Martoxid® Aluminum Oxides
Calcined Aluminas for Technical Ceramics

Aluminum oxides to meet and exceed the most demanding ceramic applications requirements
Huber's Martoxid® Products

Huber Advanced Materials offers a range of tailor-made Martoxid® aluminum oxides to meet and exceed the most demanding requirements of ceramic product producers.

Martoxid® best-in-class ceramic materials provide highest chemical purity, low alkali content (Na₂O < 0.1%), optimized crystal properties, finest particle size, optimized particle size distribution, best rheological behavior and unsurpassed ceramic reactivity.

Each product has specific characteristics for distinct fields of application. Typical application fields include high mechanical strength, extreme hardness, excellent resistance to wear, temperature and corrosion, thermal conductivity and good electrical insulation.

Huber Advanced Materials produces a wide range of Martoxid® specialty oxides with constant quality characteristics. Stringent quality control and careful manufacturing procedures ensure a consistent process and low batch-to-batch variability.

Huber's Martoxid® Products

Martoxid® Product Portfolio

**Grade** | **Characteristics** | **Applications**
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MPS | Unground alumina for manufacturing high purity super reactive alumina compounds > 99.5% Al₂O₃ | Specifically developed feedstock for engineering ceramics, providing highest sintered densities
MRS | Unground alumina for manufacturing of highly reactive ceramic compounds > 98% Al₂O₃ | Specifically developed feedstock for engineering and performance ceramics
MZS | Unground material for specific processing on the customers’ milling equipment | Ideal feedstock for wear resistant engineering ceramics
MDS | Unground material dedicated to the customers’ upgrading equipment | Ideal for the manufacturing of high quality spark plugs, insulators and automotive converters
MZS-3 | Fine ground alumina with narrow particle size distribution; qualified for injection molding | Technical ceramics > 92% Al₂O₃, such as thread guides, seal discs and wear resistant electronic parts
MRS-1 | Roundish shaped, superground alumina with narrow particle size distribution and high sintering potential | Specifically developed feedstock for film substrates, mechanical engineering and performance ceramics
MR-23 | Fine ground alumina with optimized shrinkage | Electrical and technical ceramics > 92% Al₂O₃, such as housings, vacuum tubes, substrates and seal discs
MR-32 | Superground alumina with controlled wide grain size distribution and high green density; for low shrinkage applications | For formulations > 99.5% Al₂O₃, dedicated to advanced ceramics mostly used for electrical and mechanical engineering components
MR-700 | Thermally reactive Al₂O₃ (fired density > 3.88 g/cm³ at 1600 °C); for mechanical, electrical, chemical and thermal loads | Technical ceramics with an alumina content of 99.7% such as pump parts, bearings, substrates and tubes

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UNGROUNDSUPERGROUND GROUND
Martoxid® unground, ground and superground calcined aluminas
Typical chemical properties

