



## Global Product Data

# Global Aggregate Test Methods

### Chemical Analyses

Impurities such as  $\text{Na}_2\text{O}$  and  $\text{SiO}_2$  are determined on the feedstock for Tabular Alumina and Spinel with an ICP-AES or an ARL 29000 series Quantometer. Samples are prepared for the ICP by dissolving the alumina in a heated mixture of sulfuric and phosphoric acids. Samples are prepared for the Quantometer by co-grinding the alumina with graphite and pressing the resultant powder into an electrode for electric spark emission testing.

The metallic iron content of all Tabular Alumina finished products is determined by means of a magnetic analyzer or a Soluble  $\text{Fe}_2\text{O}_3$  test. The magnetic analyzer is manufactured by Buck & Co. INC, 186 Grove Street, PO Box 468, Franklin, MA 02038, USA. The Soluble  $\text{Fe}_2\text{O}_3$  method determines the amount of soluble iron in crushed Tabular Alumina by digesting a sample in hot, diluted 1:1 hydrochloric acid to effect dissolution of the iron. The digested sample is then filtered and an aliquot analyzed by development of the 1-10 phenanthroline color. The absorbance of the color, which is directly proportional to the iron content, is determined at 510 nm using a colorimeter.

The wt-% of  $\text{Al}_2\text{O}_3$  is calculated from the difference between 100 wt-% and the sum of all impurities.

### Analyses of Physical Properties

These include Water Absorption [WA], Apparent Porosity [AP] and Bulk Specific Gravity [BSG]. These parameters are calculated from the dry weight [ $w_t$ ] and wet weight after boiling in water [ $w_w$ ] of crushed Converter Discharge balls (particle size about 6-12 mm) and from the volume of displaced water [ $V_{di}$ ], measured by means of a hydrostatic scale, according to following formulas:

$$\text{Water Absorption [wt-\%]} = [w_w - w_t / w_t] \times 100$$

$$\text{Apparent Porosity [vol-\%]} = [w_w - w_t / V_{di} \times \rho_{\text{H}_2\text{O}}] \times 100$$

$$\text{BSG [g/cm}^3] = w_t / V_{di}$$

In all calculations it is assumed that the density  $\rho_{\text{H}_2\text{O}}$  of water is exactly 1 g/cm<sup>3</sup>.

### Sieve Analysis

For all closed size and open size Tabular Alumina and Spinel products a sieve analysis is performed on an assembly of sieves according DIN/ISO 3310/1 and Tyler Screen Scale respectively. The assembly of required sieves is arranged in order of increasing mesh size with the coarsest sieve in the top position and a receiving pan in the bottom position. A weighed sample is placed on the top sieve and the assembly is placed in a sieve shaker. The sample is shaken for 10 minutes and the amount of material on each sieve is weighed. The percentage of material on each sieve is calculated and expressed as wt-% of the original sample weight. The coarse products are dry sieved whereas the -45 micron products are dry or wetsieved and the -20 micron products are wet sieved.



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### CILAS Granulometer / Sedigraph

The PSD of Tabular Alumina -20 micron and of all Spinel sizes with upper limits < 90 micron (MR 66 -90 micron; AR 78 -90 micron, -45 micron, -20 micron) is measured in a Cilas Granulometer or a Sedigraph 5100. In both methods a powder sample is ultrasonically dispersed in an aqueous solution with sodium metaphosphate. The first method allows the determination of the PSD from the diffraction behavior of a laser beam. In the second method the PSD is determined by measuring the settling rate of the particles in a x-ray beam according to Stoke's Law.



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