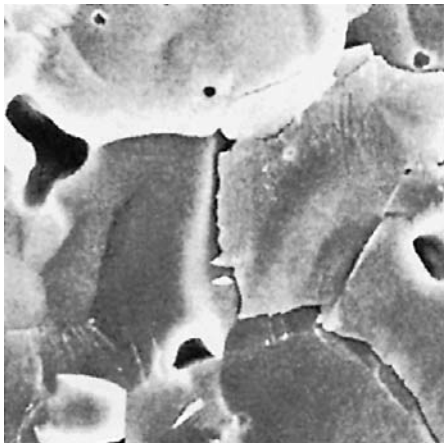
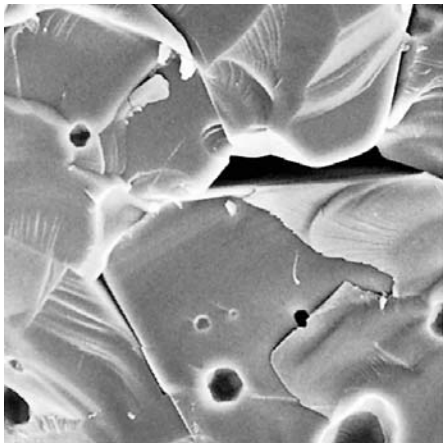
ALMATIS

Product Data

# Magnesium Aluminate Spinels



Spinel AR 78 ⌊——⌋ 10 µm



Spinel AR 90 ⌊——⌋ 10 µm

# Alumina-Rich Spinel AR 78

| Chemical Composition [%] | Typical | All sizes [3] | | - 20 micron | |
|---|---|---|---|---|---|
| | | Min | Max | Min | Max |
| $Al_2O_3$ by difference | | 74.0 | | 74.0 | |
| MgO | 22.5 | 20.5 | 24.0 | 20.5 | 24.0 |
| CaO | 0.24 | | 0.30 | | 0.30 |
| $SiO_2$ | 0.10 | | 0.15 | | 0.20 |
| $Na_2O$ | 0.09 | | 0.32 | | 0.32 |
| $Fe_2O_3$ | 0.15 | | 0.25 | | 0.25 |
| Fe Magnetic | 0.005 | | 0.02 | | 0.02 |

| Physical Properties | | | | | |
|---|---|---|---|---|---|
| Bulk Specific Gravity [g/cm³] | 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 Almatis standard test methods.

3) All sizes excluding - 20 micron

## Particle Size Distribution

| DIN [4] [mm] | Typical [%] | Min/Max [%] |
|---|---|---|
| 0.5 - 1 mm | | |
| + 1.00 mm | 3 | 0-5 |
| + 0.71 mm | 47 | |
| + 0.50 mm | 43 | |
| – 0.50 mm | 7 | 0-10 |
| | | |
| 0 - 0.5 mm | | |
| + 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 [4] [mm] | Typical [%] | Min/Max [%] |
|---|---|---|
| - 90 micron | | |
| + 0.090 mm | 5 | 0-10 |
| + 0.063 mm | 8 | |
| – 0.063 mm | 87 | |
| d50 [5] | 22 [µm] | 16-32 [µm] |
| - 45 micron | | |
| + 0.045 mm | 3 | 0-10 |
| d50 [5] | 11 [µm] | 5-16 [µm] |
| - 20 micron | | |
| + 0.020 mm | 3 | max. 7 |
| d50 [5] | 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 |
|---|---|---|---|
| $Al_2O_3$ by difference | | 87.0 | |
| MgO | 9.5 | 8.0 | 11.0 |
| CaO | 0.14 | | 0.25 |
| $SiO_2$ | 0.06 | | 0.18 |
| $Na_2O$ | 0.15 | | 0.38 |
| $Fe_2O_3$ | 0.06 | | 0.17 |
| Fe Magnetic | 0.005 | | 0.02 |

| Physical Properties | | | |
|---|---|---|---|
| Bulk Specific Gravity [g/cm³] | 3.4 | 3.3 | |
| Apparent Porosity [%] | 2.0 | | 3.0 |
| Water Absorption [%] | 0.6 | | 0.9 |

All data are based upon Almatis standard test methods.

## Particle Size Distribution

| DIN [6] [mm] | Typical [%] | Min/Max [%] |
|---|---|---|
| **3 - 6 mm** | | |
| + 6.30 mm | 1 | 0-10 |
| + 5.00 mm | 27 | |
| + 4.00 mm | 40 | |
| + 3.35 mm | 24 | |
| – 3.35 mm | 8 | 0-10 |
| **1 - 3 mm** | | |
| + 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 [6] [mm] | Typical [%] | Min/Max [%] |
|---|---|---|
| **0.5 - 1 mm** | | |
| + 1.00 mm | 2 | 0-10 |
| + 0.71 mm | 46 | |
| + 0.50 mm | 46 | |
| – 0.50 mm | 6 | 0-10 |
| **0 - 0.5 mm** | | |
| + 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 Spinels

## 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 Alumina-Rich Spinels AR 78 and AR 90

Almatis Spinels 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 Spinels

## Packaging

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

## Contacts for sales, technical information and application assistance


**Almatis GmbH**
Giulinistrasse 2
67065 Ludwigshafen
Germany

 49 621 5707 0
49 621 5707 130

**Almatis B.V.**
Theemsweg 30
3197KM Botlek RT
The Netherlands

 31 181 2701 0
31 181 2178 53

**Almatis Singapore Pte. Ltd.**
300, Tampines Ave 5
#09-02 Singapore 529653
Singapore

 65 9049 6123
65 9049 6123

**Almatis Limited**
Morimura Bldg.
Toranomon Tower Office 13 F
1-28, Toranomon 4-chrome
Minato-ku, Tokyo 105-8451
Japan

 81 3 3432 6121
81 3 3432 6125

**Qingdao Almatis Co. Ltd.**
No.1 Songhuajiang Road
Qingdao Economic &
Technology Development Zone
Qingdao, 266510
P.R. China

 86 532 8695 7300
86 532 8676 3270

**Almatis Alumina Private Limited**
Kankaria Estate, 2nd Floor 6,
Little Russell Street
Kolkata 700-071,
India

 91 33 2289 4694
91 33 2289 4693

ALMATIS

Almatis GmbH
Lyoner Straße 9
60528 Frankfurt/Germany

Phone 49 69 957 341 0
Fax 49 69 957 341 13

info@almatis.com
www.almatis.com

**Almatis, Inc.**
501 West Park Road
Leetsdale, PA 15056,
USA

 800 643 8771 General
 1 412 630 2800
1 412 630 2900

**Almatis do Brasil Ltda.**
Avenida Jose de Souza
Campos, 243
2° Andar – Cambuí
13025-320 – Campinas,
SP – Brasil

 55 19 3515-1400
55 19 3515-1410


SDS 340