

PRODUCT CATALOGUE / / / CAT-002

Alpha Alumina Powder

AAP-99

Full density, *fewer* degrees.

POSITION / / / CAT-002

Density is a **temperature** problem.

SINGLE-PHASE α - Al_2O_3 / / / SUBMICRON / / / SINTER-ACTIVE / / / ITAR-FREE

Reaching full density in an alumina usually costs peak temperature, and peak temperature costs furnace time, grain growth and tooling life. Alpha Alumina Powder is a high-purity, single-phase, submicron α - Al_2O_3 produced by calcination and controlled comminution. Under the reference schedule, pressureless sintering in air at 1550 °C, it reaches 98.05% of theoretical density without sintering additives or pressure assistance.

The powder is fully converted to the α phase, with no transition aluminas detectable by X-ray diffraction, and is supplied with a narrow, sub-micron particle size distribution optimised for pressureless sintering. It contains no sintering aid: where controlled grain growth or transparency is required, dopants are added by the user.

01 / / / PHASE

Phase

Single-phase α - Al_2O_3 (corundum). XRD shows the full corundum reflection set with no transition alumina, boehmite or amorphous halo.

02 / / / SINTERED BODY

Sintered body

98.05% of theoretical density at 1550 °C, pressureless, in air. Vickers hardness 14.20 GPa, fracture toughness 3.89 $\text{MPa}\cdot\text{m}^{1/2}$, dynamic elastic modulus 361.76 GPa on the sintered reference body.

03 / / / EXPORT

Export

ITAR-free across the supply chain. No United States export licence sits between a purchase order and a delivered lot.

SPECIFIED PER CUSTOMER PROCESS

/ Median particle size and distribution width

/ Specific surface area, reported on the batch Certificate of Analysis

/ Agglomerate state and flow behaviour



STR-TDS-AAP-99 / / / AAP-99

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SPECIFICATION / / / STR-TDS-AAP-99

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STATUS

Data obtained on development batches. Sintered properties are measured on specimens pressureless-sintered at 1550 °C in air and characterise the sintered ceramic, not the as-supplied powder. A batch-specific impurity analysis, including loss on ignition, is reported on the Certificate of Analysis.

ASTM C20 / / / ASTM C1327 / / / ASTM C1322

DELIVERY AND HANDLING

- / Dry, white, free-flowing submicron powder. Bulk density as packed approx. 0.80 g/cm³ loose, approx. 1.30 g/cm³ tapped.
- / Sealed container with PE liner; batch and revision identified on the label.
- / Store sealed and dry, 5 to 35 °C, away from direct sunlight; reseal after use. Shelf life indefinite when stored sealed and dry.
- / Sinter-ready as supplied. Certificate of Analysis and Safety Data Sheet ship with every delivery. Sample and production quantities on request.

KEY DATA

PURITY	99.5% Al_2O_3 min.
PHASE	α - Al_2O_3 , single phase
D10 / D50 / D90	0.49 / 1.34 / 3.20 μm
SPAN (D90 - D10) / D50	2.02
SINTERED DENSITY	98.05% theoretical
BULK DENSITY, SINTERED	approx. 3.91 g/cm ³
VICKERS HARDNESS	14.20 GPa
FRACTURE TOUGHNESS	3.89 $\text{MPa} \cdot \text{m}^{1/2}$
ELASTIC MODULUS	361.76 GPa

SINTERED PROPERTIES AT 1550 °C, PRESSURELESS, AIR / / / FULL SPECIFICATION STR-TDS-AAP-99

NOTES

- / The powder contains no sintering aid (e.g. MgO). Where controlled grain growth or transparency is required, dopants must be added by the user.
- / Submicron alumina is abrasive. Ball milling, mixing and pumping equipment should be lined or made of a compatible material to avoid contamination and wear.
- / Flexural strength has not yet been determined; a value will be added once measured to ASTM C1161. The dynamic elastic modulus is an independent stiffness measurement, not a strength value.
- / Indentation toughness values are method-sensitive and should not be compared directly with values obtained by SEPB, SEVNB or chevron-notch techniques (ASTM C1421).

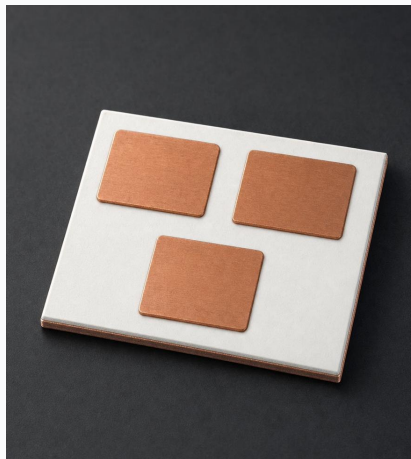
APPLICATIONS / / / CAT-002

In service

AAP-99



MODULAR BALLISTIC ARMOUR
DEFENCE



DIRECT BONDED COPPER SUBSTRATE
AI INFRASTRUCTURE



DENTAL CERAMIC COMPONENTS
INDUSTRY

USE CASES

- / Modular ballistic armour
- / Direct bonded copper substrate feedstock
- / Cutting tool inserts
- / Wear-resistant components
- / Refractory crucibles
- / Dental ceramic components

REQUIREMENT AND RESPONSE / / / CAT-002

What it **answers**

AAP-99

The left column is the problem on your side. The right column names the sector flyer that carries the full mapping.

REQUIREMENT	MATERIAL RESPONSE	SECTOR / / / FLYER
Ballistic protection at a controlled areal density	Single-phase 99.5% alumina. 98.05% of theoretical density at 1550 °C, pressureless, to ASTM C20.	DEFENCE / / / AN-001
Wear life in abrasive service	Vickers hardness 14.20 GPa to ASTM C1327. Fracture toughness 3.89 MPa·m ^{1/2} by Vickers indentation.	DEFENCE / / / AN-001
Direct bonded copper feedstock at a specified distribution	D10 / D50 / D90 of 0.49 / 1.34 / 3.20 µm by laser diffraction, span 2.02. Specific surface area reported on the Certificate of Analysis.	AI INFRASTRUCTURE / / / AN-003
Sintering within an existing furnace envelope	98.05% of theoretical density reached at 1550 °C without sintering additives or pressure assistance. Dynamic elastic modulus 361.76 GPa.	INDUSTRY

PROCESS / / / CAT-002

Specification first

AAP-99

FORMULATION / / / CHARACTERIZATION / / / VALIDATION / / / DELIVERY

01 / / / FORMULATION

Formulation

Your specification is the starting point. Composition, particle distribution and thermal behaviour are set against your process, not selected from a grade list.

02 / / / CHARACTERIZATION

Characterization

Every formulation is measured before it ships: phase by X-ray diffraction, particle size by laser diffraction, morphology by SEM, to the methods named on the datasheet.

03 / / / VALIDATION

Validation

Sintered and thermal properties are tested to the ASTM method where one applies. Where a test is documented on video, the record travels with the material.

04 / / / DELIVERY

Delivery

Powder blend or simulant in a sealed, lined container, batch and revision on the label. A Certificate of Analysis and a Safety Data Sheet ship with every delivery. ITAR-free across the supply chain.



Bring your *specification*.

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FULL SPECIFICATION / / / STR-TDS-AAP-99