IS 17441 (Part 1) : 2021 Calcined Alumina – Specification Part 1 Non-Metallurgical Grade (first revision)

Calcined alumina is aluminium oxide that has been heated at temperature in excess of 1050° C to drive off nearly all chemically combined water. In this form, alumina has higher chemical purity, extreme hardness (9 on the Mohs hardness scale, on which diamond is 10), high density and a high melting point (slightly above 2050° C). However, by controlling the calcinations temperature and time, properties of alumina can be controlled. With increasing the temperature during calcinations, alumina transforms to α-alumina which is chemically stable with high melting temperature.

After calcinations, alumina possesses good thermal conductivity, heat and shock resistance and high electrical resistivity at elevated temperatures. This combination of properties makes calcined alumina useful in abrasives, glass, porcelains, spark plugs, electrical insulators and other ceramic products. Calcined alumina is obtained by calcining aluminium hydroxide powder at 1200-1300° C in order to get pure Al_2O_3. As the temperature is increased, alumina transforms into α-alumina which is chemically stable with high melting temperature

Commercially available alumina or aluminium oxide is generally known as calcined alumina. On the basis of heat treatment, crystal size, soda content and degree of thermal conversion to alpha phase, calcined alumina is available in number of grades. One of the major factors that decides the final use of alumina is its soda content. Materials having low soda content are used for electronic applications and high-end refractories and the one having medium level of soda content is used for electrical insulation and porcelains. Further, material with normal level of soda content is used for glass, glaze, fibre glass and electrical porcelain.

Calcined alumina is primarily used in various industrial applications due to its unique properties such as aluminium production, refractories, ceramics, abrasives, electronics. These diverse applications highlight the importance calcined alumina in various sectors.

BIS first published IS 17441 for calcined alumina in the year 2020. This standard has been revised in 2021 keeping in view the requirements of the Industry and based on the inputs received from Aluminium Industry. It was also decided to segregate the Standard into 2 parts:

Part 1 Non-metallurgical grade calcined alumina

Part 2 Metallurgical grade calcined alumina

This standard prescribes the requirements and methods of test for non-metallurgical grade (chemical grade) calcined alumina. Various physico-chemical properties including aluminium oxide content and various impurities and their test methods have been stipulated. A new grade, ultra-low soda (high purity) alumina (grade-4) has been incorporated which is mainly used in Li-ion battery separator, hybrid cars, sodium lamps, display glasses/screens, semiconductors, headlights of vehicles, optical lenses, aerospace, LED lighting, electronic substrates, etc. The alternate test methods for the determination of chemical composition of calcined alumina through X-Ray fluorescence and alpha phase analysis through x-ray diffraction have also been added in this revision.