

# Evolution of Mechanical Properties of Carbon Anodes During Baking

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## Abstract

To be considered as a good quality product, carbon anodes must not only have a low electrical resistivity, but also a high mechanical resistance to crack generation and propagation. To obtain such anodes, a good understanding of the evolution of their mechanical properties during baking is crucial. Traditional mechanical characterization approaches consist of baking anode samples at specific temperatures and performing the tests at either room temperature or slightly lower than that of the baking level. In the latter case, it is well-known that numerous chemical reactions take place during the tests which affect the results. In this paper, an innovative approach is proposed to ensure the reliability of mechanical properties measurements. The anode cores were taken from industrial green anodes removed directly from the production line of Aluminerie Alouette Inc. (AAI) and then baked to different temperatures in a laboratory furnace of the UQAC/AAI Chair. Compression tests initially performed using the Gleeble system showed that this system was not suitable for low temperature testing, at which the anode samples were in a semi-solid state. To overcome this problem, a new setup was installed on a classical CRIMS press which accurately measures the Young's modulus, compressive strength, and particularly, Poisson's ratio.

**Keywords:** Carbon anodes; baking process; mechanical properties; high temperature mechanical property testing.