AF-R SERIES

Reactive Alumina — Technical Data Sheet

Revision: 2025-01 ISO 9001 Certified viseray.com

1. PRODUCT DESCRIPTION

AF-R reactive aluminas are engineered ultra-fine powders with high specific surface area (BET) and controlled primary crystallite size. Monomodal and bimodal grade options provide optimal particle packing for high green density and low sintering temperature. MgO-doped variants available for spinel-forming ceramic systems.

2. CHEMICAL COMPOSITION

PARAMETER	AF-R-1	AF-R-2	AF-R-3
Al_2O_3	≥ 99.6%	≥ 99.7%	≥ 99.7%
Na_2O (total)	≤ 0.20%	≤ 0.10%	≤ 0.10%
Fe_2O_3	≤ 0.03%	≤ 0.03%	≤ 0.03%
SiO_2	≤ 0.05%	≤ 0.05%	≤ 0.05%
CaO	≤ 0.04%	≤ 0.04%	≤ 0.03%
MgO (optional)	≤ 0.08%	≤ 0.08%	≤ 0.07%
LOI (300–1100°C)	≤ 0.50%	≤ 0.50%	≤ 0.60%

3. PHYSICAL PROPERTIES

PARAMETER	AF-R-1	AF-R-2	AF-R-3
Alpha-Al_2O_3	≥ 96%	≥ 96%	≥ 95%
D50 (median particle size)	1.5–2.5 µm	1.5–2.0 µm	0.8–1.0 µm
BET (specific surface area)	1.5–3.0 m²/g	3.0–5.0 m²/g	5.0–8.0 m²/g
Sintered density*	≥ 3.86 g/cm³	≥ 3.87 g/cm³	≥ 3.88 g/cm³
Green density (100 MPa)	≥ 2.55 g/cm³	≥ 2.60 g/cm³	≥ 2.65 g/cm³
Primary crystal size	0.3–0.8 µm	0.2–0.5 µm	0.1–0.3 µm
Distribution type	Monomodal	Bimodal	Monomodal

* Sintered density measured after 2 h at 1600°C, uniaxial pressing at 100 MPa, without sintering aids.

4. SINTERING BEHAVIOR (TYPICAL)

TEMPERATURE	AF-R-1	AF-R-2	AF-R-3
1400°C / 2 h	≥ 3.60 g/cm³	≥ 3.65 g/cm³	≥ 3.70 g/cm³
1500°C / 2 h	≥ 3.75 g/cm³	≥ 3.80 g/cm³	≥ 3.82 g/cm³
1550°C / 2 h (MgO-doped)	≥ 3.86 g/cm³	≥ 3.87 g/cm³	≥ 3.88 g/cm³
1600°C / 2 h	≥ 3.86 g/cm³	≥ 3.87 g/cm³	≥ 3.88 g/cm³

5. APPLICATIONS

- High-performance technical ceramics
- Electronic substrates and electro-ceramics
- Ballistic armor ceramics (Al_2O_3, Al_2O_3-SiC)
- Refractory castables with low cement content
- Dental ceramics and bio-ceramics

6. PROCESSING RECOMMENDATIONS

- Dispersion: use polyacrylate-based dispersants (0.2–0.5 wt%)
- Milling: attritor or ball mill with alumina media to prevent contamination
- Binder: PVA or PEG at 1–3 wt% for pressing grades
- Debinding: ramp at 0.5–1°C/min to 600°C, hold 2 h
- Sintering: 1550–1650°C, hold 1–2 h, ramp 5°C/min

7. PACKAGING & STORAGE

- 25 kg paper sacks with moisture barrier liner (standard)
- 500 kg or 1000 kg big bags
- Custom packaging available for high-humidity shipping routes
- Store in dry conditions; re-seal opened packaging immediately
- Shelf life 18 months in unopened original packaging

8. SAFETY

Non-hazardous under REACH and OSHA HCS. Avoid dust inhalation — use local exhaust ventilation. Full SDS available on request.

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