# 2. Aluminium Oxide (Alumina)

Sumitomo Calcined Aluminas are produced in various levels of calcination/soda content and supplied in both unground and ground shapes to satisfy diverse customer requirements.

## Normal Soda / Unground

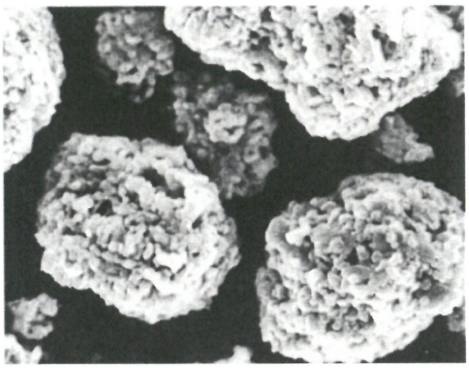
| Typical Properties | | Product | A-21 | A-26 | A-210 | A-260N | A-260L |
|---|---|---|---|---|---|---|---|
| Chemical Composition | H2O | [%] | 0.04 | 0.1 | 0.04 | 0.1 | 0.2 |
| | L.O.I | [%] | 0.05 | 0.1 | 0.05 | 0.1 | 0.1 |
| | Fe2O3 | [%] | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| | SiO2 | [%] | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 |
| | Na2O | [%] | 0.26 | 0.26 | 0.30 | 0.30 | 0.30 |
| | Al2O3 | [%] | 99.7 | 99.7 | 99.6 | 99.6 | 99.6 |
| Specific Gravity | | [g/cm3] | 3.95 | 3.90 | 3.95 | 3.90 | 3.90 |
| D50 (MT-3300, Laser Diffraction) | | [μm] | 50 | 50 | 90 | 100 | 90 |
| α Crystal Size | | [μm] | 2~4 | <1 | 2~4 | <1 | <1 |
| Bulk Density | Green | [g/cm3] | 0.7 | 0.9 | 1.0 | 1.0 | 1.0 |
| | Packed | [g/cm3] | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |

| Packing | | |
|---|---|---|
| | Big Bag | 1,000kg |
| | Paper Bag | 25kg |

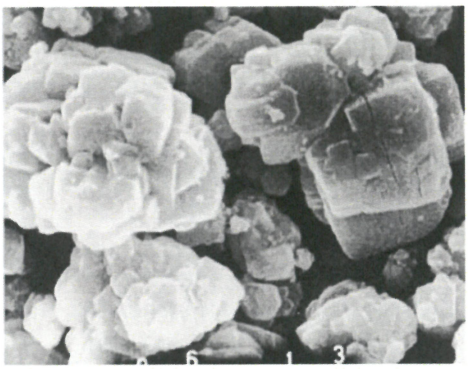
A-210 : Generic grade, could be used for various applications. Low dust and good flowability.

A-260N : Generic grade of smaller α crystal size. Could be used as an easy-sintering alumina when ground.

A-260L : A variation of A-260N with wider surface area and higher reactivity.



A-21 20μm



A-26 20μm

A-210 20μm

## Intermediate Soda / Unground

| Typical Properties | | Product | AN-210 |
|---|---|---|---|
| Chemical Composition | H2O | [%] | 0.04 |
| | L.O.I | [%] | 0.03 |
| | Fe2O3 | [%] | 0.01 |
| | SiO2 | [%] | 0.05 |
| | Na2O | [%] | 0.09 |
| | Al2O3 | [%] | 99.8 |
| D50 [MT-3300, Laser Diffraction] | | [μm] | 90 |
| α Crystal Size | | [μm] | 2~4 |

| Packing | | |
|---|---|---|
| | Big Bag | 1,000kg |

AN-210 : Easier milling than normal soda products thanks for lower soda content. In addition, sinterability is stable