<table>
<thead>
<tr>
<th>Martoxid® Grade</th>
<th>MPS</th>
<th>MRS</th>
<th>MZS</th>
<th>MDS</th>
<th>MZS-3</th>
<th>MDS-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>STATE OF MILLING</td>
<td>UNGROUND</td>
<td>UNGROUND</td>
<td>UNGROUND</td>
<td>UNGROUND</td>
<td>GROUND</td>
<td>GROUND</td>
</tr>
<tr>
<td>(\text{Al}_2\text{O}_3) Content [%]</td>
<td>99.8</td>
<td>99.8</td>
<td>99.8</td>
<td>99.8</td>
<td>99.8</td>
<td>99.8</td>
</tr>
<tr>
<td>(\text{Na}_2\text{O}) Content [%]</td>
<td>- 0.05</td>
<td>- 0.02</td>
<td>- 0.03</td>
<td>- 0.02</td>
<td>- 0.03</td>
<td>- 0.03</td>
</tr>
<tr>
<td>(\text{SiO}_2) Content [%]</td>
<td>- 0.06</td>
<td>- 0.05</td>
<td>- 0.06</td>
<td>- 0.06</td>
<td>- 0.07</td>
<td>- 0.07</td>
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<tr>
<td>(\text{Fe}_2\text{O}_3) Content [%]</td>
<td>- 0.03</td>
<td>- 0.03</td>
<td>- 0.03</td>
<td>- 0.03</td>
<td>- 0.03</td>
<td>- 0.03</td>
</tr>
<tr>
<td>(\text{CaO}) Content [%]</td>
<td>- 0.02</td>
<td>- 0.02</td>
<td>- 0.02</td>
<td>- 0.02</td>
<td>- 0.02</td>
<td>- 0.02</td>
</tr>
<tr>
<td>α-Content [%]</td>
<td>± 90</td>
<td>± 90</td>
<td>± 95</td>
<td>± 97</td>
<td>± 95</td>
<td>± 97</td>
</tr>
<tr>
<td>Specific Surface Area (BET) [m²/g]</td>
<td>- 4.5</td>
<td>- 1.8</td>
<td>- 1</td>
<td>- 0.6</td>
<td>- 1.2</td>
<td>- 0.9</td>
</tr>
<tr>
<td>Primary Crystal Size [µm]</td>
<td>- 0.6</td>
<td>- 1.2</td>
<td>- 2.5</td>
<td>- 4</td>
<td>- 2.5</td>
<td>- 4</td>
</tr>
<tr>
<td>PARTICLE SIZE DISTRIBUTION</td>
<td></td>
<td></td>
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<tr>
<td>(d_{10}) [µm]</td>
<td>~ 0.8</td>
<td>~ 0.9</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>(d_{50}) [µm]</td>
<td>~ 3.5</td>
<td>~ 4.5</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>(d_{90}) [µm]</td>
<td>~ 12</td>
<td>~ 13</td>
<td></td>
<td></td>
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<tr>
<td>≥ 45 µm [%]</td>
<td>~ 1</td>
<td>~ 1</td>
<td></td>
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<tr>
<td>Bulk Density [kg/m³]</td>
<td>~ 950</td>
<td>~ 900</td>
<td>~ 850</td>
<td>~ 750</td>
<td>~ 550</td>
<td>~ 600</td>
</tr>
<tr>
<td>Pressed Density at 50 MPa [g/cm³]</td>
<td></td>
<td></td>
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<tr>
<td>Sintered Density at 1600 °C* [g/cm³]</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

*Retention Time: 2 Hours at \(1600 °C\)

Martoxid® Calcined Aluminas for Technical Ceramics

The Martoxid® alumina oxide grades are the material of choice for technical ceramics applications as they meet and exceed the highest product quality standards and customer requirements. Our comprehensive listing of Martoxid® grades on the previous page is showing all grades offered by Huber Advanced Materials along with individual product characteristics and ceramics applications. Martoxid® MRS and Martoxid® MRS-1 are aluminas specifically designed to meet our customers’ requirements in high performance ceramics. They are well-suited for use in sophisticated electronic applications, mechanically stressed and engineering components.

To get a better understanding of our comprehensive line-up of Martoxid® product offerings for technical ceramics, above is a snapshot of the typical chemical and physical properties and unique product characteristics. You will notice the products are divided into groupings to showcase our unground, ground and superground grades.

Visualize the outstanding appearance of two Martoxid® grades

Under the Scanning Electron Microscope (SEM), one can truly visualize the outstanding physical appearance of Martoxid® MR-70D and Martoxid® MDS.

Look closely at the excellent technical pattern and symmetry of both products. Unground Martoxid® MDS is ideal for automotive and insulation applications while Martoxid® MR-70D is thermally reactive and ideal for a number of industrial ceramics applications.
The high performing superground Martoxid® grades meet the requirements of many high-end ceramic applications. This plot of Martoxid® superground products by median particle size (μm) and specific surface area (m²/g) shows the wide range of grades available from Huber Advanced Materials.

Since we offer a number of products with varying properties, we will work closely with you to completely understand your specific ceramics application to identify and customize the product solution perfectly suited for your application.

Huber Advanced Materials has more than half a century of supplying calcined aluminas for the most demanding technical ceramics applications. In addition to our innovative Martoxid® grades that we’ve presented, we provide superior technical service and expertise along with a deep dedication toward providing fast, personalized customer service and support.

We look forward to working with you. Contact us today for more information and samples of our array of Martoxid® calcined alumina products for your technical ceramics applications.

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The Huber Advanced Materials (HAM) SBU is a specialty chemicals business with a global, leading position in the development and production of halogen-free fire retardant solutions, smoke suppressants and specialty aluminas touching lives and enhancing safety for millions of people around the world.

Our global footprint

Europe
- Bergheim, Germany
- Breitenau, Austria

Asia Pacific
- Qingdao, China

Americas
- Fairmount, GA
- Atlanta, GA
- Kennesaw, GA
- Marblehead, IL
- Bauxite, AR

R&D Centers: 2
Manufacturing plants: 6
Customer Care Centers: 3

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