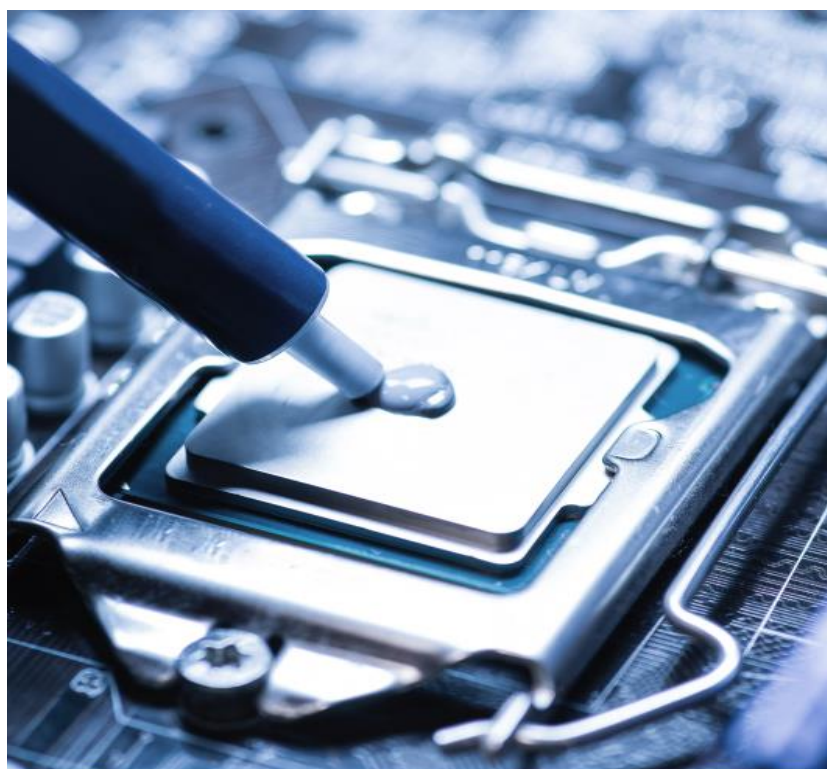




Provisional Product Data

Aluminas for Thermal Interface Materials



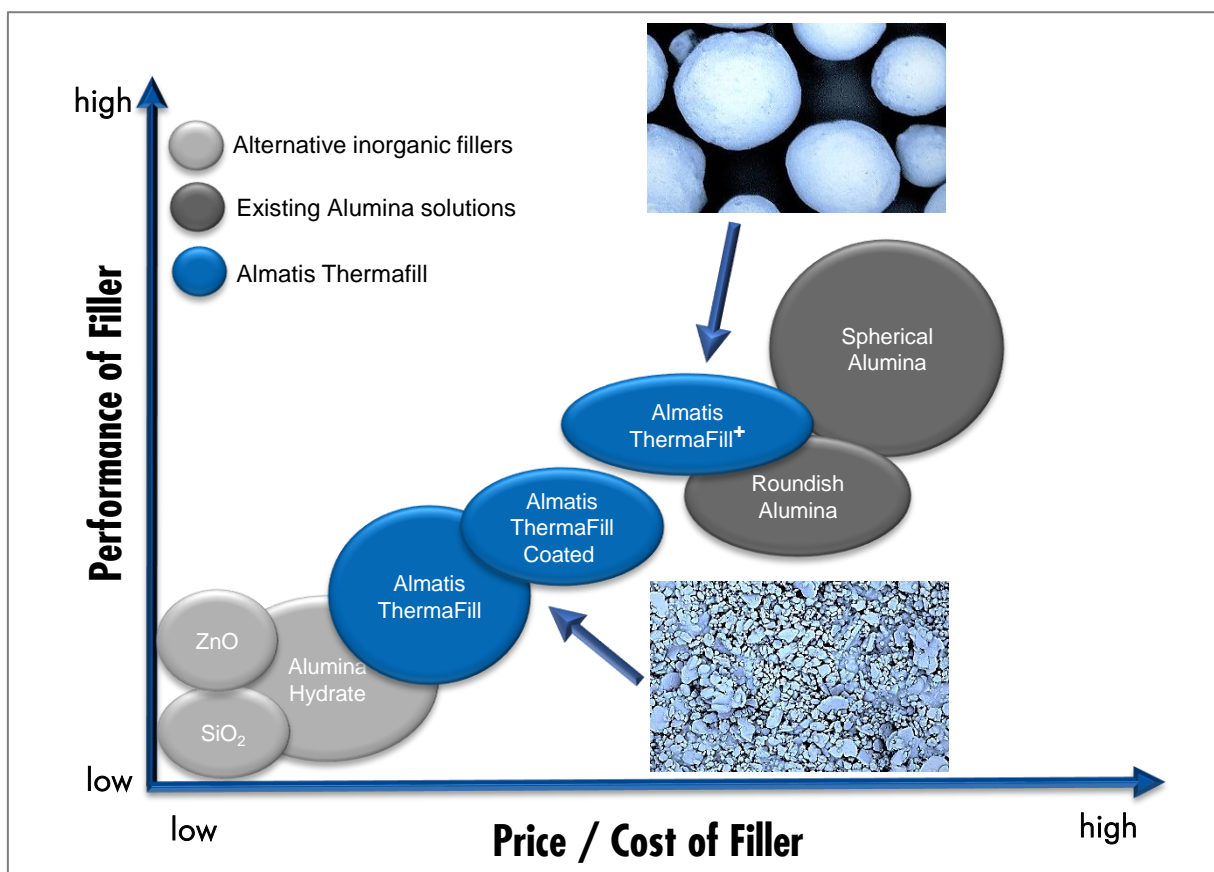
Think alumina, think Almatris.



Aluminas for Thermal Interface Materials

ThermaFill-Series

ThermaFill products are specially designed alumina fillers to yield higher performance in thermal interface applications. Alumina fillers provide a high value/cost option to increase thermal conductivity in polymer systems such as silicone, epoxy and more. The lower viscosity and higher packing efficiency with ThermaFill products allows a higher filler loading and the potential to increase thermal conductivity further.



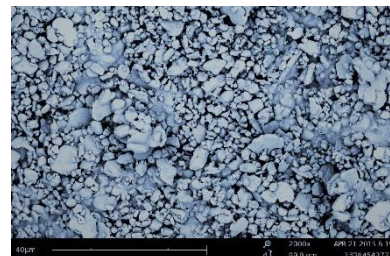


Aluminas for Thermal Interface Materials

ThermaFill-Series

ThermaFill products are the economic solution for basic functional filler applications.

The ThermaFill product series is available as a surface treated version, which enables the user to increase the solids loading in compounds for optimized thermal conductivity. There are solutions for Epoxy (E), Silicone (S), Polyol (P) and Urethane (U) available, which are labeled with a suffix accordingly.