## Normal Soda / Ground

| Typical Properties | | | Product | AM-21 | AM-210 | AM-210-02 | AM-27 | AM-28B |
|---|---|---|---|---|---|---|---|---|
| Chemical Composition | H2O | | [%] | 0.06 | 0.06 | 0.05 | 0.1 | 0.05 |
| | L.O.I | | [%] | 0.05 | 0.05 | 0.05 | 0.1 | 0.05 |
| | Fe2O3 | | [%] | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| | SiO2 | | [%] | 0.02 | 0.02 | 0.02 | 0.01 | 0.02 |
| | Na2O | | [%] | 0.26 | 0.30 | 0.30 | 0.26 | 0.25 |
| | Al2O3 | | [%] | 99.7 | 99.6 | 99.6 | 99.7 | 99.7 |
| Specific Gravity | | | [g/cm3] | 3.95 | 3.95 | 3.95 | 3.90 | 3.95 |
| D50 (MT-3300, Laser Diffraction) | | | [μm] | 4.8 | 4.8 | 7.9 | 2.8 | 19 |
| α Crystal Size | | | [μm] | 2~4 | 2~4 | 2~4 | 0.3 | 3~5 |
| Bulk Density | Green | | [g/cm3] | 0.7 | 0.7 | - | 0.6 | 0.6 |
| | Packed | | [g/cm3] | 1.3 | 1.3 | - | 1.3 | 1.6 |
| Oil Absorption | | Boiled Linseed Oil | [ml/100g] | 16 | - | - | 27 | 24 |
| Green Density* | | | [g/cm3] | 2.26 | 2.26 | - | - | - |
| Fire Density* | | | [g/cm3] | 3.72 | 3.72 | - | - | - |

| Packing | | |
|---|---|---|
| | Big Bag | 1,000kg |
| | Paper Bag | 25kg |

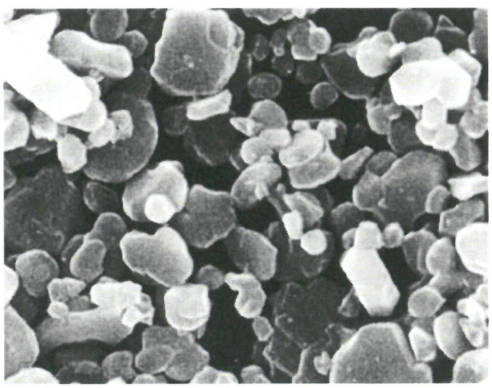
* Flux 4%, 49MPa(500kg/cm2), sample sintered at 1600 degC.

AM-210 / AM-21 : Generic grade, could be used for various applications.

AM-210-02 : A variation of AM-210 with shorter milling time. By-modal particle size distribution.

AM-27 : Finely ground, mainly for buff polish of mirror polishing grade.

AM-28B : Specially developed for buff polish, retaining coarse particles to a certain extent to be crumbled to fine particles.



AM-21 5μm

## Low Soda / Unground

| Typical Properties | | Product | AL-41-01 | AL-43-01 | AL-420A |
|---|---|---|---|---|---|
| Chemical Composition | H2O | [%] | 0.05 | 0.05 | 0.05 |
| | L.O.I | [%] | 0.05 | 0.05 | 0.05 |
| | Fe2O3 | [%] | 0.01 | 0.01 | 0.01 |
| | SiO2 | [%] | 0.04 | 0.05 | 0.08 |
| | Na2O | [%] | 0.04 | 0.03 | 0.03 |
| | Al2O3 | [%] | 99.9 | 99.9 | 99.9 |
| D50 (MT-3300, Laser Diffraction) | | [μm] | 50 | 50 | 90 |
| α Crystal Size | | [μm] | 1~2 | 2~3 | 2~3 |

| Packing | | |
|---|---|---|
| | Big Bag | 1,000kg |
| | Paper Bag | 25kg |

AL-41-01 / AL-43-01 : α crystal sizes are different, and consequently molding density and firing shrinkage vary. Customers could choose either one of them depending on application requirements.

AL-420A : Originally developed for LCD glass applications. Easy handling due to good flowability.

## Low Soda / Ground

| Typical Properties | | Product | ALM-41-01 | ALM-43 | AL-M73A | AL-S43B | AL-S43A |
|---|---|---|---|---|---|---|---|
| Chemical Composition | H2O | [%] | 0.08 | 0.07 | 0.07 | 0.07 | 0.07 |
| | L.O.I | [%] | 0.07 | 0.05 | 0.05 | 0.05 | 0.05 |
| | Fe2O3 | [%] | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| | SiO2 | [%] | 0.04 | 0.05 | 0.05 | 0.05 | 0.05 |
| | Na2O | [%] | 0.04 | 0.03 | 0.03 | 0.04 | 0.04 |
| | Al2O3 | [%] | 99.9 | 99.9 | 99.9 | 99.9 | 99.9 |
| D50 (MT-3300, Laser Diffraction) | | [μm] | 2.2 | 3.7 | 3.0 | 3.1 | 3.8 |
| α Crystal Size | | [μm] | 1~2 | 2~3 | 2~3 | 1.5~2.5 | 1.5~2.5 |
| Green Density* | | [g/cm3] | 2.23 | 2.27 | 2.28 | 2.10 | 2.10 |
| Fire Density* | | [g/cm3] | 3.71 | 3.67 | 3.67 | 3.67 | 3.67 |
| Linear Shrinkage* | | [%] | 16 | 15 | 15 | 17 | 17 |

