

# Optimum Baking Level of Carbon Anodes for Aluminum Production

**Khalil Khaji<sup>1</sup> and Najeeba Al Jabri<sup>2</sup>**

1. Manager, Process Control and Improvements, Carbon and Port  
Emirates Global Aluminium (EGA), Al Taweelah Operations, Abu Dhabi, UAE

2. Director, Reduction  
Emirates Global Aluminium (EGA), UAE  
Corresponding author: kkhaji@ega.ae

## Abstract

Carbon anodes are consumed in electrolysis cells during primary aluminum production. Carbon consumption in pre-bake anode cells is 400 to 450 kg C/t Al and is affected by the CO<sub>2</sub> reactivity and air reactivity of anodes. The anode reactivities are affected by the properties of raw materials and by the parameters of the manufacturing processes. Carbon anode reactivities data over the last three years at Emirates Aluminum were analyzed, with a particular focus on anode baking levels. This study indicates relationships between anode reactivities and the levels of anode baking, measured through the anode real density values. Low and high levels of baking result in higher anode reactivities, while optimum baking level gives the lowest anode reactivities. A real density value of 2.08 g/cm<sup>3</sup> is found to be optimum, as at this baking level both the CO<sub>2</sub> reactivity and air reactivity are at the lowest value. Low chemical reactivities give low net carbon consumption during aluminum production. The understanding gained through this study helps to reduce anode reactivities by adjusting the anode baking level, thereby achieving low net carbon consumption.

**Keywords:** Carbon anode; CO<sub>2</sub> reactivity; air reactivity; anode baking; real density; net carbon consumption.