

Development of a New Type of Cathode for Aluminium Electrolysis

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Abstract

Over the past decades, aluminium smelting industry has been increasing significantly its productivity, producing more aluminium per day with lower energy consumption. In this race toward higher the productivity, cathode producers have played a major role with the development of highly conductive cathodes. Indeed, from the older anthracitic cathodes to the newest graphitized cathodes, the electrical resistivity has been divided by 5, leading to lower electrical losses. In recent years, the use of copper in the collector bars has changed the game. With this technology, the heat loss from the cell can be excessive. Consequently, there is a renewed interest for cathodes with intermediate properties, from the older smelters for increasing their productivity and from newer smelters for optimizing their thermal balance. In 2012, it became evident that a new way to produce intermediate properties cathode blocks was needed in order to supply the market. Carbone Savoie has launched an R&D project to adapt to this demand. After a few industrial trials, the targeted electrical resistivity was reached. A complete characterization of the product, including tests at high temperatures, made us confident that a new way was found to produce intermediate properties cathodes. And the cathodes were tested in electrolysis cells.

Keywords: Aluminium electrolysis cells; Cathode; electrical resistivity of cathode blocks; graphitized cathode blocks; high temperature properties of cathode blocks.