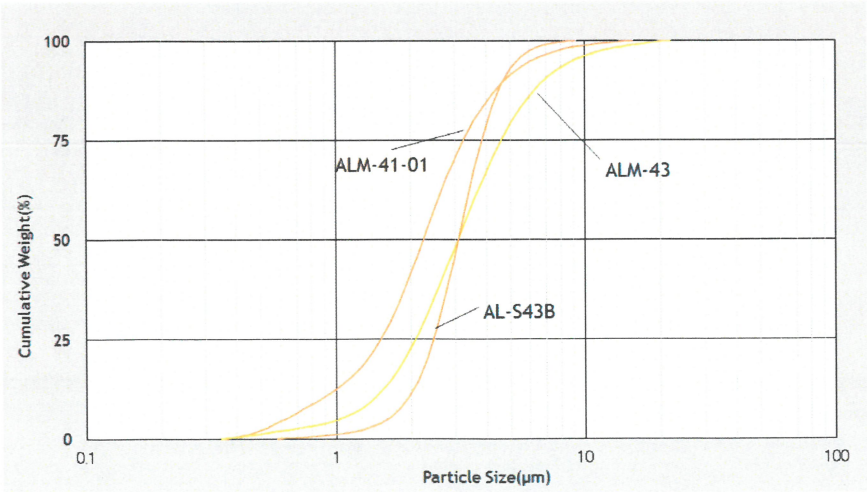
| Packing | | |
|---|---|---|
| | Big Bag | 1,000kg |
| | Paper Bag | 25kg |

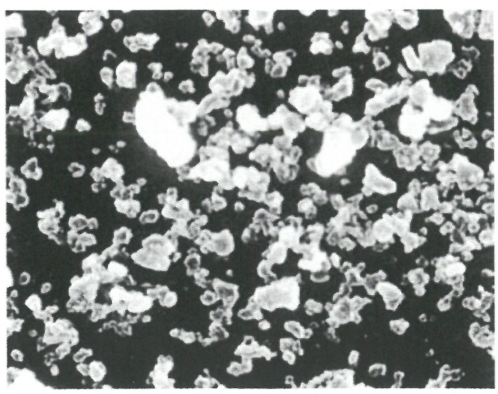
*Flux 4%, 49MPa (500kg/cm2), sample sintered at 1600 deg C.

ALM-41-01 / ALM-43 : Milling unground grades down to α crystal sizes.

AL-M73A : Narrower particle distribution than ALM-43

AL-S43B : Narrower particle distribution than AL-M73A. Suitable for ceramic package; narrow particle distribution enables debinding without lots of difficulty.



ALM-41-01

10μm

## Normal Soda / Easy Sintering

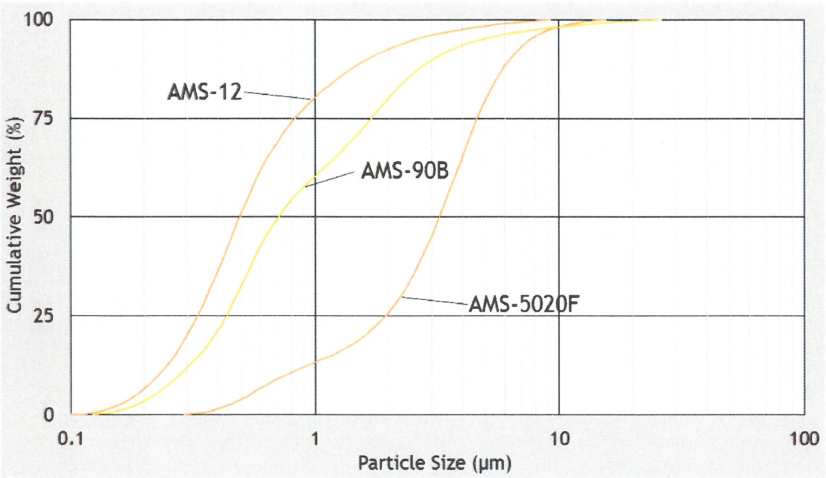
| Typical Properties | | Product | AMS-5020F | AMS-90B | AMS-12 |
|---|---|---|---|---|---|
| Chemical Composition | H2O | [%] | 0.1 | 0.1 | 0.1 |
| | L.O.I | [%] | 0.1 | 0.3 | 0.2 |
| | Fe2O3 | [%] | 0.01 | 0.01 | 0.01 |
| | SiO2 | [%] | 0.02 | 0.01 | 0.01 |
| | Na2O | [%] | 0.30 | 0.30 | 0.26 |
| | Al2O3 | [%] | 99.6 | 99.6 | 99.7 |
| Specific Gravity | | [g/cm3] | 3.95 | 3.90 | 3.90 |
| D50 (MT-3300, Laser Diffraction) | | [μm] | 3.2 | 0.7 | 0.49 |
| α Crystal Size | | [μm] | 0.3~4 | 0.3 | 0.3 |
| Green Density* | | [g/cm3] | 2.44 | 2.07 | 2.18 |
| Fire Density* | | [g/cm3] | 3.40 | 3.82 | 3.87 |