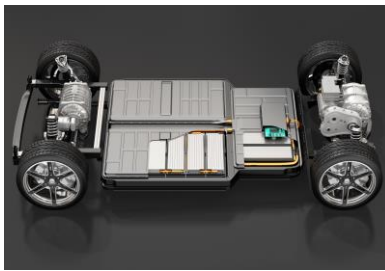
SEM Image: ThermaFill 5

| ThermaFill | | | | | | | | | | |
|--|---------------------|------------|------------|------------|------------|------------|------------|----------|------------|------------|
| Chemical Composition | Unit | 15 | 10 | 9 | 8 | 5 | 4 | 3 | 2 | 1 |
| Al ₂ O ₃ Typical | [%] | 99.7 | 99.5 | 99.7 | 99.5 | 99.7 | 99.7 | 99.7 | 99.7 | 99.7 |
| Na ₂ O Typical | [%] | 0.08 | 0.4 | 0.03 | 0.1 | 0.08 | 0.1 | 0.1 | 0.08 | 0.08 |
| Particle Size Distribution | | | | | | | | | | |
| Grain Size Distribution | | Mono-modal | Mono-modal | Mono-modal | Mono-modal | Mono-modal | Mono-modal | Bi-modal | Mono-modal | Mono-modal |
| D50 Typical | [μm] | 15 | 10 | 9 | 8 | 4 | 3 | 3 | 1.2 | 0.5 |
| > 45 μm / 325 mesh | [%] | ≤ 10 | ≤ 5 | ≤ 5 | ≤ 5 | ≤ 0.3 | ≤ 0.1 | ≤ 0.1 | | |
| > 20 μm / 635 mesh | [%] | | | | | ≤ 3 | | | ≤ 1 | ≤ 1 |
| Physical Properties | | | | | | | | | | |
| Specific Surface Area Typ. | [m ² /g] | 0.4 | 0.8 | 0.8 | 0.5 | 0.9 | 2 | 3 | 3 | 7 |

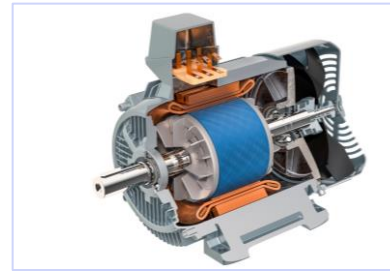
All data are based upon Almatix standard test methods and published as typical or range limits.



APPLICATION: Electronics



APPLICATION: potting materials for battery packs



APPLICATION: Encapsulation for electric motors

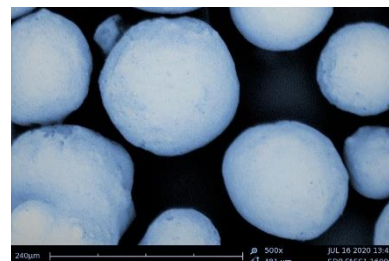


Aluminas for Thermal Interface Materials

ThermaFill⁺

ThermaFill⁺ is used as an alumina filler designed to yield a higher performance in polymer resin systems, such as silicone, epoxy, etc., for heat dissipation applications. The higher packing efficiency of ThermaFill⁺ compared to standard aluminas allows for a higher filler loading and lower viscosity of the filled resin, offering the potential to significantly increase the thermal conductivity. ThermaFill⁺ provides a cost efficient, high value solution for thermal interface materials.

ThermaFill⁺ is available as a surface treated version, including Epoxy (E), Silicone (S), Polyol (P) and Urethane (U), which are labeled with a suffix accordingly.



SEM image: ThermaFill⁺

| ThermaFill ⁺ 80 | | |
|--|---------------------|------------|
| Chemical Analysis | Unit | Typical |
| Al ₂ O ₃ Content | [%] | 99.7 |
| Na ₂ O | [%] | 0.1 |
| Particle Size Distribution | | |
| Grain Size Distribution | | Mono-modal |
| D50 | [μm] | 75 |
| > 200 μm / 74 mesh | [%] | 0.1 |
| < 45 μm / 325 mesh | [%] | 10 |
| Physical Properties | | |
| Specific Surface Area Typ. | [m ² /g] | 0.25 |

All data are based upon Almatix standard test methods.

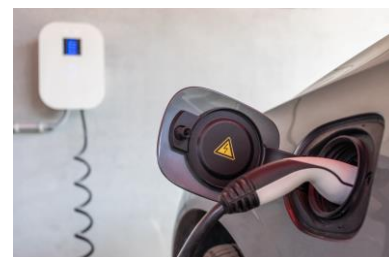
The typical properties are based upon the actual averages from production data.



APPLICATION: Electronics



APPLICATION: Telecommunication



APPLICATION: EV Mobility



Aluminas for Thermal Interface Materials

ThermaFill-Series

Standard Packaging

- 25 kg paper bags
- 1000 kg big bags



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**SDS 387**