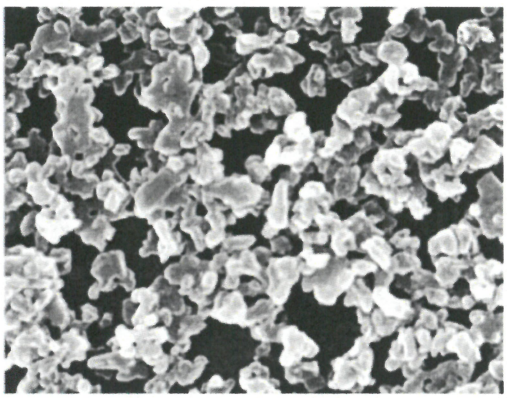
| Packing | | |
|---|---|---|
| | Big Bag | 1,000kg |
| | Paper Bag | 25kg |

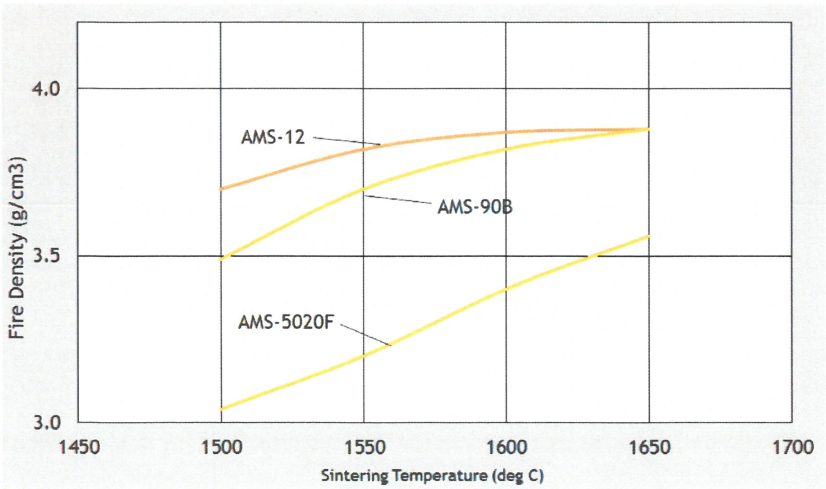
*No flux added, 29.4MPa (300kg/cm2), sample sintered at 1600 deg C.

AMS-5020F : Enables high filling ratio thanks for bi-modal and broad particle distribution. Refractory plasticizer and low shrinkage ceramics are typical applications for this product.

AMS-90B : Mono-modal particle distribution. Developed mainly for refractory applications.



## Low Soda / Easy Sintering

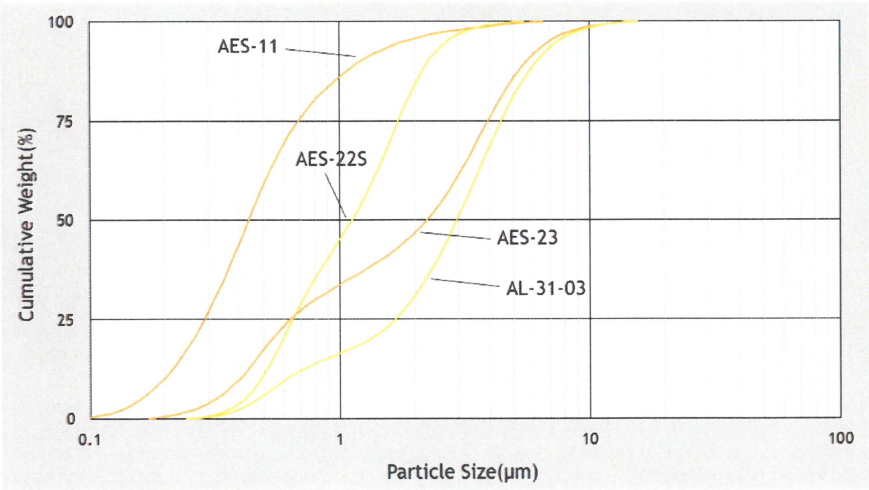
| Typical Properties | | Product | AES-12 | AES-11 | AES-11C | AES-11F | AES-22S | AES-23 | AL-31-03 |
|---|---|---|---|---|---|---|---|---|---|
| Chemical Composition | H2O | [%] | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| | L.O.I | [%] | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| | Fe2O3 | [%] | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| | SiO2 | [%] | 0.03 | 0.03 | 0.03 | 0.03 | 0.02 | 0.04 | 0.04 |
| | Na2O | [%] | 0.04 | 0.04 | 0.04 | 0.04 | 0.02 | 0.04 | 0.03 |
| | MgO* | [%] | - | 0.11 | 0.05 | 0.05 | - | - | - |
| | Al2O3 | [%] | 99.9 | 99.9 | 99.9 | 99.9 | 99.9 | 99.9 | 99.9 |
| D50 (MT-3300, Laser Diffraction) | | [μm] | 0.44 | 0.43 | 0.39 | 0.47 | 1.1 | 2.2 | 3.0 |
| α Crystal Size | | [μm] | 0.3 | 0.3 | 0.3 | 0.3 | 0.3~1.0 | 0.3~4 | 0.3~4 |
| Green Density** | | [g/cm3] | 2.22 | 2.22 | 2.20 | 2.17 | 2.35 | 2.57 | 2.56 |
| Fire Density** | | [g/cm3] | 3.88 | 3.93 | 3.94 | 3.93 | 3.88 | 3.77 | 3.22 |
| Linear Shrinkage** | | [%] | 17 | 17 | 18 | 18 | 15 | 12 | 7 |

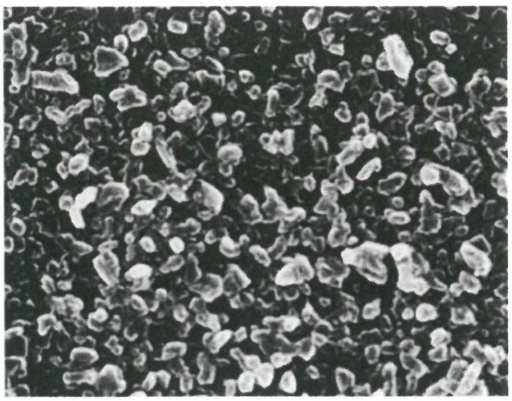
| Packing | Paper Bag | 25kg |
|---|---|---|

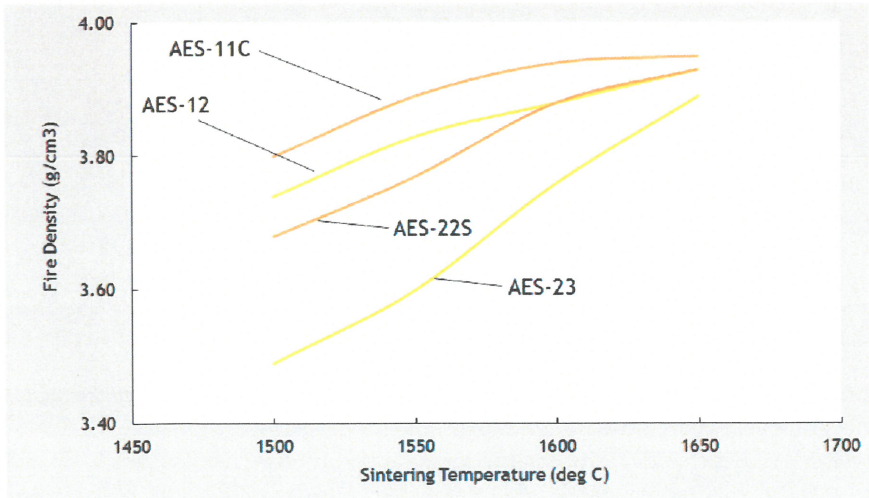
*MgO is an additive and not considered as an impurity in Al2O3.
**No flux added, 29.4MPa (300kg/cm2), sample sintered at 1600 deg C.

AES Series : Sub-micron size particles, used for fine ceramic applications requiring 99% purity or more.

AL-31-03 : Bi-modal particle distribution, which enables high filling ratio. Refractory plasticizer is one of typical applications for this product.



AES-12

2μm